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What are the factors influencing Canadian-trained residents' choice of pursuing the subspecialty of Maternal-Fetal Medicine?

by

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Abstract

An increasing need for Maternal-Fetal Medicine (MFM) physicians in Canada has been reported, along with decreasing resident interest in the subspecialty. This study was designed to explore the factors influencing Canadian-trained residents' career choice of Maternal-Fetal Medicine (MFM), focusing on their perceptions of MFM residency and career, the positive and negative influencing factors, and how MFM could be perceived as a more attractive career choice by residents. Twenty-one residents from Canadian Obstetrics and Gynecology (O&G) and MFM residency programs participated in semi-structured telephone interviews. A qualitative approach was selected, and interview data were analyzed using a thematic analysis approach, drawing on constructivist grounded theory techniques.

Seven themes influencing resident perception of MFM were identified, including the field of MFM, O&G residency experiences, the MFM residency program, perceived variety of MFM practice, lifestyle of MFM, academic career, and finances. Current trainees identified the field itself, a dislike of gynecology, academic practice, and mentorship from MFM faculty as positive factors influencing their choice of MFM. Residents viewed the emotional toll of MFM practice, increasing demand and burnout, patient complexity, the exclusion of gynecology, and their O&G residency MFM experience as negative factors pushing them away from MFM. The resident perception of positive and negative influencing factors varied by their general favourability towards MFM. Factors intrinsic and extrinsic to MFM were identified, as well as potential

changes to attract residents to the subspecialty, including opportunities for change within O&G residency, MFM residency, and gynecology practice as part of a MFM career.

This study revealed several novel and contemporaneous factors influencing MFM subspecialisation decision-making, including the field of MFM itself, exposure to MFM residents and residency program requirements, and the impact of staff physician burnout on residency education and career choice. The results have implications for O&G and MFM postgraduate education, as well as for the subspecialty of MFM in Canada. Further research is needed to (1) define Canadian MFM practice, (2) determine accurate workforce needs, (3) assess the effect of physician burnout on trainees, and (4) resolve the question of gynecology practice in MFM.

Preface

This thesis is original, unpublished, and independent work by the author, A. Roggensack. The interviews and analysis reported in Chapters 3-5 were covered by Ethics Certificate number REB 16-0027, issued by the University of Calgary Conjoint Health Ethics board for the project “What are the factors influencing Canadian-trained residents’ choice of pursuing the subspecialty of Maternal-Fetal Medicine” on May 3, 2016.

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Dedication

To my very understanding and supportive husband Douglas,

and to my children Maren and Jana,

who grew up during this course of study.

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List of Symbols, Abbreviations and Nomenclature

Abbreviation	Definition
ABOG	American Board of Obstetrics and Gynecology
APOG	Association of Academic Professionals in Obstetrics and Gynecology
AR	Anne Roggensack
CAPER	Canadian Post-MD Education Registry
CSMFM	Canadian Society of Maternal-Fetal Medicine
EOP	Elizabeth Oddone Paolucci
FRCSC	Fellow of the Royal College of Surgeons of Canada
GO	Gynecologic Oncology
JL	Jocelyn Lockyer
MFM	Maternal-Fetal Medicine
O&G	Obstetrics and Gynecology
PGY	Postgraduate Year
PREM	Plans régionaux d'effectifs médicaux
PV	Pamela Veale
RCPSC	Royal College of Physicians and Surgeons of Canada
REI	Reproductive Endocrinology and Infertility
SAQ	Short-answer question
SEAP	Subspecialty Examination Affiliate Program
SOGC	Society of Obstetricians and Gynecologists of Canada
SC	Sujata “Sue” Chandra

CHAPTER ONE: INTRODUCTION

1.1 Overview

Maternal-fetal medicine (MFM) is described by the Royal College of Physicians and Surgeons of Canada (RCPSC) as: "a subspecialty of Obstetrics and Gynecology concerned with the prevention, diagnosis, management, and treatment of those conditions responsible for morbidity and mortality of the mother, fetus, and neonate."[1] At present, MFM is the only subspecialty of Obstetrics and Gynecology (O&G) focussed on obstetrical care, while there are numerous gynecologic subspecialties. Care of complex patients by MFM subspecialists has been found to be associated with improved clinical outcomes in high-risk pregnancies.[2,3] Thus, training enough MFM specialists to provide needed complex obstetrical care is of importance for optimal obstetric patient care.

This study was prompted by recent reviews suggesting a shortage of MFM physicians in Canada, as well as a perception of decreasing applicants to MFM residency nationally, culminating in only four residents applying and matching to MFM residencies in all of Canada in 2015.[4] A review of national data from the Canadian Post-MD Education Registry (CAPER)[5] indicated stability, suggesting instead that 2015 was an anomalous year. However, while limited, the Canadian literature describes MFM as one of the least-chosen subspecialties by O&G graduates.[6] While even more Canadian O&G residents are pursuing subspecialisation, there was stable[7] or decreasing commitment to MFM[8] among O&G residents over time. On review of the literature, there was a

paucity of information as to why residents chose to pursue MFM residency and career, and in particular there was no recent Canadian information.

A clear understanding of why residents are choosing MFM subspecialisation is of importance to the subspecialty, and this information may provide a path to improved recruitment of future MFM physicians. It is not presently known if enough residents are choosing MFM to provide adequate care to Canadian women with complicated pregnancies. The most recent Canadian data[9] suggest a serious shortage of MFM physicians in Canada. Such a shortage could lead to decreased access to MFM clinical services, such as delays in and limited access to high-risk consultation, complex obstetric ultrasound, and fetal diagnostic procedures, possibly compromising both women's health care and neonatal outcomes. Thus, understanding why residents are (and are not) choosing to pursue residency and career in MFM is of clinical significance.

1.2 Study Rationale and Purpose

The objective of this study was to explore the factors influencing Canadian-trained residents' career choice of MFM, including their perceptions of MFM, the positive and negative factors influencing their decision-making about MFM residency and career, and how MFM could be perceived as a more attractive career option by residents. These questions were investigated through a qualitative lens, using semi-structured telephone interviews with O&G and MFM residents, and a thematic analysis approach. With a better understanding of the perceptions of current resident

physicians, national strategies for both workforce planning and recruitment of residents to the field of MFM could be developed.

1.3 Thesis Structure

There are five separate chapters in this thesis. This chapter introduces the current need for MFM physicians in Canada, and the purpose of and rationale for this study. Chapter Two's literature review presents an overview of the MFM subspecialty, Canadian educational requirements, the need for MFM physicians in Canada, and a summary the current state of knowledge regarding factors influencing one's choice of MFM, as well as factors identified as influencing decision-making about specialization and subspecialisation in other fields. The research questions are then presented. Chapter Three details the methods used in this study, including the description of the qualitative study design, setting and participants, data collection, and data analysis. In Chapter Four, the study results are identified, including study participant characteristics, the identified factors influencing choice of MFM career, the positive and negative factors influencing choice of MFM, and how a career in MFM could be perceived by residents as a more attractive career choice. Lastly, in Chapter Five the study findings are discussed with respect to the research questions, implications for the both the field of MFM and residency programs, and future directions for research.

CHAPTER TWO: REVIEW OF THE LITERATURE

2.1 Overview

MFM physicians positively contribute to the clinical care of high-risk pregnancies in Canada. Given the recent national concern regarding falling applications to MFM residency, understanding the perceptions of Canadian residents about the subspecialty is crucial. The purpose of this chapter is to introduce the background and existing literature pertinent to this thesis. This literature review identifies what is known, and what remains unknown, about resident subspecialisation decision-making. First, the MFM subspecialty and residency training will be reviewed, as well as the current understanding of workforce planning and need for MFM physicians in Canada. Next, this chapter will review the existing literature about factors influencing resident decision-making regarding subspecialisation (including MFM, O&G, medical, and surgical residents), as well as factors influencing medical student decision-making about O&G specialization. With the gap in knowledge identified, the research questions are then presented.

2.2 The specialty of Maternal-Fetal Medicine

2.2.1 What is Maternal-Fetal Medicine?

To understand the present concerns and clinical needs, a clear understanding of the field of MFM is necessary. MFM physicians are high-risk pregnancy experts "specializing in the un-routine," treating two patients at the same time.[10] MFM is a

relatively new subspecialty, first emerging as a discipline in the 1960's, following advances in technology and procedures to diagnose and treat fetuses, such as amniocentesis, ultrasound, and fetal blood sampling. MFMs provide care for women who face unexpected problems that develop during pregnancy, including common and uncommon complications related to pregnancy, as well as maternal medical conditions in pregnancy. MFM physicians also diagnose and manage fetal complications such as birth defects, growth restriction, and genetic syndromes. MFM physicians are specialists in procedures for fetal genetic diagnosis, such as amniocentesis and chorionic villus sampling, as well as in the advancing field of fetal therapeutic procedures, such as intrauterine fetal transfusion, laser of placental anastomoses, and complex multidisciplinary procedures like open fetal surgery. MFM physicians partner with multiple healthcare providers to care for complex obstetric patients before, during, and after pregnancy, with an overarching goal of improving health outcomes for both mothers and babies.[11] Alternate names for MFM in common usage are "perinatology" and "high-risk obstetrics." MFM is a now a recognized subspecialty of O&G, requiring additional postgraduate medical education and certification.

In Canada, a typical course from high school graduation to MFM subspecialisation would include at minimum undergraduate studies (two to four years), an undergraduate medical degree (three or four years), and a postgraduate medical education program in O&G (five years). Following completion of residency and Royal College of Physicians and Surgeons of Canada (RCPSC) requirements, graduates may

practice independently as a specialist obstetrician-gynecologists, or may elect to pursue subspecialisation. O&G subspecialties most commonly recognized include MFM, Gynecologic Oncology (GO), Reproductive Endocrinology and Infertility (REI), Female Pelvic Medicine and Reconstructive Surgery, and Minimally Invasive Surgery, and programs range between one to three years in length. Presently, the RCPSC only offers certifications for graduates MFM, GO, and REI subspecialty training.

2.2.2 Canadian MFM residency education

Upon completion of a MFM residency program, a resident is expected to have become a competent subspecialist in MFM, capable of assuming a consultant's role. The MFM clinical practice is focussed on referred high-risk obstetrical patients, and MFMs function as regional consultants in matters of organization, standards, and education in the broad field of MFM.[1] Canadian RCPSC certification in MFM requires previous RCPSC certification in O&G, completion of two-year RCPSC-accredited MFM program, completion of a scholarly research, quality assurance, or educational project relevant to MFM, and successful completion of the certification examination in MFM.[12] Canadian MFM residency programs have long been two years in length, in contrast to the American three-year MFM fellowship, a program that was lengthened in direct response to feedback from trainees.[13]

Canadian MFM residency programs vary in execution across the country, but all must meet the minimum training requirements laid out by the RCPSC. These training requirements include: six months of fetal ultrasound, six months of clinical MFM, one

month of reproductive genetics, two months of selective in various associated fields, one to three months of elective, and six months of protected time for scholarly activity relevant to MFM. While sometimes still referred to colloquially as "fellows," MFM trainees in Canada are postgraduate year (PGY) six and seven residents. At the end of their program, residents must undertake a written examination on MFM and the related basic sciences consisting of two three-hour written papers. The requirement of a written examination in MFM was introduced in September 2008.[14] Prior to the introduction of the written examination, residents successful in their programs were granted "accreditation without certification" by the RCPSC. Subsequently, certifications (by examination) were granted to successful candidates by the RCPSC (Appendix A). Once all the requirements are met, graduates are admitted as Fellows of the Royal College of Surgeons of Canada (FRCSC) in MFM. Presently, all MFM programs offered in Canada are fully accredited.[15]

2.2.3 Need for MFM subspecialists in Canada

A need for MFM physicians in Canada has been identified. Farine and Gagnon[9] reported on an anticipated MFM physician shortage in Canada in 2008, compiling the findings of two similar and concurrent surveys conducted by the Society of Obstetricians and Gynecologists of Canada (SOGC) MFM committee and the Association of Academic Professionals in Obstetrics and Gynecology (APOG). University O&G department chairs were surveyed as to information about their training programs and resource needs, and all Canadian MFM subspecialists were surveyed as to their plans for MFM recruitment

and retirement in the next 5 years. The APOG survey found a need for an additional 38 MFM subspecialists by 2011 to fill currently vacant positions and to meet new needs. The SOGC survey demonstrated a need for 52 new MFMs (including eight for Level II units) by 2011, evenly distributed across the country. At the time of the survey, there were only 110 MFM subspecialists practicing in Canada; 100 in Level III centres and 10 in Level II centres. Graduates from Canadian MFM residencies were inadequate to meet this need, with only 24 MFM FRCSC graduates in total between 2001 and 2005. Of these graduates, approximately 15% were non-Canadians, who frequently would either not plan to or could not practice MFM in Canada. The authors noted that only two of the nine training programs in Canada had trainees every year over the preceding ten years, and suggested concern that the MFM physician shortage would likely worsen as a result.

The 2015 Canadian O&G Subspecialists Needs Survey conducted by APOG investigated the current MFM workforce needs of academic, tertiary, and level II centres to address both planned retirements and recruitments. Completed in 2015, this study found that about 25% of current MFM positions would become available over the next 3 years.[16] However, this study remains unpublished, and a more detailed summary of the findings is not available. While national workforce planning is limited, the available studies suggest a forthcoming shortage of MFM physicians in Canada, and that this clinical need would be difficult to meet with the current number of graduates from Canadian MFM residency programs.

There is a clear need for physicians skilled in the management of high-risk pregnancy. With increasing maternal age, obesity, multiple gestation, and medical disorders for Canadian mothers, pregnancy care is only becoming more complex.[17-23] There is increasing need for quality obstetric ultrasound and fetal assessment, and initiatives for fetal imaging are being primarily led by MFM subspecialists in Canada. Canadian literature suggests that while 25% of O&G residents consider a career in MFM, only 10% choose to pursue MFM, and that MFM is one of the least popular subspecialties for O&G residents.[6] As such, understanding resident perceptions of MFM and the factors influencing their decision-making process are critical to both maintaining resident consideration of MFM subspecialisation, and to then developing enough MFM physicians to meet the identified Canadian clinical need.

A shortage of MFM physicians could be expected to lead to a variety of significant issues in clinical care. For instance, there could be decreased access to fetal diagnostic procedures, delays in high-risk consultation, decreased accessibility to needed complex obstetric care, and with increased clinical demands on a small group of specialized physicians, less dedicated non-clinical time would available for research and medical education endeavors. Studies have found that both adverse pregnancy outcomes and maternal mortality rates are inversely related to the number of MFM specialists,[3] and that outcomes for patients with high-risk diagnoses improve if treatment is provided by MFM subspecialists.[2] Thus, adequate access to MFM clinical care is important to the health of the Canadian obstetric population.

While a clinical need for MFMs in Canada has been identified, a link has not yet been made with applicants for and matches to Canadian MFM residency programs. This research subject was originally prompted by a perception among the RCPSC MFM subspecialty committee members of decreasing Canadian citizen or permanent resident applicants to the annual MFM residency match over recent years, culminating in only four applicants nationally for MFM residency for training starting in 2015,[4] as shown in Table 1.

TABLE 1: Annual Maternal-Fetal Medicine Residency Match
(Canadian Citizen / Permanent Resident Trainees)

Year of Match	Program starting	Applicants to Residency	Positions available	Applicants matched	Applicants unmatched
2014	2015	4	unknown	4	0
2015	2016	14	14	10	4
2016	2017	9	12	7	2
2017	2018	14	10	7	7

Data from: RCPSC subspecialties unit,[14] and Dr. Alain Gagnon, current chair of the RCPSC MFM subspecialty committee.[4] Data from prior to 2014 could unfortunately not be located through either the RCPSC or the previous chairs of the RCPSC MFM subspecialty committee (who operated the annual resident match).

Review of the existing CAPER data demonstrated that while there are annual variations, in most years the quantity of Canadian MFM residents has remained relatively stable, with seven to ten residents starting MFM programs per year (Appendix B). However, it became evident that information about available residency positions, resident applications, and successful matching in Canada was not being tracked, and that there was no recent Canada-specific data as to resident perceptions of and

decision-making about MFM subspecialisation. Thus, an assessment was indicated as to why O&G residents are choosing, or alternatively are not choosing, to pursue MFM residencies and careers.

There has not been any detailed update to national workforce planning since the study conducted in 2006,[9] and there is no national body or initiative to monitor either the need for trainees or workforce requirements in O&G subspecialties. While the concern regarding decreasing trainees in MFM was, in light of the data, perhaps unfounded, there was no robust data available to determine if enough MFMs are being graduated to serve Canada's future healthcare needs, and the limited national workforce planning data would suggest that there is a looming shortage of MFM physicians. Thus, determining why residents are choosing to pursue additional training in the subspecialty of MFM is of utmost importance.

2.3 Trainee decision-making about specialization and subspecialisation

On review of the existing literature about trainee perceptions of MFM residency and career, as well as factors influencing resident career decision-making, little information was found specific to the field of MFM. Thus, the literature review was expanded to include similar trainee decision-making instances, as these other factors may relate to MFM, and could inform the development of this study's interview guide. As such, in addition to reviewing MFM and O&G resident perception of MFM subspecialisation, this chapter will also review factors identified as influencing O&G residents choosing other gynecologic subspecialties, other surgical and medical

residents choosing to subspecialize, and medical students choosing to specialize in O&G. These findings will be summarized in Table 2, as part of Section 2.3.6.

2.3.1 MFM resident perception of MFM subspecialty

The MFM trainee perception of MFM residency has been primarily assessed in the United States, and interestingly research on this subject resulted in substantial changes to their national MFM fellowship training program requirements. Between 1994 and 1999, a 46% decrease was seen in the numbers of fellows entering MFM subspecialty training, while there was an overall substantial increase in O&G residents undertaking subspecialisation.[24] Sciscione[13] sought to assess MFM fellowship satisfaction through a survey of US MFM fellows. This study found that a strong mentor or faculty advisor was associated with higher satisfaction with the fellowship program, thesis completion, and entrance into academic practice after graduation. Fellows ranked their reasons for selecting MFM fellowship, with fellowship location, research opportunities, faculty quality, and academic reputation of the centre as leading their decision-making. This study also found that 20% of respondents were not willing to recommend their fellowship to others, and sparked a review of the fellowship curriculum and requirements to better support fellow needs. In response to the 1996 survey, the American Board of Obstetrics and Gynecology (ABOG) made several changes to the American MFM fellowship program, including lengthening the program to three years, requiring a thesis to be completed, protecting eighteen months of the fellowship for research, and requiring a research mentor. When the survey was re-administered in

2000 after the changes had been made, there were no significant differences found in trainee perceptions from before and after the changes. Non-significant positive trends were noted in thesis completion, the ability to perform research, and fellow desire to enter academic practice.[25] Recent follow-up studies have not been published, so it remains unknown if this major curriculum change has resulted in any improvement in fellow satisfaction.

A Canadian survey regarding factors influencing choice of MFM residency and career was conducted through the SOGC in 2009, coinciding with the founding of the Canadian Society of Maternal-Fetal Medicine (CSMFM). Unfortunately, this study remained unpublished, and the original data has been lost. Personal communication with the author has permitted limited recalled information to be included in this literature review.[26]

While the literature is very limited, identified factors influencing MFM resident perception of the MFM subspecialty have been highlighted. Strong mentors and high faculty quality have been emphasized as important factors.[13] Elements relating to the practice of MFM have also been identified, including general interest in MFM,[27] experience with ultrasound,[26] and exclusion of gynecology practice.[26] Factors related to success in future academic practice were also found to influence perceptions of MFM.[13] Given the importance of the perceptions of MFM resident trainees, there remains little published contemporaneous information, and no published Canadian data at all, illustrating a significant gap in knowledge.

2.3.2 O&G residents choosing MFM subspecialty

The factors influencing O&G resident perception of MFM subspecialisation have also been rarely described, limited to studies by Lu[28] describing American residents, and the unpublished study of Canadian residents by Bos.[26] Similar to the MFM residents, encouragement by MFM faculty is a factor that influences resident perception of an MFM career.[26,28] An interest in academic practice including teaching and or research also draws O&G residents to MFM.[26] The experience of the O&G residency MFM rotation and ultrasound, be it positive or negative, was identified as an influencing factor.[26] Elements of the field of MFM including the varied MFM practice and issues around gynecologic surgery impacted decision-making.[26,28] For some residents, their dislike of gynecologic surgery leads them to MFM, and for others an unwillingness to abandon gynecologic surgery is a roadblock to MFM career.[26,28] Lu also found that salary during fellowship and the three-year duration of fellowship influenced O&G resident perceptions,[28] but these issues may be different for Canadian trainees given residency program and funding differences. This American study also found a number of factors that did not impact resident perceptions, including the national fellowship match program, financial issues, having the opportunity to attend a national MFM meeting, and having a same-gender role model. In summary, while some influencing factors are suggested by the literature, only one study has published, and additional information is needed for this group of trainees, particularly those training in Canada.

2.3.3 O&G residents choosing gynecologic subspecialties

As there is so little literature available regarding MFM subspecialty, factors influencing the perceptions of O&G residents about the gynecologic subspecialties were reviewed. Additionally, three of the four studies investigating this resident group are from the last ten years and are Canadian,[6-8] so elements may be more applicable to the population under the current study. While field of MFM is very different from all of the gynecologic subspecialties, there may be some factors in common with MFM. Again, both faculty role modelling and encouragement and a preference for academic practice were identified to influence trainees.[6,8] Exposure to the subspecialty during medical school and during O&G residency were noted as factors.[6] Issues specific to the subspecialty field were also described, including a specific interest in the field,[6,27] preference for a patient population,[6] the issue of obstetric practice,[6,7] and exposure to other residents, medical students, and healthcare professionals.[6] Issues of employment and finances were also seen to influence perception of gynecologic subspecialisation, including job opportunities and location,[6] the burden of educational debt,[7] and expectation of a higher career salary as a subspecialist.[27] Lastly, issues of lifestyle were described as factors that influenced decision-making, including preferred size of centre and call group,[7,8] personal life and family circumstances,[6,7] and anticipated improved general lifestyle with subspecialisation.[6,27] While MFM varies significantly from gynecologic subspecialties, for example due to obstetric on-call and the absence of gynecologic surgery practice, additional factors influencing decision-making were identified in this review about gynecologic subspecialties that could potentially

influence decision-making about MFM. The issue of gynecology practice in MFM may parallel the issue of obstetric practice in gynecologic subspecialties. Additionally, the data available about gynecologic subspecialisation are more detailed, contemporaneous, and potentially more regionally appropriate for our study group than the available published work limited to decisions about MFM subspecialisation.

2.3.4 Other surgical and medical residents choosing subspecialties

Given that MFM is the only surgical subspecialty where significantly less surgery is practiced, MFM is unique among other surgical subspecialties. However, there are many other fields where specialists make decisions about subspecialisation. Thus, a review of decision-making about subspecialisation in other fields may identify additional factors worthy of exploration in the current study. As this literature review was performed, studies were found detailing resident perception of subspecialisation from internal medicine,[29-32] pediatrics,[33] general surgery,[34-36] radiology,[37] and otolaryngology.[38] New factors relating to issues of subspecialisation were identified, including intellectual stimulation,[30] fit with personality and interest,[29,30] providing a challenge in diagnosis,[30] patient acuity,[39] and preferences for ambulatory versus inpatient care.[29,38,39] In addition to academic pursuits, studies identified the influence of prestige and respect for the subspecialty.[30,35,39] Lastly, specific issues related to lifestyle were highlighted, including avoidance of difficult or burdensome on-call[31] and anticipation of future leisure time.[30] While describing various subspecialisations far afield from MFM, the review of this literature contributed some novel factors that could

potentially influence decisions around MFM subspecialisation, and informed the design of this study.

2.3.5 Medical students choosing O&G specialty

The level of knowledge, experience, and thus factors influencing decision-making of senior residents is likely very different than the relatively inexperienced medical student considering primary specialization. However, medical students who become obstetrician-gynecologists also later become MFMs and gynecologic subspecialists. Thus, factors associated with decision-making about O&G specialisation were also explored to identify issues known to be important for decision-making in this specific group of residents. This part of the literature review yielded some novel influencing factors, including an aptitude for the specialty,[40] early career advice,[41] interest prior to medical school or clerkship,[41-43] the student's own circadian preference,[44] and the concept of a career being challenging, fulfilling, and rewarding.[45] Some of these future O&G residents become MFM residents, thus it is possible that factors leading students to an O&G career may also influence their eventual choice of subspecialty.

2.3.6 Summary of factors influencing decisions around specialization

The findings of this literature review of factors influencing decisions around subspecialisation and specialization are summarized in Table 2 below. Described by trainee group studied and specialty considered, factors found to both influence and not influence decision-making are described. The studies found in this review were

primarily survey-based research, with rates of return ranging 27%[28] to 98.5%.[13] In most cases faculty, and not residents, developed the surveys and thus chose the factors to be assessed in their studies. Few studies included qualitative elements, such as focus groups or narrative analysis.[6,28,39] Of particular interest, qualitative findings were seen to yield novel and seemingly important influencing factors, such as an unwillingness to abandon gynecologic surgery.[28] While a number of potential factors have been identified, the published literature about perceptions of MFM residency and career is lacking, and in particular there is a lack of contemporaneous and or Canadian information.

TABLE 2: Factors influencing choice of subspecialisation and specialization

Trainees studied	Specialty considered	Factors influencing choice or perceptions	Factors not influencing choice or perceptions
MFM residents	MFM	Strong mentor or faculty advisor[13,26] Faculty quality[13] Interest in the field[27] Gynecology practice[26] Ultrasound exposure[26] Thesis completion[13] Entrance to academic practice[13] Research opportunities[13] Academic reputation[13] Location of fellowship[13]	Salary post MFM fellowship[27] Job availability[27] Medical liability[27] Personal and or family issues[27] *Not reported[13,26]
Gynecologic subspecialties	Gynecologic subspecialties	Interest in the field[27] Medico legal liability[27] Expected future salary[27] Lifestyle[27]	Job availability[27] Personal and or family time[27]

O&G residents	MFM	Encouragement from MFM faculty[26,28] MFM rotation experience[26] Ultrasound exposure[26] Unwillingness to abandon gynecology[26,28] Opportunity for varied MFM practice[26] Academia or research interest[26] Salary during fellowship[28] 3-year length of training[28]	Requirement of a thesis[28] Same gender role model[28] Negative experiences with MFM staff[28] Location of fellowship[28] National match program for fellowship[28] Available MFM "track" in residency[28] Financial issues and or loans[28] Attending or presenting at a national MFM meeting[28] Salary post MFM fellowship[28] Family and spousal considerations[28] *Not reported[26]
	Gynecologic (or all) subspecialties	Role models or faculty encouragement[6] Exposure as a medical student[6] Clinical interest in the domain[6,27] Preference for a patient population[6] Surgical and or clinical component of practice[6] Obstetrics practice[6,7] Specific clinical activities of the subspecialty[6] Exposure to the subspecialty in residency training[6] Exposure to other residents, medical students, and allied health professionals[6] Academia, teaching and or research interest[6-8] Job opportunities[6] Higher salary as a subspecialist[27] Educational debt[7] Desire to work in an academic centre or large community[7,8] Plans to perform <5 on-call shifts per month[7,8] Influence of personal and family issues[6,7]	Multidisciplinary team based practice[6] Subspecialty fellowship located at O&G residency[6] Requirement of a two-year fellowship[6] Level of financial reimbursement in fellowship or career[6] Flexibility for leave[6] Gender[6] Lifestyle issues and or quality of life in fellowship or career[6] *Not reported[7,8,27]

		Individual life circumstances and personal attributes[6] Anticipated improved lifestyle[6,27]	
Other residents	Other subspecialties	Influence of a mentor[30,32,35] Role models[30,39] Intellectual stimulation[30] Fit with personality and interests[29,30] Provides a challenge in diagnosis[30] Clinical diversity[30,35] Interest in the common diseases of the subspecialty[35,37,39] Patient population[30,39] Procedures[30,32,39] Acuity of the clinical practice[39] Ambulatory versus critical patient care[29,38,39] Scope of practice area[29] Relationships with patients[29] Experience with the field during residency[30,39] Fellowship training environment[39] Additional year of training and or delay in income[32,39] Prestige and respect of the subspecialty[30,35,39] Academic pursuits[32,34,37] Educational debt[33,38] Eventual salary[29-31,35,39] Job prospects and or demand for skills[30,32,34,35,37,39] Lifestyle and family[29-31,34,37,39] Future leisure time[30] Difficult and or burdensome call[31] Age[38]	Interest in healthcare policy issues[29] Exposure to fellows[31] *Not reported[30,32-35,37,39]

Medical students	O&G	Interactions with O&G staff and or residents[40,41,46] Role model[42] Early career advice[41] Aptitude for O&G skills and principles[40] Intellectual content[40,47] Interest in the organ system[40,45] Opportunities for continuity of patient care[46] Primary care opportunities[42,46,48] Patient population of healthy patients[40,46] Female patients and or women's health[40,46,47] Performing surgery[40,46] Mix of medicine and surgery[41,42,47,48] Obstetrical deliveries[40,48] Desires a narrow scope of practice[40,42] Challenging, fulfilling, and rewarding[45] Interest in O&G prior to medical school[41,42] Interest in O&G prior to clerkship[43] Clerkship O&G rotation experience and or performance[40,41,43,48] Second year rotation[46] Student exclusion from pelvic examination[41] Student gender[40,42,43,45-47] Research opportunities[48] Financial opportunities[31,42,46,48] Malpractice[45] Lifestyle opportunities[45,46] Lifestyle and or time demands[40-42,46-48] Circadian preference[44] Length of training[47] Level of stress and or pressure[47]	Patient desire for a female physician[46] First, second, and forth year rotations[46] O&G program director[46] Resident involvement[46] Residency location[46] Malpractice concerns[40,46] Residency work hours[40] Career work hours[40] Gender[41] *Not reported[42-45,47,48]

2.4 Summary and research questions

On review of the literature, there is little published information about factors influencing resident decision-making about MFM subspecialisation. Additionally, issues important to American trainees[13,27,28] may differ significantly from the current concerns of Canadian residents. There is a documented need for MFM physicians to provide clinical care in Canada,[9,16] and thus maximizing MFM resident recruitment is critical. At present, there is inadequate information available about how O&G residents decide to become MFM physicians. How can additional MFM physicians be recruited, if the issues critical to their decision-making are unknown? This study provides an opportunity to learn about these issues through the lens of residents both considering the field and currently in MFM postgraduate programs.

The main research objective was to explore the factors influencing Canadian-trained residents' career choice of MFM, to understand the factors leading trainees either towards or away from a MFM career path. The results were anticipated to assist in understanding resident choices, and perhaps indicate needed actions for the subspecialty and or for postgraduate educational programs.

The specific research questions were:

1. What are the perceptions of Canadian-trained O&G residents regarding MFM residency and career?
2. What do current trainees in O&G and MFM residency see as the positive and negative factors influencing their choice of MFM residency and career?

3. How could MFM career be perceived as a more attractive career choice for residents?

CHAPTER THREE: METHODS

3.1 Overview

This chapter describes the research methods employed to explore the research questions. First, the qualitative approach will be described, and specifically the selection of thematic analysis method. The chapter will then summarize the study setting and participants, data collection, and data analysis. Lastly, reflexivity, issues of confidentiality, and specific ethical considerations for this study will be highlighted.

3.2 Study design

3.2.1 Overview

Given the objective of understanding the perceptions of Canadian O&G and MFM residents, a qualitative approach was selected to explore resident perceptions of MFM residency and career, in order to identify factors influencing their decision-making regarding MFM subspecialisation. This study analyzed interview data using a thematic analysis, drawing on constructivist grounded theory techniques.

3.2.2 Thematic analysis

As described by Braun and Clarke, thematic analysis is "a method for identifying, analysing, and reporting patterns (themes) within data."[49] It is a qualitative analytic method that offers a "theoretically flexible approach,"[50] and can provide a rich, detailed, and complex description of data. The thematic analysis approach has been described as

"factist" perspective, assuming data to be more or less accurate and truthful indices of reality.[51] Thematic analysis was applicable this study, as the themes sought were exploratory (content or data driven), rather than confirmatory (hypothesis or theory driven). Additionally, thematic analysis offers flexibility, and is accessible to new qualitative researchers.[52]

The strengths of thematic analysis that are particularly applicable to this study include: befitting large data sets, being appropriate for team research, that interpretation is directly supported by the data, and that unanticipated insights can be generated.[49] As the research questions focus on understandings, perceptions, and influencing factors, thematic analysis is a suitable approach.[53] This study's research questions fit well with a thematic analysis method, as this study endeavours to understand the underlying ideas, assumptions, and conceptualizations behind resident decision-making about MFM subspecialty training and eventual career.

3.2.3 Constructivist grounded theory

Thematic analysis only provides a method for data analysis, and does not prescribe methods for data collection.[52] Grounded theory is an inductive methodology that enables the creation of theory to be constructed through analysis of data, in order to "discover theory from data."[54] This study drew on the methods of grounded theory, specifically in that the method is iterative in nature, where data collection, coding, and analysis should "blur and intertwine continually."[54] A constructivist approach to grounded theory "shreds notions of a neutral observer and value-free expert,"[55] treating

research as a construction occurring under specific conditions. Thus, constructivist grounded theory "acknowledges the role of the researcher in shaping the analysis, views meaning as contextual, and argues that it is not possible to generate one 'true' reading of data."[52] This study is not a constructivist grounded theory study; the objective was to explore the resident perceptions of MFM, rather than to generate a theory therein. While a thematic analysis approach was selected, elements of grounded theory such as simultaneous data collection and analysis informed both the design of the study and the approach to data analysis.

3.3 Setting and Participants

3.3.1 Setting and context of the research

The setting for this study was O&G and MFM residents in Canadian residency programs, all based at major university centres in Canada. At the time of the study, there were 522 Canadian citizen or permanent resident O&G residents enrolled in postgraduate training, 320 of whom were PGY-3, -4, or -5 O&G residents. There were twenty PGY-6 and -7 MFM residents enrolled in postgraduate training.[5] Universities vary in maximum number of residents accepted, with some programs varying the number of MFM residents annually, noted in Table 3 below. While sixteen academic centres offer O&G residency programs, only ten of these centres also offer residency programs in MFM.

TABLE 3: Canadian O&G and MFM Residencies, by Region

Region	Universities	Maximum number of O&G residents matched per year	Maximum number of MFM Residents matched per year
West	University of British Columbia	8	1-2
	University of Calgary	6	1-2
	University of Alberta	6	0
	University of Saskatchewan	6	0
Central	University of Manitoba	4	1
	Western University	6	1
	McMaster University	6	1
	University of Toronto	10	2-3
	University of Ottawa	5	1
	Queen's University	3	0
East	McGill University	2	1-2
	Université de Montréal	3	1
	Université de Sherbrooke	3	0
	Université Laval	2	0
	Dalhousie University	4	0-1
	Memorial University of Newfoundland	4	0
TOTAL		68	10-15

Data from: Canadian Resident Matching Service (CaRMS),[56] and Dr. Alain Gagnon, RCPSC MFM subspecialty committee chair.[4]

3.3.2 Study participants

The program directors of all sixteen Canadian O&G residencies and all ten Canadian MFM residencies were contacted through their openly posted email addresses.[15,57] Program directors received a letter of invitation (Appendices C and D), including a request that they invite their residents via email to participate in the study. Letters of invitation addressed to residents (Appendices E and F) were provided to the program directors for distribution. Program directors were electronically contacted via email with reminders twice more over three months, in an effort to maximize resident

participation in the study. The intent was to recruit resident participants from a range of senior postgraduate years of training (PGY-3 to PGY- 5 in O&G and PGY-6 to PGY-7 in MFM) who were diverse in gender, age, and level of interest in pursuing MFM residency. Only senior O&G residents were recruited, as direct clinical experience in MFM generally occurs in the third or fourth year of O&G residency. This timeframe also coincides with resident decision-making regarding subspecialisation, with residency interviews, and then matching or offers, usually occurring between late fourth and early fifth year of residency. PGY-1 and -2 O&G residents were purposely excluded, as they usually would have not yet been exposed to MFM or other subspecialty rotations, and may not have yet have substantially considered subspecialisation. The research team's goal was to recruit a variety of residents along the spectrum from MFM-favourable to MFM-adverse. Following a review of all the interview transcripts, participant favourability to MFM was to be subjectively assessed, using descriptors adapted from Lu.[28] The intent of this assessment was to better describe the distribution of participant perspectives, as well as to assess for the role of favourability to MFM as a selection bias for the study. Interested residents were invited to contact the study's administrative assistant if considering participation in the study.

This study's focus was on Canadian-trained Canadian citizens or permanent residents of Canada, the majority of whom would both be eligible to and plan to practice medicine in Canada. This delineation was made to differentiate O&G or MFM trainees on visas to Canada. Visa trainees may be completing a parallel program to

Canadian trainees, or alternatively may be undertaking a different or specialized clinical or research fellowship. While majority of visa trainees will return to their country of origin with enhanced skills, some are eligible for practice in Canada, and elect to remain in Canada for their careers. Visa trainees may now be eligible to write the RCPSC MFM examination through the Subspecialty Examination Affiliate Program (SEAP),[58] but many would still lack credentials for independent practice in Canada. Visa trainees may have very different factors influencing their choice of Canadian MFM training and MFM career in their home country, and thus were not included in this study.

3.4 Data collection

3.4.1 Development of the interview guide

Interviews are "a professional conversation,"[59] with a goal of getting the participant to talk about their experiences and perspectives, and to capture their language and concepts, in relation to a topic that you have determined.[52,60] Qualitative interviews differ from standardized interviews, preferring open-ended questions to encourage responses with depth and detail, and with the interviewer playing an active role in the interview "to capture the range and diversity of participants' responses, in their own words."[52] The semi-structured interview, also known as the interview guide approach, is most frequently used for qualitative research, and was employed for this study (Appendix G). The use of an interview guide permitted a standardized approach to the interview process. The interview guide was developed to investigate factors identified from the literature review as potentially influencing resident decision-making

about subspecialisation (as previously described in Table 2). Additionally, the interview guide was developed to examine both the residency training requirements and aspects of a career in MFM, as this differentiation had not been previously studied and could be useful to answer the research questions. The research questions were addressed initially in an open-ended manner, avoiding simple yes or no questions, with standard prompts available for use by the interviewer to probe further as needed.

A research assistant experienced in qualitative research, interviewing, and perinatal research was recruited to conduct the telephone interviews with the study participants. Prior to interviewing participants, AR trained the research assistant, and was herself a participant in two mock interviews. Rubin[60] describes the ideal qualitative interview as "on target while hanging loose," in which questions and wording may be contextualized. The research assistant was specifically instructed to be flexible to discuss issues important to the participant, even if they were not on the interview guide. The interviewer's skill with asking follow-up, elaborating questions (probes) influences the richness of the qualitative interview,[61] and as such the training of the research assistant and mock interview process was of importance. The research team reviewed and revised the interview guide prior to interviews, and following a review of the initial interview transcripts, re-assessed the suitability of the interview guide to optimise the data collected.

3.4.2 Initial contact with participants

Interested residents contacted the primary contact for the study, an administrative assistant from the department of O&G. The administrative assistant was responsible for handling consent forms, initiating contact with the research assistant to arrange the resident interview, and collecting a minimal amount of demographic information from the participant. The information collected included age, gender, postgraduate year, and region of Canada. This demographic data was of importance to describe the distribution of participant characteristics, particularly the postgraduate year and region. As identification of university centres would potentially lead to identification of participants, only the region of their university centre was collected. For this study, regions were defined as west (British Columbia, Alberta, Saskatchewan), central (Manitoba, Ontario), and east (Quebec, Nova Scotia, Newfoundland). This basic information collected permitted study participants to be generally described, without compromising confidentiality of individual participants. The administrative assistant also provided participants with copies of the interview guide prior to the interview to facilitate participation, intended to support participants for whom English was their second language. Interviews were offered only in English, as personal communication from Université Laval and Université de Montréal program directors indicated that the majority of their residents could successfully undertake an interview in English.

3.4.3 Participant interviews

Telephone interviews were the only feasible approach for this study, given the goal of recruiting residents from across Canada, the complexities of resident scheduling, and costs of travel. While often used for quantitative studies,[62] telephone interviews have been less studied in qualitative research, and are still often described as a less attractive alternative to face-to-face interviews.[63] With respect to the effect of the interview mode on survey outcomes, conflicting reports exist in the literature.[64,65] Mealer described the primary methodological concerns with telephone interviewing to be "establishing rapport and connections between the researcher and participant, and the therapeutic use of non-verbal communication."[66] With respect to non-verbal communication, proxemics (communication of attitudes and trust by controlling personal space) and kinesics (use of posture, gestures, and facial communication) to establish rapport are lost with telephone interviews. However, chronemics (the use of time) and paralinguistic communication (voice characteristics) remain preserved with telephone interviewing.[66] Chronemics and paralinguistic communication were highlighted during the training of the research assistant, and were utilized during the interview process. Data loss or distortion with telephone interviews is postulated to result from the absence of visual cues, including the loss of nonverbal data, loss of contextual data, and the loss or distortion of verbal data. However, Novick[63] found little evidence that significant data loss or distortion occurs, or that the quality of findings or later interpretation is compromised, with telephone interview data collection. Additionally, in their assessment of face-to-face and telephone interviews, Sturges and

Hanrahan[67] found that a comparison of transcripts between these two interview approaches found no significant differences with respect to quantity or depth of data. Telephone interviews offer several advantages over face-to-face interviews specific to this study, including the decreased cost and travel, ability to reach geographically dispersed respondents, and increased participant perception of anonymity.[63,67,68] As such, semi-structured telephone interviews were conducted for this study.

Interviews commenced on May 30, 2016 and continued until August 10, 2016. This interview period facilitated the participation of PGY-5 O&G residents, as they would be unlikely to participate prior to the completion of their RCPSC examinations. Interviews occurred at a time convenient to the participants to maximize participation. As such, interviews generally occurred after hours for residents from various Canadian time zones. The interviews were audio recorded for transcription using the Call Recorder application for iPhone, with a back-up recording made using a digital recorder. A professional transcriptionist then transcribed interview recordings verbatim. AR reviewed the initial transcripts for accuracy, comparing the interview transcripts to the audio recording.

3.4.4 Privacy, confidentiality, and data handling

Expecting that the population of participants and resultant sample size would be small, and additionally given the narrow O&G community in Canada, all efforts were undertaken to protect participant anonymity and security. All members of the research team signed confidentiality agreements. However, it was of utmost importance to keep

the participant identities confidential from the O&G members of the research team (AR and SC).

At the time of recruitment, the administrative assistant assigned the participant a study identification number. Only the administrative assistant had access to participant names and contact information, and this information was stored electronically in her password-protected file. At the time of recruitment, written informed consent was obtained (Appendix H) for study participation, which included agreement for audio recording of the interview. The administrative assistant distributed participant consent forms, and received completed forms. Participant consent forms were signed by JL on behalf of the research team, thus keeping the participant identities confidential from the O&G members of the research team (AR and SC).

Immediately prior to every interview, the research assistant interviewer verbally reassured participants that all information would remain confidential, and that they could decline to answer any question. Participants were also reminded that they could choose to withdraw their consent at any time, without any adverse consequences. Only the study number identified the recorded interview, and thus interview transcripts never included participant names. The interview guide's introduction included a reminder for the participant to avoid mention of names, regions, and identifying healthcare and university centres. Additionally, the interview questions were designed to be specific to career choice and the national MFM training program elements. As such, judging or comparing individual programs or hospitals was discouraged. During

her training, the research assistant interviewer was instructed to avoid discussion of individual programs or regions, and to redirect the participant as needed.

Following transcription of the audio recordings, the professional transcriptionist was instructed to redact any identifying information from the transcript before circulation to the research team. Specifically, any mention of faculty and resident names, hospital, university, city, or province was redacted. Prior to review of the transcript by the rest of the research team, AR confirmed complete redaction of identifying information. As such, no participant or regional names appeared on transcripts used for analysis, nor were they associated with any quotations contained within documents prepared for dissemination. The only identifier left on transcripts was the study identification number. Transcripts were kept in an encrypted shared online folder, with access limited to only the research team. Additionally, electronic copies were kept in a password-protected file, on a password-protected computer. Any printed interview transcripts were kept in a secure location.

3.5 Data analysis

3.5.1 Analysis of transcript data

Analysis of qualitative data from the telephone interviews employed thematic analysis,[52] as well drew on the techniques of grounded theory. Thematic analysis as described by Braun and Clarke consists of six phases of analysis, with the process being more recursive than linear in nature, and these phases were adapted for this study.

The thematic analysis began with familiarization with and immersion in the transcript data. Phase one involved actively reading and re-reading transcripts, and noting ideas. Analysis began with the first interview. As such, transcripts were reviewed as they were completed, permitting early ideas and analysis to potentially shape the future data collection,[69] such as consideration for modification of the interview guide if indicated. Drawing on grounded theory techniques, analysis occurred in an iterative manner, meaning the data collection and analysis occurred simultaneously, purposely informing each other.[69]

Coding is used to organize data around conceptual ideas, wherein the researcher plays an active role interacting with the data, and remains open to many possible directions.[55] The second phase of the thematic analysis involved coding interesting features systematically across the data set, generating the initial codes. Codes refer to "the most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding the phenomenon."[70] AR undertook the initial line-by-line coding of the transcripts, using NVivo for Mac (version 11.2.2, QSR International), software designed to assist with qualitative data analysis. The members of the research team became familiar with the interview transcripts and assisted in the construction of the coding framework. The coding process employed constant comparison,[54,71] facilitating the emergence of new concepts by comparing the codes within the data set.[72] This promoted higher-level analysis and theory development, and as such memos and diagrams were utilized for this study.[69] All investigators participated

in the coding process, identifying and generating initial codes, and collating data relevant to each code. Discussion at meetings resolved any differences within the research team.

In the third phase of the thematic analysis, codes were collated into potential themes, and data was gathered to all the potential themes. The intent of this phase was to "re-focus the analysis at the broader level of themes, rather than codes,"[49] in order to develop overarching themes, as well as sub-themes. A theme "captures something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data set."[49] An inductive or bottom-up approach was utilized for this study, meaning the identified themes were linked strongly with the data set.[73] Thus, the inductive analysis that occurred demonstrated a process in which the data was coded "without trying to fit it into a pre-existing coding frame, or the researcher's analytic preconceptions."[49]

For phase four of the thematic analysis, potential themes were reviewed, assessing if themes "work" relative to both the coded extracts and the overall data set, thus "generating a thematic 'map' of the analysis."[73] The generated themes were assessed for internal homogeneity, and external heterogeneity. At research meetings, the research team debated both the meaningful coherence of data within individual themes, and the clarity of distinctions between the themes. The relationships between themes that emerged and the contexts of particular codes were assessed by the study team at regular research meetings, and a thematic map of the study's analysis was

developed.[74] Thematic analysis acknowledges that the researchers will take an active role in identifying themes from the data set.

For phase five of the process, the identified themes were defined, refined, and named, developing an "overall story" for the analysis, linking back to the research questions. In the final phase, vivid and compelling extracts were selected related to the analysis in preparation for the final report.

The number of study participants was not determined prior to the beginning of this study. Rather, theoretical sampling is "responsive to the data" and thus only occurs in a setting where concurrent data analysis "actually drives the data collection."[69] For this study, both data collection and the process of adding and modifying codes and or themes continued until thematic saturation, when no additional constructs were emerging, and the data set was then "rich, full, and complete."[75] In this study, thematic saturation occurred after analysis of the seventeenth transcript. Due to the inherent delay with transcription, four interviews had already taken place and were additionally analysed. No further themes were identified, providing further confirmation of thematic saturation.

3.5.2 Rigour in qualitative research

Similar to reliability and validity in quantitative research, qualitative rigour establishes confidence in study findings.[76] Lincoln and Guba[77] described a model of trustworthiness suitable for qualitative research, including credibility (internal validity), transferability (external validity or generalizability), dependability (reliability), and

conformability (objectivity). A qualitative study demonstrates credibility when "it presents an accurate description or interpretation of human experience that people who also share the same experience would immediately recognise."[78] Credibility was achieved in this study by reviewing initial interview audio recordings and transcripts (AR and JL) for accuracy. The entire research team (AR, JL, EOP, PV, and SC) participated in reviewing and discussing the coding process. To achieve transferability and replicability, the participant population was well-described and limited to a narrow timeframe of participation. Dependability was addressed by providing detailed descriptions of: the study purpose, participant recruitment and selection, methods for data collection, data analysis and interpretation, and lastly the study team's participation in the analysis process. Through email communications and minutes of team meetings, an audit trail was achieved. Conformability occurs with the establishment of credibility, transferability, and dependability.[76] Other strategies for establishing validity in this study included prolonged engagement and observation, thick description, negative case analysis, and reflexivity.[79]

3.6 Reflexivity

Reflexivity, similar to construct validity in quantitative research, is defined as self-questioning and self-understanding,[80] and as a:

> "Process of continual internal dialogue and critical self-evaluation of the researcher's positionality as well as active acknowledgement and explicit recognition that this position may affect the research process and outcome."[81]

The study team included five researchers. Anne Roggensack (AR) is a MFM physician and MFM residency program director. Jocelyn Lockyer (JL) is a PhD medical education researcher with extensive experience in qualitative research, and is a leader for educational programs at the University of Calgary. Elizabeth Oddone Paolucci (EOP) is also a PhD medical education researcher with extensive experience, and a focus in graduate student and resident education. Pamela Veale (PV) is a developmental paediatrician, and a leader for undergraduate medical education. Sujata Chandra (SC) is a MFM physician, a former program director for O&G, and a voting member of the RCPSC MFM subspecialty committee. Researchers must acknowledge and be reflexive to their experience and bias:

> "Just as the methods we choose influence what we see, what we bring to the study also influences what we *can* see. Qualitative research of all sorts relies on those who conduct it. We are not passive receptacles into which data are poured …. neither observer or observed comes to a scene untouched by the world."[55]

Qualitative researchers must be aware that everyone holds preconceptions that influence "what we attend to and how we make sense of it."[55] Having more recently completed a similar course of training as the study participants (with residencies in O&G and MFM), AR shares a common experience with the study participants. Given her experience as a medical educator, mentor, and program director, AR brought knowledge of current MFM resident concerns, as well as her bias and preconceptions about the trainee perceptions of MFM. AR developed the interview guide with consideration to the available evidence on resident perceptions, rather than based on

her personal opinions or experience. AR also provided the training for the research assistant's approach to interviewing, including practice and feedback from mock interviews. While she did not interact directly with the study participants, AR's experience and perspective likely affected the interview process, as well as the subsequent data analysis. Elliott[82] stresses the importance of "owning one's perspective" in qualitative research, such that the researcher disclosing their values and assumptions assists readers to both interpret the data and consider possible alternatives. Analysis is "always shaped to some extent by the researcher's standpoint."[50] Finlay[83] offers 'maps' on five reflexivity variants, including introspection, inter-subjective reflection, mutual collaboration, social critique, and discursive deconstruction. The concepts of introspection (given similar experiences as the participants) and social critique (given the power imbalance between participants and researchers) resonate as applicable to this study.

Berger[81] describes approaching reflexivity as an insider with shared experience with participants, permitting the researcher to be "better equipped" with special insight and understanding of implied content. By employing a research assistant to conduct interviews who was insider-trained, but not herself an insider, this study limited the imposition of the researcher's beliefs and perceptions during the interviews with participants. The experience of being an insider offered benefits of familiarity with complex issues in the field, specialty-specific language, understanding implied content, and being sensitized to aspects of the data.[81] During the data analysis, AR and SC

brought their own perceptions and experiences as MFM specialists and educators, but as all team members participated in data analysis, their views were intentionally balanced by the "outsider" perspectives of both the non-O&G and non-MD team members.

3.7 Ethical considerations and approval

Given AR's role as a leader for MFM education, this study required unique ethical considerations. AR is presently the program director for the University of Calgary MFM residency program, and as such is a non-voting member of the RCPSC MFM subspecialty committee. Given her leadership position, she was intentionally not the primary contact for interested participants, and did not perform any of the interviews with O&G and MFM residents. Administrative and research assistance outside of the MFM residency program and section of MFM was recruited. The research assistant who performed interviews had experience with perinatal research, but was not herself associated with the department of O&G or the section of MFM. This design was intended both to protect participant confidentiality, as well as to facilitate the collection of the most honest data possible from residents.

The potential for ethical conflict exists for PGY-4 O&G residents applying to the University of Calgary MFM residency program, residents currently in the University of Calgary MFM residency program, and MFM residents applying for a faculty position in MFM at the University of Calgary. The University of Calgary MFM residency program committee functions as a group to determine resident selection, assessment, and

promotion. Thus, the information collected in this study would have no role in any of the above pursuits. AR is not a member of the RCPSC MFM examination board, so would not participate in either the development or in the marking of the RCPSC short answer question (SAQ) certifying examination. Neither the O&G department head nor the MFM section head participated in this study, and the University of Calgary department of O&G determines hiring of graduated physicians by a search committee (infrequently including AR), using specific criteria. The research team was confident that participation in this study did not, could not, and would not affect either admission to or promotion in the University of Calgary, admission to other MFM residency programs, or applications for MFM or other faculty employment with the University of Calgary department of O&G. In addition to discussion with the research team, these issues were also discussed with the department of O&G head Dr. R. Douglas Wilson, who was similarly in agreement.

This study was reviewed and approved by the University of Calgary Conjoint Health Research Ethics Board (REB 16-0027) in March 2016.

CHAPTER FOUR: RESULTS

4.1 Participant characteristics

Twenty-one residents participated in this study. O&G residents were on average 30.6 (SD=2.1) years old, and MFM residents (more advanced in training) were on average 35.3 (SD=3.5) years old. The mean age of participants in the study was 31.7 (SD=3.1) years old. The participants were largely, but not exclusively, female (86%, n=18). Given that very few of the participants were male, gender was only reported in the setting of proportion of all participants, to avoid the possibility of participant identification. More participants joined the study from O&G residencies (76%, n=16) as compared to MFM residencies (24%, n=5). Residents from all years of training were participated in the study. While identifying only a general region of training to protect resident confidentiality, there was participation from all three regions of Canada; 38% (n=8) from western Canada, 48% (n=10) from central Canada, and 14% (n=3) from eastern Canada. Participant characteristics are illustrated in Table 4 below.

As described in Chapter Three, participant favourability to MFM was subjectively assessed using descriptors adapted from Lu.[28] Of O&G resident participants, 4 (19%) residents had been matched to MFM residency, or were planning to purse MFM subspecialty training. Eight (38%) of the O&G resident participants expressed favourable perceptions of MFM, but were planning to pursue a generalist or other career path. Lastly, 4 (19%) of the O&G resident participants expressed adverse perceptions of a career in MFM. All five MFM resident participants were currently engaged in MFM

residency programs, and thus had already selected a career in MFM. In summary, 9 (43%) of participants were either matched to, or were strongly considering, a career in MFM, 8 (38%) were favourable to MFM as a field but not planning on pursuing MFM, and 4 (19%) were averse to MFM as a career.

TABLE 4: Participant Characteristics

N=21		O&G	MFM	ALL
Age (years)		Mean=30.6, SD=2.1	Mean=35.3, SD=3.5	Mean=31.7, SD=3.1
Female		n/a	n/a	18/21 (86%)
Program		16 (76%)	5 (24%)	n/a
Postgraduate year		5 (24%) PGY-3 5 (24%) PGY-4 6 (29%) PGY-5	1 (5%) PGY-6 4 (19%) PGY-7	Mean=4.7, SD=1.4
Region	West Central East	6 (29%) 9 (42%) 1 (5%)	2 (10%) 1 (5%) 2 (10%)	8 (38%) 10 (48%) 3 (14%)
Favourability to MFM	Committed Favourable Adverse	4 (19%) 8 (38%) 4 (19%)	5 (24%)	9 (43%) 8 (38%) 4 (19%)

4.2 Resident perception of MFM residency and career (Research Question 1)

Seven major themes influencing resident perception of MFM residency and career were identified: (1) the field of MFM, (2) O&G residency MFM experiences, (3) impact of MFM residency program, (4) perceived variety of MFM practice, (5) lifestyle of MFM career, (6) academic career, and (7) finances. Additionally, sub-themes were identified for all of these major themes. The themes and sub-themes are summarized in Table 5 below, and are described in detail in the subsequent sections.

TABLE 5: Resident perceptions of MFM residency and career: Overview of themes

Themes	Sub-themes
Field of MFM	• High-risk obstetrics • Clinical complexity and challenge • Obstetric ultrasound • Patient interactions • Multidisciplinary care • Exclusion of gynecologic practice
O&G residency MFM experiences	• Mentorship by MFM faculty • Experience with MFM and or ultrasound • MFM as experienced at their centre • Elective experience in MFM
Impact of MFM residency program	• Focus on learning over service • Length of training • RCPSC examination • Requirement of a scholarly project
Perceived variety of MFM practice	• Provision of intrapartum care • Type of centre preferred for practice • Regional MFM practice variation
Lifestyle of MFM	• Partner and or family issues • Work-life balance • Working hours • Geographic considerations
Academic career	• Academic aspirations • Becoming a researcher • Teaching trainees • Subspecialty medicine
Finances	• Financial issues of additional training • Future employment opportunities • Income from eventual MFM career

4.2.1 Field of MFM

The nature of the field of MFM was a driving force in resident decision-making. There were six sub-themes related to the field of MFM identified: high-risk obstetrics,

clinical complexity and challenge, obstetric ultrasound, patient interactions, multidisciplinary care, and exclusion of gynecologic practice.

Participants identified a strong preference for managing complex obstetric cases, over the routine obstetric practice of general O&G. Residents described "always gravitat[ing] more towards obstetrics" and being "much more interested in that than I was doing [gynecology]." Many residents aspired to having an enhanced and complicated obstetric practice: "I wanted something that my brain wasn't becoming stagnant with" (Participant #3). Residents identified a key component of the field that involved finding inspiration and professional satisfaction in managing high-risk obstetric cases. Resident participants identified a particular interest, satisfaction, and passion for caring for the most complex and vulnerable obstetrical patients. For those who viewed MFM favourably, they were excited at the prospect of managing complex patients for the rest of their career, instead of the lower-risk patients often seen in a general practice. MFM was described as "intellectually interesting."

> "So, I just always had an interest in that aspect O&G. I always was more into the [obstetrics] than the [gynecology], and then within [obstetrics], the really difficult cases, and especially the ones that had ethics involved and the puzzles involved in the diagnosis, and how the best way to manage the patient and deliver this patient" (Participant #16).

Many specifically mentioned satisfaction with providing care to obstetric patients with severe and critical complications, and being the physician trained to manage these more complex and emotional situations. Residents specifically wanted to help patients with the challenging parts of their pregnancies.

> "You get to deal with some antenatal issues with people that are going through some difficult times or some anxiety-provoking times, so I found it very empowering to be able to help a lot of people in their moments of need. To be there during these exciting and terrifying times to help them through it, and to hopefully deliver them the best outcome as possible. And it was very rewarding when you did deliver a set of triplets or even quadruplets, and you're able to be there and be able to experience that with the family. It's something you wouldn't really get in the low-risk obstetrical world" (Participant #17).

Ultrasound plays an increasing role in MFM practice, and was identified by the residents as an essential part of the field. Resident participants described the importance of ultrasound in MFM practice, and how ultrasound attracted them to the MFM field: "and also, like I said, the ability of doing ultrasounds, and the amount of things that we can diagnose prenatally, I thought that very fascinating" (Participant #2). Obstetric ultrasound exposure and experience in O&G residency was critical in gaining competence, as well as a desire to include ultrasound in their careers. Residents spoke positively of their exposure to ultrasound during their mid-residency MFM rotation, and even more so if they had experienced a first year or junior obstetric ultrasound rotation in their training. Comfort and confidence with hands-on ultrasound skills enhanced the perception of MFM, and led the residents to consider MFM and a career heavy in obstetric ultrasound.

> "I think the most attractive portion of MFM for me is getting very comfortable with the ultrasound component. I find the ultrasound fascinating, and I would love to be competent enough to be able to do my own scans, [biophysical profiles] and growth measurements, as well as being able to read, look at anatomy scans … that would definitely be the most interesting portion of it" (Participant #17).

Residents with less ultrasound exposure in residency expressed less confidence in their hands-on ultrasound skills, leading them to doubt they could pursue a career in MFM: "But initially I think as a junior resident … I was pretty discouraged thinking that MFM just does ultrasound so often … was another reason that I thought, 'well I don't think I can do MFM.'" The opportunity to gain skill and expertise in ultrasound was exciting to residents with interest in MFM.

> "I would say while on working [on] call, it was always kind of exciting to be able to use [ultrasound] to get whatever answer or clinical assessment was needed. I always wished that I had more skill that I could do more. It was kind of the first time it opened my eyes to what actually ultrasound was capable of" (Participant #6).

Residents identified patient interactions as core to the field of MFM. Specifically, they recognized the importance of the doctor-patient relationship amid complex clinical situations often seen in MFM. Resident participants were attracted to the continuity of care, as well as to providing care for difficult cases, often with delivery of bad news.

> "I think the best things are working with the families on the complicated cases and just trying to serve them well and do a good job, because you're often telling them the worst news of their life, and if you can do it in a way that makes it any more tolerable for them, you know, I feel really accomplished" (Participant #16).

Active involvement as a trainee in complex patient care was formative for several resident participants. Interactions in training with complex and vulnerable patients were important in developing an interest in MFM, as well as in developing confidence that they could pursue this career path.

> "So, there were like a couple of situations like from my core rotation where I had like seen the same patient over several encounters, and that kind of

> helped build that rapport, and kind of like getting to the bottom of their diagnosis and working through it, and developing plans for them, which probably helped guide me down the path" (Participant #8).

MFM practice is generally multidisciplinary, and the prospect of working regularly with a multidisciplinary team as a practicing MFM was seen positively by the resident participants: "to do this all kind of in a collaborative way with a small group of colleagues whom I admire." Quite simply, they "like the multidisciplinary teamwork that's involved in MFM."

> "So, I think most attractive would be in kind of the collaboration with other MFMs and, you know, neonatology, genetics and pediatric surgery, whatever would need to be involved for managing patient care, so like the collaboration aspect and teamwork aspect of it" (Participant #8).

Residents were influenced by being part of a multidisciplinary team with MFM during residency.

> "The most memorable patients that I had as a resident were obstetric patients and … by virtue of being complicated were MFM patients, so it maybe in a backwards way made me want to do MFM, because it showed me how enjoyable it was to be part of these kind of complex cases that required really a multidisciplinary approach, and how nice it was to work with the MFMs on those cases" (Participant #6).

Collaboration is at the very essence of the field of MFM, and residents successfully identified this collaboration as a positive aspect of the field.

Among the resident participants, the most dividing aspect of the field of MFM was the general exclusion of gynecologic practice from one's career. Several residents were attracted to MFM primarily due to a dislike of gynecology: "the predominant factors were a like of obstetrics and a dislike of gynecology and gynecologic surgery"

(Participant #6). Residents who developed a preference for complex obstetrics found a career in MFM, that was without gynecology, to be most favourable.

> "I knew right off the bat that gynecology was not something that I was interested in, and I would not be happy as a generalist [O&G], so that definitely swayed me right into MFM because if, you know, even looking at a generalist position, I ultimately would have to incorporate some elements of gynecology into my future practice, and then looking at the other subspecialties within the field, again all of them are gynecology oriented. So, it became very easy to kind of pursue MFM" (Participant #7).

Some resident participants did enjoy gynecology and operating, and while choosing MFM, still struggled with making the decision to no longer include gynecology and gynecologic surgery as part of their practice.

> "I feel like going into MFM, I had to pretty much give up gynecology, and I spent a lot of time learning how to do hysterectomy three ways and different surgeries and different office gynecology, and it was very satisfying to do that and I did love it, just not as much as MFM, so giving it up was very difficult, and I think it's something that I still struggle with … having given that up" (Participant #16).

Other residents expressed great enthusiasm for complex obstetrics and the field of MFM, but during O&G residency gained enthusiasm and expertise in operating, and did not want to consider "giving up" gynecology for MFM:

> "I really like the practice that they have; I really like the types of patients that they're exposed to, the complex medical cases, but there's that big component of my residency, which is gynecologic surgery, that was missing from MFM for me" (Participant #14).

> "I think when I was in medical school and I wanted to do, I knew I wanted to do OB, MFM was very interesting, but then really once I started operating, I realized how much I like operating … so [MFM] kind of fell off the table very quickly for me" (Participant #10).

For residents with a dislike of gynecology and gynecologic surgery, MFM was a natural fit. But other residents struggled with choosing their love of MFM over their love of surgery. Lastly, some residents were enthusiastic about and interested in pursuing MFM, but did not want to let go of gynecologic surgery after all of their training. The issue of exclusion of gynecology from a career in MFM remained divisive among trainees.

As noted in Table 6, the field of MFM itself was a major stimulus for residents considering a career in MFM. MFM is a dynamic field with opportunity to work in a complex and challenging multidisciplinary environment. The exclusion of gynecologic practice is satisfying for some residents, but a source of apprehension for others.

TABLE 6: Field of MFM: Sub-themes

Theme	Sub-Theme
Field of MFM	High-risk obstetrics
	Clinical complexity and challenge
	Obstetric ultrasound
	Patient interactions
	Multidisciplinary care
	Exclusion of gynecologic practice

4.2.2 O&G residency MFM experiences

Resident participants were influenced by their experiences with MFM during O&G residency, both positively and negatively. All participants had experienced MFM rotations during their residency, and had become very aware of the MFM faculty and

practice at their centre. On the theme of trainee experience with MFM during O&G residency, four sub-themes were identified: mentorship my MFM faculty, residency experience with MFM and or ultrasound, MFM as experienced at their centre, and elective experience in MFM.

Mentorship and support by MFM faculty positively influenced resident participants, even if they were not interested in a MFM career: "interestingly, most of the MFMs here are really nice and they're really supportive" (Participant #11). The resident's appreciation for the national MFM faculty was evident in the interviews; the majority of residents noted that MFM faculty were not only fantastic mentors, but also great teachers and role models.

> "I would say that the MFMs that I've had the opportunities to work with are definitely very influencing. They are fantastic teachers; they love their job; they're inspiring, like they make you want to be a better resident because, because of how they interact with patients, because they're so smart. Like it's just, you want to work harder because of them. So, I think their enthusiasm for the specialty is a bit infectious and when you're around them, you feel like, 'oh, this is for sure what I want to do' because they kind of rub off on you. So, for sure the faculty that I worked with has been very influential" (Participant #5).

The support from faculty was successful at influencing residents to consider careers in MFM.

> "So, I think most of the support obviously came from the MFM faculty and they definitely were like big encouragers of my interest in exploring … MFM. Like they definitely encouraged me to set up electives in other places to ensure that that's what I wanted to do" (Participant #8).

Resident participants cited their mandatory rotation in MFM as a strong influence in career choice. Residents that were inspired by a positive rotation in MFM became passionate about pursuing additional training for a career in MFM.

> "I think I'm very interested 'cause I finished my rotation in MFM as a resident and I basically loved every bit of it, and I just felt like I really want to learn more about it. So, I think during fellowship, I'll be able to do that" (Participant #2).

Residents who were given the opportunity to manage complex cases and become fully involved in the multidisciplinary team became more enthusiastic about a career in MFM.

> "Well certainly my rotation in MFM was very, very positive, and it wasn't just the experience going through and working with the individuals here but the feeling that as a resident, I for the first time was really given ownership of complex cases. I felt that there was that sense of kind of continuity of care and being involved as part of a team. That was very exciting and I loved that" (Participant #6).

Experiences with ultrasound during O&G residency rotations were also important – residents who were able to gain skill and confidence enhanced their view of MFM as a career.

> "I enjoy the technical aspect of ultrasound and I think it's amazing that you can see a growing baby through this technology. The one-month exposure that I had as a junior resident and then the subsequent six weeks that I had as a senior resident has been very helpful in making sure that I am comfortable with any patient that walks into triage at labour and delivery, that I can scan them and say whether the baby is well or whether the baby is small" (Participant #12).

Unfortunately, when the MFM rotation experience was sub-optimal, residents developed an unfavourable opinion of the MFM subspecialty. When there had been a negative residency experience, residents were unlikely to pursue additional training and career in MFM.

> "I just feel like it's not particularly well done at the site that I'm at. It's not a positive association with it unfortunately" (Participant #1).

Resident participants were reasonably influenced by the practice and conditions of MFM at their centre of training. As centres vary in the practice patterns, patient volume, resources, and staffing, trainee perceptions likely vary across the country. When the clinical team was working well together at their site, residents were clearly influenced positively.

> "I enjoy the variety, the continuity of care, the way it's set up at my centre, I think works very well. It's a nice team. I could picture working there with the individuals who are currently there, and that appeals to me very much" (Participant #6).

However, when a MFM centre was in difficulty, such as with staffing problems, increasing patient volume, or other clinical or interpersonal issues, the resident participant perceptions reflected the difficulties. If faculty were over worked or burning out, residents were not attracted to the field.

> "Aspects that aren't as appealing - the volume just keeps going up, and I'm speaking specifically from my centre, but I imagine it's the same kind of across the board and the patient numbers are going up and number of physicians is not, so it's been very clear even since starting my [MFM residency] in the past year or two, that they're getting increasingly stressed and overworked, so that's not terribly appealing" (Participant #6).

For residents considering MFM, elective experiences at other sites contributed to their decision-making. Given the variety of MFM practice across Canada, elective experiences had the potential to be very eye opening for residents. Positive elective experiences led residents to MFM residency, but also illuminated some of the differences in MFM across the country.

> "That being said, I did do an elective at a different centre, and while it was excellent exposure, I had an excellent time, it made me appreciate my training more, but also opened my eyes to the fact that my training is very different than the centre where I was, so I can only imagine that it's very different from other centres too. So, while I'm happy where I am, I recognize that it's not a terribly standardized training, and I realize how little I know about kind of what's going on across the country" (Participant #6).

Elective experiences assisted residents in understanding what a career in MFM might be like, and for some even helped them understand that MFM might not be the best individual choice.

The participant's experience with their residency MFM rotation was also identified as a major contributing theme to trainee career choice, summarized in Table 7. The experiences with MFM faculty and with ultrasound were of paramount importance. Participants were influenced by the experience and practice at their centre, as well as at other centres with electives. All residents undertake a rotation in MFM during their residency, and this experience appears to be significantly influential in career decision-making.

TABLE 7: O&G residency MFM experiences: Sub-themes

Theme	Sub-Theme
O&G residency MFM experiences	Mentorship by MFM faculty
	Experience with MFM and or ultrasound
	MFM as experienced at their centre
	Elective experience in MFM

4.2.3 Impact of the MFM residency program

Resident participants were accepting of the programs offered for MFM residency, with some concerns identified. O&G residents who worked along-side MFM residents at their centre were very aware of the local program perceptions and issues. Still, within the theme of impact of the MFM residency program, there were four sub-themes identified: a focus on learning over service, length of training, the RPCSC written examination, and the requirement of a scholarly project.

Residents prized MFM programs that had a focus on learning over a requirement for service. Flexibility for adult learners to identify their learning needs was valued among residents.

> "And I wanted to be somewhere where my training really was a goal, that it wasn't entirely service-based or seemingly service-based, where the program felt very strongly of, you know, sitting down with you personally and saying, 'What do you need to get out of this training program and how can we help you for the job that you want to have when you're done?' So those were some big things to me" (Participant #16).

While the majority of Canadian MFM programs are small, the opportunity for individualization of learning opportunities was considered ideal.

> "So, I think the most attractive thing is the fact that my training program is very small so because of that, I basically get the best of what the program has to offer, so for example, if there's a case happening, I'm not fighting with anyone for that case" (Participant #7).

The availability of programs with respectful and functioning teams was seen as important, and influential for optimal learning.

> "I think we have like really good, a really good team and the team works really well together. I think that there's a lot of respect for learners … giving learners enough independence but also enough support. I think the MFM

> program is laid out in such a way that it will really like facilitate my learning objectives" (Participant #8).

For most of the resident participants, the two-year length of MFM residency training was not a significant deterrent. Moreover, for residents who were passionate about MFM, the length of training was seen instead as a reasonable investment.

> "I feel like I've been in medicine for, or been in school or education for 30+ years, doing two more years on top of that to learn something I really love is not going to be a big deal" (Participant #2).

However, some resident participants hesitated at the concept of extending training by two more years. They did not express concern about the duration of training to become a MFM, but rather were concerned about the issue of extension of residency. Participants identified the personal implications of a delay in starting practice, such as deferring starting a family, student debt repayment, and perception of life still being put on hold. They wondered if "the increase in the satisfaction of my career [was] large enough to warrant the increased time and training, the prolonging of what in a sense feels like your life actually starting?" (Participant #1).

While the majority of resident participants were not enthusiastic about the prospect of a second RCPSC examination, it was not a significant deterrent to choosing a MFM residency: "It's not something I would be excited to do, but I can see the value and why they would have people do it" (Participant #13).

> "If I decided that I really loved MFM and wanted to do it, I wouldn't let an exam discourage me from going through the program" (Participant #5).

Resident participants did recognize the purpose for the examination as valid.

> "I would probably think that's a good thing, to make sure everybody's standardized and has this basic common knowledge that is required to be a specialist. I don't think that would be harmful; I think it would be more stress for us as a fellow … to study for it. But I can't really think of a downside to mak[ing] sure that everybody has the standard knowledge" (Participant #2).

Residents planning MFM or currently in a MFM residency identified some positive differences about their perceptions of this examination, as compared to their attitudes about the RCPSC O&G examination; since they would now be studying their field of choice, the subject matter was viewed as attractive to interested trainees, thus the experience of exam preparation was perceived more positively.

> "To be honest, I'm not as worried about this exam as I was for the [O&G} Royal College. I think that once you're focusing in on something that you're truly passionate about, (a) it's easier to study for because it's what you're really interested in, and (b) you know, … I'm going into this exam with a very different mindset … I would say that it's a very different ballgame than a couple of years ago" (Participant #7).

Resident participants varied in their perceptions of the required scholarly project in MFM residency, and of the required six months protected time dedicated for research in Canadian MFM programs. Some residents were planning to become researchers, and thus valued the experience of research during MFM residency.

> "So, to do that through fellowship, I think is totally fair and totally reasonable and I think, you know, the only way you can really understand how to read a research paper is when you actually try and do it on your own" (Participant #18).

Other participants were neutral to the concept of a scholarly project, but were accepting of the requirements: "I think it just comes with part and parcel of … that program. I don't have any feeling towards it one way or the other" (Participant #1).

Some resident participants did identify the requirement of a scholarly project to be a "slight deterrent." Participants questioned clinical experiences being lost for a "mandatory time period" for research. Particularly for residents interested in non-academic careers, the scholarly project was less valued.

Issues pertinent to MFM residency training programs were influential in resident decision-making. Program elements, including the length of training and requirement of another RCPSC examination, were generally accepted, but were of concern for some trainees. Perhaps the most divisive sub-theme was the required scholarly project and protected time, with varied opinions among participants, and this issue was noted to be influential in decision-making for some participants.

TABLE 8: Impact of MFM residency training program: Sub-themes

Theme	Sub-Theme
Impact of MFM residency program	Focus on learning over service
	Length of training
	RCPSC examination
	Requirement of a scholarly project

4.2.4 Perceived variety of MFM practice

Resident participants identified flexibility with a MFM career, including a variety of practice options in Canada. There were three sub-themes identified: provision of intrapartum care, type of centre preferred for practice, and regional variation in MFM practice.

The issue of MFM practice either including or excluding intrapartum care generated a variety of perspectives from resident participants. For many of the residents, the provision of intrapartum care was integral to their ideal MFM practice, and viewed as very desirable.

> "I don't think it's a necessary part. I think for me it would be a welcome part. I would not want to ever give up labour and delivery duties" (Participant #6).

Some deterrents to intrapartum care were noted, including impact of overnight calls on personal health and family, noting that "it's a trade-off, right, but I'm not ready to give that up" (Participant #16).

> "I would say the call is least attractive, but as I get further along and once my child grows up and I'm done kind of having kids, then I think it will be easier to increase the amount of call that I'm doing" (Participant #7).

Resident participants identified potential opportunities for flexibility in MFM practice, primarily involving shifting away from intrapartum care and night on-calls as their careers progressed. MFM offers the possibility of managing complicated obstetric cases, but potentially without in-hospital intrapartum care.

> "I guess the way I answered it in terms of, you know, MFM potentially having more of a consulting role as opposed to working labour and delivery, so that's something that I again think about. It's something that's attractive to me" (Participant #7).

Residents demonstrated a preference for MFM careers in academic tertiary centres, perceiving these sites as having the most complex and interesting cases, as well linking to a desire for an academic career.

> "That's most exciting to me, being in that kind of academic, big referral centre, where you see all the weird, wild, and wonderful that's rare, and you

> have to puzzle it out, piece it out, put it together and come up with a plan" (Participant #16).

Among resident participants, positions in academic tertiary centres were favoured, with community positions seen as less attractive alternatives.

While influenced by the practice at their residency centre, some resident participants were very aware of regional variation in Canadian MFM practice. In addition to the issue of intrapartum care, residents considered the patterns of consultation-only practice as compared to continuing primary care. Residents preferred practices that were perceived as being "hands-on," suggesting continuing care and labour and delivery.

> "Because it's practiced differently in my opinion … across the country ... I see practice more as truly consultancy-based career where you don't have as much involvement in patient care on the wards, or as much hands-on management of that patient, which is less attractive to me. And I've seen it practiced, you know, a lot more with a generalist flair, where you're actually hands-on and you're following those patients that you know, in all those labour and deliveries, and you're not just purely a consultant that's seen in the office between certain hours or whatever the case may be" (Participant #1).

Resident participants recognized the need to be aware of those practice variations, through speaking to MFM physicians, electives, or other sources.

> "I think as a trainee, it's a little bit hard for us to figure out. Like if you're in MFM, if you're only exposed to your own centre because of the variety of different practice status available across Canada, we don't necessarily see that perspective unless we actively seek out. So, if I were just doing my rotation, I probably would have no idea nor have thought about asking what the specialty could be like. I think I only really only ask around more 'cause I was interested in it" (Participant #2).

In summary, the practice patterns experienced in residency, or otherwise known, were influential in perceptions of MFM, as noted in Table 9. Variation in the practice of MFM was known by some participants, and not well understood by others. Consideration for the provision of intrapartum care and preference for clinical practice at a tertiary versus community centre also influenced decisions made by participants about MFM.

TABLE 9: Perceived variety of MFM practice: Sub-themes

Theme	Sub-Theme
Perceived variety of MFM practice	Provision of intrapartum care
	Type of centre preferred for practice
	Regional MFM practice variation

4.2.5 Lifestyle of MFM

Issues around lifestyle were of importance to many residents making career choices about MFM. The concerns varied, but MFM was generally seen as having a favourable lifestyle. Issues of lifestyle, family, and geography did significantly sway some participants in their perceptions of MFM. There were four sub-themes of lifestyle identified: partner or family issues, work-life balance, working hours, and geographic considerations.

Residents questioned how a career in the subspecialty of MFM might impact their family, including job opportunities for their partner, current family life, and embarking on parenthood. Residents varied in their perceptions; for some, MFM was seen as a positive choice for their family. Others were concerned about the impact of clinical

practice and on-call labour and delivery on their family. Both pros and cons were noted by resident participants, which potentially related to their experience in the practice of MFM at their academic centre. Residents emphasized the importance of lifestyle and of having a satisfying family life. Along with love of the field, family life was perceived to have great importance.

> "I mean the frequency of call and quality of life is important to my family, and it's something I considered and I discussed a lot with my [spouse] and when I made that choice. So yes, it was a factor" (Participant #21).

A frequent theme was a desire to move forward with "life," to move on from being a resident, to finally start that career after years of training, and to start or grow their family. Many of the participants were acutely aware of declining fertility with maternal age, and that their decisions regarding subspecialty training and career would impact their childbearing plans: "as you get older and want to be starting your own family, that's something to consider" (Participant #5).

> "Kind of in the back of my mind, [the] thing to look at is whether that subspecialty would improve or not improve my lifestyle. I want kids; I want a home life" (Participant #19).

Additionally, the prospect of moving cities for residency in MFM was identified to also impact partners and spouses, including their portability, availability of positions in their field, and impact on their career. Participants also acknowledged the possibility that their desire for subspecialty training could result in having to live apart from their spouse for two years, which would potentially diminish support systems and result in marital stress. Issues related to partners and family clearly impacted the ability of

individual residents to commit to subspecialty training and career in MFM, and were unrelated to the enthusiasm for MFM.

A career in MFM was viewed positively with respect to work-life balance: "I think it offers a nice work-life balance and good teamwork, as well as a lot of personal satisfaction." Perhaps also through role modelling, residents were aware that MFM physicians can set their own boundaries to obtain their desired work-life balance "because they make that a priority" (Participant #17).

> "I've seen centres where they have very good work-life balance and have a lot of control of their schedule, and I've seen some work more as a consultant only, and I've seen other MFMs that the demand for their services is so great and they are kind of overworked and need more support and are kind of overwhelmed and running all the time, so I think I've seen it both ways and I think you just have to be cognizant of what practice you're joining into, what the needs and what the supports are at that place at that time" (Participant #5).

MFM was seen as affording flexibility in career, such as including or excluding labour and delivery, that would be positive for achieving a work-life balance.

> "I also thought it provided a better lifestyle for myself and my family in regard to like work-life balance, and allowed for you to kind of tailor your career as you moved through it, to kind of change things up as you go" (Participant #8).

Residents also recognized they were influenced by the familiar; they were aware of the work-life balance of the preceptors at their centre. They recognized that they often did not know enough about the national practice options to extrapolate to practice at other centres.

Resident participants noted the perception of improved working hours for MFM, as compared to generalists. While they acknowledged that working hours may not influence their decision-making as to pursuing the subspecialty, the working hours of MFM physicians were viewed favourably: “I don’t think that alone positively or negatively influenced my decision, but that’s just what someone observed” (Participant #2).

In addition to the daily working hours, the perceived option of on-call intrapartum care was seen favourably in the long term. With a career in MFM, while there was general enthusiasm for obstetric on-call, residents expressed interest in the option of taking less obstetric call later in their careers. Participants felt this was related to the flexibility of MFM, compared with the perceived career-long requirement of obstetric on-call typical with a generalist clinical practice.

> “Well for me, like I feel like every time I do a night shift and I’m up all night, it like wears on my body, and it takes me longer to recover, so I think that MFM offers more opportunities in the long run for, you know, doing some call, but not staying up all night long as well” (Participant #8).

Perception of working hours was influenced by the type of MFM practiced at their centre of training. As practices vary, so do the working hours for in-house obstetric on-call, versus lower volume obstetric on-call from home, versus no longer providing obstetric on-call.

While many resident participants saw themselves as very portable for subspecialty training and career, for other participants, issues of geography were paramount. For some residents, proximity to family for subspecialty training and

eventual career was critically important, and related to numerous issues, including: day-to-day family life, support, childcare, cost, and lifestyle. This was especially evident for residents who were already themselves parents.

> "I wanted a bigger city closer to family, while moving to a place where we have all of our family members … I wanted my kids to know their grandparents, know their cousins and what-not" (Participant #3).

Other residents highlighted how MFM might help or hinder their eventual goal of, for family reasons, employment at a certain centre or in a certain city. Some resident participants spoke very favourably of the field of MFM, but for family reasons desired a community practice in a small centre with low patient volume and complexity, where MFM specialists would not be needed. For other residents, a residency and career in MFM was seen to increase the opportunities for eventual employment in a city favourable for family reasons.

> "I mean for me … I thought the program here was very good, but also I wanted to stay in the same city, because of my family and life obligations" (Participant #8).

For several resident participants, issues of geographic location relating to choosing MFM residency and career were significant, and sometimes more important than a love of the field itself.

While generally favourably considered by participants, issues related to lifestyle in MFM were influential, primarily related to individual resident issues, such as their partner, family, or need to be located in a certain area during residency or eventual career. The concepts of work-life balance and satisfactory working hours were

significant to trainees, and MFM was perceived to offer an advantage in these areas. Issues related to the theme of lifestyle are summarized in Table 10.

TABLE 10: Lifestyle of MFM: Sub-themes

Theme	Sub-Theme
Lifestyle of MFM	Partner or family issues
	Work-life balance
	Working hours
	Geographic considerations

4.2.6 Academic career

Residents viewed a subspecialty career in MFM to be a route to achieving an academic career, and perhaps the best option when most passionate about obstetrics. MFM teachers in university centres are often academic physicians, and did inspire residents to pursue similar careers. Subspecialists traditionally have careers in tertiary or academic centres, and have been leaders in research and medical education. On the theme of academic medicine, there were four sub-themes identified: aspirations to an academic career, becoming a researcher, teaching trainees, and practicing subspecialty medicine.

With residency training predominantly located in tertiary academic centres, many role models, including MFMs, are academic physicians, and as such residents often aspired to fully academic careers.

> "About my future and my personal goals, I would like to be a faculty member, and also [have] a career about teaching and research, so it's something that needs to be done at a university center, in a city with enough resources" (Participant #4).

Some residents identified that in their vision, they saw themselves as academic physicians, employed at a tertiary centre, with university roles and expectations.

Residents also saw MFM as an opportunity to lead obstetrical research: "I think it will be part of my career" (Participant #1). With many of their residency preceptors in academic positions, residents were likely inspired to similar careers. Study participants described their interest in pursuing research in MFM, and highlighted how the field itself stimulates research.

> "I think that it's great because if you're doing a [subspecialty residency] in something, I think you should love it enough to be interested in advancing the area which you're trying to go into" (Participant #20).

However, some residents expressed that they were more interested in the clinical aspects of MFM than in research. While many residents were excited by the prospect of an academic research career in MFM, others were decidedly less interested in research, preferring a predominantly clinical or educational career.

Residents also noted a desire to teach trainees, a goal seen as best accomplished through an academic career at a university centre. Residents spoke of a desire to teach at all levels, but especially at the level of specialty and subspecialty resident teaching, as well as providing continuing medical education.

> "So, for me, I think probably a major tertiary centre rather than a community or rural area, having some component of medical education,

whether resident or a medical student, would be important for me" (Participant #2).

Residents expressed a distinct interest in being a subspecialist, specifically to be perceived as an expert in MFM. Interested residents emphasized their interest in becoming an expert subspecialist, and their view of MFM physicians as specialized experts.

> "I think it's nice to have like a specialized skillset that you have specialized knowledge in a certain area. I like the idea of being an expert in an area" (Participant #6).

Being a subspecialist in MFM was seen as opening up opportunities within an academic career, bringing elements of flexibility and leadership opportunity (Table 11). The concept of becoming a researcher and an educator were seen as integral elements to MFM. Lastly, the desire to become a subspecialist was also influential. While an academic career was seen as important for many participants, others planning careers in the community were deterred by the prospect of mandatory academia.

TABLE 11: Academic career: Sub-themes

Theme	Sub-Theme
Academic career	Academic aspirations
	Becoming a researcher
	Teaching trainees
	Subspecialty medicine

4.2.7 Finances

While financial issues were not the leading theme in decisions about MFM as subspecialty, finances and employment evolved as important issues for some residents.

Many residents were emphatic that financial issues were not of concern to their decision-making: "so finances have never been … a factor in any of my decisions." There were three sub-themes around financial issues identified: the financial issues of pursuing additional training, future employment opportunities in MFM, and income from an eventual career in MFM.

Participants uniformly expressed concern about the high student debt incurred in medicine. For many residents, the debt was already so large that continuing for two more years of residency training when already a specialist was not a major deterrent:

> "Most of us, myself included, have really a significant amount of debt, so the idea of being able to make staff money … a little over a year from now is very attractive, but I think if I really had a specific clinical interest … I mean, our training is already so long, we already have so much debt, that I think the idea of having like one or two more years of not making real staff money would not be a deterrent to me" (Participant #10).

> "Like most residents, I have debt from medical school, maybe I'm idealistic but I think it's possible to pay off the debt eventually. I don't like to think of that as something that really drives my decision-making, so hopefully I'm not being overly idealistic about the whole situation" (Participant #15).

Residents uniformly reported financial stress, but finances were not usually seen as a reason to not pursue additional training with a MFM residency. However, for other residents, particularly residents with dependents, finances did impact their decision to pursue additional residency training. Participants were specifically concerned with continuing on "a resident salary," and the implications of delaying decisions and actions around financial issues for two additional years of residency education.

> "I don't think it's particularly influencing my choice of subspecialty versus not, and it's two more years before I'm putting money towards my

> mortgage, two more years before my student debt is going to start being paid off, and everything just gets put on hold in my life. But two more years of paying interest on your line of credit or whatever it may be … it's prolonging the student lifestyle for that much longer" (Participant #1).

An added financial stress related to pursuing a MFM residency was the cost of moving themselves and their family, as not all university centres in Canada offer MFM residency.

> "Obviously [there are] only certain centres that have MFM [residencies], and so it may potentially mean moving to a different location, which is another factor … whether my husband would be able to move or not, and that definitely would factor into the decision" (Participant #5).

For the majority of participants, their love of the subspecialty and desire for training was paramount, and financial concerns did not impact their ultimate decision-making. "I volunteered to do the [residency]. Like, when it wasn't clear if we'd have spots or funding or anything, I would have happily stayed on to do it for nothing" (Participant #6).

The availability of MFM employment opportunities, whether actual or perceived, affected the desirability of MFM residency training. Participants often favourably described the availability of positions as drawing both themselves and other trainees to the field of MFM.

> "My impression is that there are needs for MFM, so I think in the next few years, there would definitely be positions for me to go into if I were interested" (Participant #2).

Residents who were aware of recent hires in MFM and or availability of current jobs in MFM felt positive about eventual career opportunities in MFM.

> "I also think in our region, there are more jobs in MFM than there are in other subspecialties … I suspect that may be influencing people" (Participant #10).

Residents expressed awareness of opportunities local to their O&G residency, but not necessarily awareness of national opportunities in MFM. Some residents echoed concerns about underemployment of subspecialists, and particularly about finding suitable employment after an additional residency.

> "The most heartbreaking scenario is when you invest more time into training with no guarantee of a job, because that means that you can't really do the thing you loved [and] you wanted to do anyway" (Participant #19).

While residents were aware of job opportunities in MFM, some were concerned about many of these opportunities being in community settings, rather than tertiary or academic centres, and uncertainty about what these positions would involve for clinical practice.

> "There's a lot more MFM positions opening up in some of the smaller communities which may be attractive to some, for me not as attractive because again I see myself more in an academic centre" (Participant #7).

In summary, residents generally perceived that there were job opportunities in MFM, and while the prospect of eventual employment was important, it was not the major influence in their decisions about a subspecialty MFM career.

> "I mean in terms of job availability … it didn't really affect my decision, because I feel like it all just depends on timing, and you can't really predict when jobs will be available or not" (Participant #9).

The majority of residents had expectations of adequate income from an eventual career in MFM, and were not very concerned about future finances. Rather, participants

expressed significantly more concern about finding a permanent position in MFM. Some residents believed that MFM was more lucrative than a general O&G practice: "well my teachers talked to me about this, and I know that MFMs usually, in my centre, they make more money than the general obstetricians" (Participant #4). Other residents expressed concern about MFMs having less income than generalists: "I was going to take a pay cut and that was okay with me, because I wanted to do MFM" (Participant #3). Among participants, there was uncertainty about income in MFM, and how a practice in MFM generates income: "I don't know, to be honest. I don't know how much MFMs make compared to [generalists] or other physicians" (Participant #15). Residents expressed that issues of finances and income were often not discussed frankly with trainees, and that undue preoccupation with money might be seen as unseemly for both residents and staff. Several participants expressed concern about a lack of understanding about finances and income in MFM, and reliance on trusting that everything "will be OK" when working as a staff.

> "I think my understanding coming out of residency, although a lot of doctors don't like to give specific numbers, and I'm not sure why. I think they should all be a little more open about it but, you know, I always got the heavy understanding that as an MFM, being able to support yourself and have a good lifestyle was not going to be an issue" (Participant #16).

Perception of eventual income from a MFM career was generally seen as adequate, and not generally a deterrent to career choice, but residents demonstrated limited understanding of the financial issues surrounding a career choice of MFM.

While not the leading force behind decision-making, financial issues were on the minds of participants, and were influential for some, as illustrated in Table 12. There are undeniably financial issues of additional training that are impactful for some residents. Perception of available MFM positions influenced both perceptions and decisions, and understanding eventual income in a MFM career was identified as an area for more resident education.

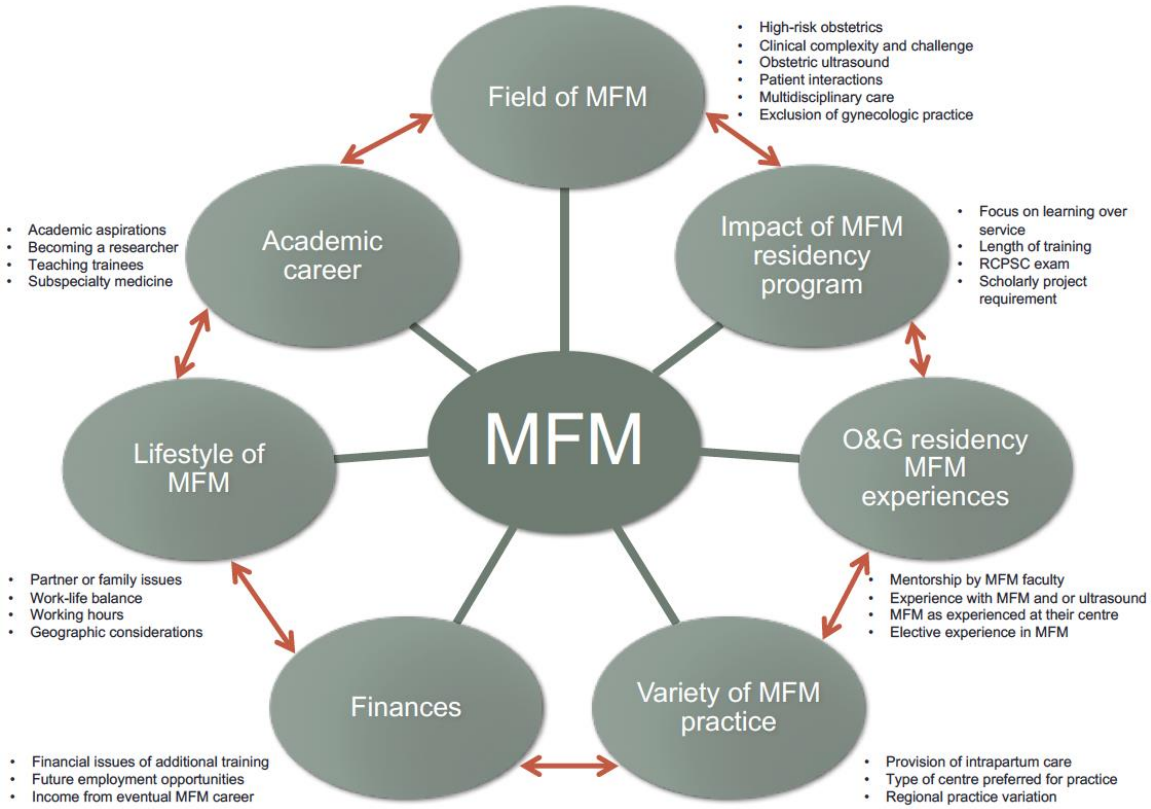
TABLE 12: Finances: Sub-themes

Theme	Sub-Theme
Finances	Financial issues of additional training
	Future employment opportunities
	Income from eventual MFM career

4.2.8 Connectivity between themes

The perceptions of O&G and MFM residents have now been described through seven discrete themes: the field of MFM, O&G residency MFM experience, impact of MFM residency program, perceived variety of MFM practice, lifestyle of MFM, academic career, and finances. While these themes were assessed as distinct, there was undoubtedly some connectivity between these themes (as illustrated in Figure 1 below).

FIGURE 1: Resident perceptions of MFM residency and career: Thematic schema



The concept of an academic career relates to any subspecialty practice, including MFM. Subspecialist physicians have historically practiced in academic institutions, with many engaging in academic pursuits. Thus, academia becomes connected to the subspecialty field itself. In centers where there was also an active MFM residency program, O&G residents were exposed to MFM residents and their program elements, for better or for worse. The perceived experience and expectations of their local MFM residents influenced perceptions of MFM residency. The O&G residency experience was also connected to the variety of MFM practiced at their centre; elements of regional

practice variation and MFM participation in intrapartum care influenced their experience of MFM in residency, and their sometimes-narrow perceptions of the field itself. The local MFM practice also influenced financial issues, such as resident perceptions of future employment and eventual career income, as this would vary with different remuneration strategies and predominance of intrapartum obstetric practice, as compared to a regional focus on ultrasound and consultation. Lastly, the theme of lifestyle had connectivity with both finances and the concept of an academic career. Financial issues were interrelated with issues of partners and families, specifically by the impact of additional training on current or planned children, partner employment, and MFM job opportunities. As an academic career in MFM would often be located at a large urban academic centre, residents associated MFM career with desirable lifestyle, including concepts of urban living, the likelihood of a larger group with less time on-call, as well as the greater likelihood of achieving work-life balance.

4.3 Positive and negative factors influencing trainee choice of MFM residency and career (Research Question 2)

Participant favourability to MFM influenced perception of which influencing factors were viewed as positive or negative. Thus, the positive and negative factors influencing participant career choice were assessed in three different groups[28] of resident participants:

1) Trainees committed to a career in MFM (including residents intending to apply to MFM, residents already matched to MFM, and residents currently in MFM residency);
2) Trainees favourable to a career in MFM (including residents who expressed favourability to MFM, but who for various reasons were not planning to pursue a MFM career); and
3) Trainees adverse to a career in MFM (including residents who were not at all interested in pursuing a career in MFM).

For each of these sub-groups of participants, there were both positive and negative factors evident as influencing decisions about MFM. These findings are summarized in Table 13 below, and will be discussed in detail.

TABLE 13: Positive and negative factors influencing trainee choice of MFM

Trainee perception of MFM	Positive Factors	Negative Factors
Committed to MFM	• Love of the field: complexity, teamwork • Dislike of gynecology • Academia and tertiary centre • MFM faculty: role models and mentorship	• Emotional toll of the field • Increasing demand and or burnout
Adverse to MFM	• MFM faculty	• Dislike of field and or complexity • Exclusion of gynecology • O&G residency MFM experience
Favourable to MFM	• O&G residency experience and mentorship • Experience with ultrasound • Love of the field: complexity	• Complexity of patients • Exclusion of gynecology

4.3.1 Trainees committed to MFM

For trainees committed to a career in MFM, four positive factors were identified, including: (1) the clinical practice or field of MFM itself, (2) the opportunity to exclude gynecology from their practice, (3) the likelihood of an academic position in a tertiary centre, and (4) mentorship from MFM faculty. While these participants were very favourable to MFM as a whole, two negative factors were identified: the emotional toll of MFM practice, and perception of increasing clinical demand associated with faculty burnout.

Participants committed to MFM frequently and uniformly expressed that the strongest positive factor was their love for the many facets of MFM clinical practice. The committed trainees were excited for the opportunity to lead complex and challenging obstetric care, having "a cerebral interest in the higher-risk issues" (Participant #1). They were not "fired up" at all about the prospect of a lifetime of routine obstetric care, preferring instead "to be part of … more complicated obstetrics" (Participant #15). Participants believed that in a future MFM practice, their "brain wasn't becoming stagnant" in the ever-changing and dynamic field of MFM. Participants described their passion for the unknown and complex complications seen in MFM practice.

> "Intellectual, academic interest in terms of what the illness and the disease process entails, what it means and, you know, the complications and the fact that a lot of it is unknown … like if you take preeclampsia, a lot of it's still being determined, a lot of stuff is up and coming" (Participant #1).

Trainees also identified excitement about collaboration and a multidisciplinary approach to patient care in MFM, stating that it is: "fun and exciting to be able to work on problems and sort of complicated scenarios with colleagues from different specialties" (Participant #15). Committed trainees also identified clinical enthusiasm for some of the more difficult parts of MFM, such as breaking bad news and helping patients making difficult decisions about their pregnancy. They identified the privilege of providing obstetrical care in the most vulnerable of circumstances.

> "I like the ethical dilemmas that there is no one right answer, it's really a balance of different situations and benefits versus risks. I like being involved with patients and being there for them while they're making difficult decisions about their life, their pregnancy. I think that would the major reason why I really enjoy this specialty" (Participant #2).

Committed trainees recognized the dynamic nature of the field, with rapidly evolving technology and procedures, and were excited by the prospect of ongoing change and advancement of knowledge.

> "I'm seeing something new and every day I'm learning and I know that, you know, even though [MFM] has been around for a few decades, I think that, you know, in a few decades from now, it's still going to be completely changed again. So, I don't think that I'll have a day where it becomes just routine, which is really exciting to me. I need that in my career" (Participant #3).

Lastly, rather than seeing MFM as a narrow area of practice, committed trainees were excited by the variety offered by clinical practice in the subspecialty, as compared to generalist O&G practice.

> "The thing that I'm most attracted to is the variety in subspecialty, the fact that I could spend a day doing procedures, a day doing ultrasound, a day doing clinic and then a day on labour and delivery is probably the most attractive part of it for me" (Participant #7).

Trainees committed to MFM usually found the absence of gynecology from MFM clinical practice to be a positive factor. For some, the dislike of gynecology was so strong that it nearly influenced their original decision to match to the five-year O&G residency:

> "But the issue for me was the gynecology, so actually I had a long kind of thought process prior to applying to [O&G] because I wasn't sure if I'd be able to make it through a five-year training program with as much gynecology as there was, in order to eventually practice as an MFM subspecialist" (Participant #15).

With the emphasis on gynecology in generalist practice, trainees expressed that they couldn't see themselves in a general O&G practice, and knowing this was one of many factors that made their best fit with a career in MFM.

> "I knew right off the bat that gynecology was not something that I was interested in and I would not be happy as a generalist" (Participant #7).

For some, it was a more difficult decision, but trainees were led positively to MFM by their preference for obstetrical practice over gynecology.

Beyond just a love of the field, trainees saw MFM subspecialisation as leading to opportunities for an academic career with a university, and located at a tertiary obstetric centre. Given the acuity of complex patient care, the opportunity to practice in a tertiary centre was viewed as important, and subspecialisation in MFM was seen as enhancing the opportunity for tertiary or academic centre employment. MFM was seen as a natural fit for trainees that both preferred obstetrics to gynecology and had academic aspirations: "I realized that I wanted to pursue a more academic career and because of that, I started focusing more and more on MFM, so I think that was a big sort of influence" (Participant #15). A positive factor for career choice of MFM was that "given where MFM is, most positions would be in an academic centre" (Participant #8). Some trainees admitted to being "a bit more driven by career aspirations," with a desire for an academic career, and a focus on education, research, and or leadership.

The last positive influencing factor identified by committed trainees related to the MFM faculty was role modeling and mentorship. There was a consistent theme; MFM faculty were nationally viewed as being positive physician role models that function well as a team, and this was seen as attractive. The opportunity to practice medicine as part of a "group that functions well" (Participant #15) was very attractive to participants. MFMs in Canada frequently practice as a group, and need to work well as a team. The

trainees perceived that an eventual career in MFM would be associated with having a close and functional team, as opposed to the solo endeavour more often practiced in generalist O&G.

> "Because of the closeness of the MFM group, it was really attractive to me in terms of being a part of a group like that, and I'm not sure how it is in other universities, but I got the sense that it's kind of similar throughout other universities and that was very attractive to me" (Participant #14).

Committed residents were influenced by positive clinical interactions with MFM physicians, as well as the level of expertise of the faculty. Positive role modeling significantly influenced residents to want to be like their MFM faculty when they completed training, and made MFM a more attractive option.

Related to the nature of the field of MFM, committed residents acknowledged the potentially negative influencing factor of the emotional toll of the field.

> "I think it's part of the worst aspect of MFM, in that it can be very draining being involved in those cases because it is so emotional, and when you do develop kind of emotional connections with the patient, it can be very difficult on the doctor as well" (Participant #15).

While key to practicing in the field, MFMs routinely have some of the most difficult duties in obstetric practice, and "least appealing is obviously breaking bad news and dealing with, you know, unexpected outcomes or just unexplained findings or anomalies" (Participant #3). While committed, residents recognised the potential personal reactions to constantly managing difficult obstetric cases, and having to communicate bad news with greater frequency than in generalist O&G practice.

> "I think they also get a lot of higher volume of consultation in areas that might be quite … for example, you might have a day that's dealing with a lot

> of anomalies, so it could be a little bit more negative, the impacting your emotions. If you were to see a lot of sad cases in a row, so I think that could be something that's affecting my decision" (Participant #2).

Another negative factor for committed trainees was the perceived increasing demand for MFM consultation and the specter of physician burnout. Many MFM practices have increasing patient volume, and the residents appreciate this shift. When there is

> "increasing demand and not more human resources, then I would not want to feel as overworked and as unable to provide adequate care as some people have mentioned that they are starting to feel" (Participant #6).

When exposed to very busy clinical centres, residents reported being aware of increasing patient demands without increasing numbers of MFM physicians. When staff MFM physicians were seen as developing burnout, this was of growing concern for residents, and may have affected career choice.

4.3.2 Trainees adverse to MFM

For trainees adverse to MFM career, predominantly negative influencing factors were identified, including a dislike of the field or obstetric complexity, the exclusion of gynecology practice, and a negative experience with MFM in O&G residency. Even for residents adverse to MFM, a positive factor was identified; similar to other groups, trainees adverse to MFM noted the admirable attributes of MFM faculty. While not enough to overcome the other negative factors, trainees adverse to MFM were impressed with MFM faculty, and viewed them as physician role models.

> "I mean, there's some really amazing role models in MFM … I don't want to stereotype it, but I know in my experience, every single person that I've met staff-wise who works in MFM, they're like the nicest people. I can think of several of them that I've worked with who just have this incredible calming influence, and like who wouldn't want to be like that, right? Like … if you met them, you'd aspire to be like them. And they're just so smart in terms of just the physiology and the basic medicine. It's astonishing when you're talking to them" (Participant #18).

Trainees adverse to MFM expressed a dislike or frustration with the field of MFM. Issues noted included a dislike for multidisciplinary care, having to make clinical decisions in the absence of evidence-based literature, and a dislike of ultrasound.

> "I never really considered it much before again because I'm not really a fan of the diagnostic imaging side of it, which is a big part of it" (Participant #13).

For trainees adverse to MFM, the exclusion of gynecology practice both in residency and in one's eventual career was a roadblock. According to the trainees, "the downside of a career in MFM would be giving up all that [gynecology] and all that [gynecologic] surgery" (Participant #18). For trainees who prefer gynecology and gynecologic surgery, the streamlined career of MFM was unattractive. Loss of surgical skills during a primarily clinical MFM residency was also viewed as concerning.

> "It's definitely a very interesting field, and it feels like a very dynamic and exciting field for sure. I guess for me, I've learned that, I really like to operate, and I like keeping up the surgical skills, so to me it feels like, you know, if I did a [residency] in MFM, I guess I would just be worried that, if you're not doing enough of [surgery], then your skills really deteriorate" (Participant #18).

Trainees adverse to MFM career frequently expressed having negative experiences with MFM during their O&G residency, some reflecting issues with teaching

or curriculum, while others absorbed a negative work environment during the MFM rotation.

> "I find the work environment where I'm currently working is very unpleasant as a whole, so that's definitely a factor. I would want to find somewhere where I felt like I was appreciated and valued, rather than constantly being criticized and undermined" (Participant #13).

Residents who, for whatever reason, did not gain skill or comfort with ultrasound in their O&G residency were left with a negative perception of MFM. Thus, if they didn't feel comfortable with ultrasound, why would they choose a career in MFM? Some stated:

> "I'm not a big fan of scanning, although maybe if I did more and felt better with it, I would maybe change my mind but I think I'd miss gynecology as well" (Participant #13).

Residents who perceived a requirement for service over education, or who felt excluded from complex MFM care, were left with a negative perception of MFM as a whole.

> "I did my MFM core rotation … it was not a great reflection of MFM because I feel like a lot of the time I was just doing, you know … I hate to use the word scut but it kind of was scut work … To be honest, I would have rather done more clinics and seen more outpatient MFM. I think that would have … piqued my interest more to sort of see a more aspect of it" (Participant #18).

4.3.3 Trainees favourable to MFM, but not planning to pursue MFM

For the last group, trainees favourable to MFM but not pursuing a career in MFM, positive factors influencing career choice included O&G residency MFM experience and mentorship, and experience with ultrasound. The complexity of patient care in MFM was viewed as both a positive and negative factor. Like the previous group, the other

significant negative factor influencing choice was the exclusion of gynecology practice in MFM.

Trainees were favourably influenced by positive experiences in MFM during O&G residency, including a positive impression of MFM faculty. In fact, residents who were inspired during their mandatory MFM rotation were more attracted to considering a career in MFM.

> "Yeah, definitely, like when I did my MFM rotation, it was very, very influential, and had it not been for that missing surgical component, I probably would have gone on to pursue MFM because it was a really great rotation, it was really comprehensive, we had exposure to a wide variety of cases and it was very hands-on and all of that really gave me a sense of what it would be like to be an MFM [resident], and what it would be like to actually be an MFM staff, so that was really attractive to me" (Participant #14).

MFM faculty were reported to be instrumental to a successful MFM rotation, and they were viewed very favourably as an influence in career decision-making.

> "I would say that the MFMs that I've had the opportunities to work with are definitely very influencing. They are fantastic teachers; they love their job; they're inspiring … I think their enthusiasm for the specialty is a bit infectious and when you're around them, you feel like, "Oh, this is for sure what I want to do" because they kind of rub off on you. So, for sure the faculty that I worked with has been very influential" (Participant #5).

A positive experience with ultrasound, including attaining comfort and competency, was seen as a positive factor influencing career choice.

> "So, I think MFM is a true medicine. I love the ultrasound component of it; I like the even medical component of it. There have been quite a few interesting cases, and I would love to do something more high-risk for sure" (Participant #17).

Early exposure to ultrasound was noted as a positive influence: “So we get a block in PGY-1 that’s about a month long and it’s a very good … the teachers are excellent, that everybody wants the rotation” (Participant #10).

These participants viewed the complexity of patients, inherent to the field of MFM, as both a positive and negative influencing factor. Like other groups, complex obstetric care was considered academically intriguing: “I considered it because I find it very like intellectually interesting” (Participant #5). Trainees also recognised the rewards in successfully caring for complex patients: “it’s something you wouldn’t really get in the low-risk obstetrical world” (Participant #17).

> “I think the attractive components would be that you tend to become very close to your patients. These are people that have significant medical comorbidities, and helping them throughout the pregnancy to achieve a healthy outcome for mother and or baby can be extremely rewarding” (Participant #12).

Other residents expressed reservations about the complexity of MFM patient care, noting that the complex obstetric care is quite different than acute surgical care, and thus can be less appealing for residents who have a surgical approach and appreciate quick decision-making.

For trainees otherwise favourable to MFM, the traditional exclusion of gynecology practice in a MFM career was the primary negative factor: **“**the not appealing thing would be that your foregoing part of your gynecologic training” (Participant #19). Even for trainees very attracted to MFM career, the loss of gynecology practice after so much surgical training was seen as a significantly limiting factor: “I think

the hardest part about the specialty that I would find is that you lose the gynecology, so you really are streamlined into an obstetrical career" (Participant #17).

For residents who love both obstetrics and gynecology, the price was considered too high to walk away from gynecology.

> "My main reservation with MFM is that gynecology is not always a part of that career, and I came into the specialty liking gynecology as much as obstetrics so I did not want to give up that part of my practice" (Participant #12).

While there was some overlap, the influencing factors varied by the trainee perception of MFM as being perceived as positive or negative. Even for residents committed to MFM, negative factors were identified and viewed as significant. Those adverse to a career in MFM still appreciated the contributions of MFM faculty. The influencing factors for participants favourable to MFM were of particular interest. This group was attracted to many qualities of the field itself, but were primarily turned off by the exclusion of gynecology from usual current MFM clinical practice.

4.4 How MFM residency training and future career could be perceived as more attractive to trainees (Research Question 3)

In reviewing the developed themes as to the resident perceptions of MFM, there were factors that would be difficult or even impossible to change, but there were also factors where education and other adjustments could be introduced to potentially improve the perception of MFM as a career. To address this research question, the factors influencing perception of MFM attractiveness were best described as intrinsic to

the subspecialty, extrinsic to the subspecialty, or being potential opportunities for change or even promotion of the subspecialty.

4.4.1 Factors intrinsic to the subspecialty

Factors intrinsic to the subspecialty of MFM include many sub-themes previously developed, including high-risk obstetrics, complexity or challenges in patient care, ultrasound experience, multidisciplinary care, interactions with patients, and the usual exclusion of gynecology from MFM practice. While aspects of residency education can always be improved, interest and passion for high-risk and complex obstetric care is inherent to the resident. If a trainee is not passionate and enthusiastic about the field and day-to-day clinical practice, it is unlikely that they would ever desire or could be influenced to pursue MFM residency and career.

4.4.2 Factors extrinsic to the subspecialty

Factors extrinsic to the subspecialty of MFM were also highlighted in the resident responses regarding their perceptions of the attractiveness of MFM residency and career. While the most prominent of the identified themes relate directly to MFM, other factors unrelated to MFM subspecialty were very influential for some residents. For example, for some residents, regardless of their passion, extending training any further for subspecialisation was just not personally possible. While any prospect of employment was attractive to trainees, an opportunity to meet a known clinical need in a site or region was attractive for personal reasons.

> "The good thing, one of the really good things that I was going to say is that there is a lot of career opportunities right now which is a positive in our specialty, because it's been sort of traditionally difficult to find a job in the last five to ten years" (Participant #11).

Residents have individual personal and family needs, which are wide-ranging and often independent of the field of MFM itself. Family needs and perceived working hours predisposed residents to planning academic or community careers. In some instances, residents were very interested in the subject matter of a subspecialisation such as MFM. However, if a resident desired to work in a smaller community, a generalist career path may be more appropriate to prepare for employment at a smaller centre.

> "I know a few people have worked in, like there are some smaller centres, but for the most part it's in tertiary centres and bigger cities that MFM positions are available, did affect my decision … it is a part of why I decided not to do MFM, because it wasn't really in keeping with sort of what I saw for my life in terms of where I wanted to live" (Participant #9).

Lastly, issues relating to a significant other and or family can influence decisions for subspecialisation; residents may choose to not pursue a field they love if their personal needs are at odds with undertaking additional training, with respect to length of training or perhaps relocating to a different centre or region.

> "So, personal factors would be the idea of doing a [residency] if my [partner] had the opportunity to be in the same centre. It would be very discouraging if my [partner] wasn't able to work where I was going to be for two years. That would potentially, would strongly influence my decision" (Participant #5).

These identified factors are diverse, but are linked by being extrinsic to the subspecialty of MFM, being of great personal importance to individual resident physicians, and

unfortunately are unlikely to be influenced by any actions to promote the subspecialty of MFM.

4.4.3 Opportunities for promotion of the subspecialty

After excluding factors intrinsic to the field of MFM and personal factors that are extrinsic to MFM subspecialisation, opportunities for promotion of the subspecialty with three themes were identified: (1) opportunities within the O&G residency, (2) opportunities related to MFM residency, and (3) opportunities to address the issue of gynecology practice within MFM career.

4.4.3.1 Within O&G residency

During the O&G residency, there is opportunity to promote the subspecialty of MFM. Opportunities include trainee education about MFM training and practice patterns, enhanced faculty mentorship, assistance with career planning, and early trainee exposure to obstetric ultrasound and MFM.

Most participants identified MFM faculty and mentoring as a strength of the subspecialty. However, this could be enhanced by emphasizing (i) career planning education efforts, (ii) characteristics of and national options for subspecialty training in MFM, and (iii) the variety of practice patterns for MFM across Canada. Participants suggested that national strategies could be considered to better support trainees interested in subspecialisation, including providing assistance with applications, finding and differentiating the various MFM residency programs, and developing a mechanism for connecting interested residents with potential mentors in other centres.

> "Also, I think applying to [residency], there is really no clear guidelines as to what I should be doing, so I'm kind of making it up as I go in terms of where to go for electives, how many electives to do, what kind of research if I need to, who should I connect in terms of getting a reference letter. I found there is a lack of kind of published or standardized requirement to apply to [residency] across Canada. You kind of have to figure on your own a little bit. So, I think having that information may help a little bit more" (Participant #2).

Participants who were aware of different practice patterns in MFM recognized the possibility for flexibility, and this was seen as a positive factor for subspecialisation in MFM.

> "I think in the future, there's a role to like tailor your practice so that it could fit what you're most interested in, like if you wanted to do more of a consult-based service versus being in the labour and delivery room, there's opportunity to be flexible, I think, in a future career and then or become more research, like there's lots of opportunities that are very appealing in MFM" (Participant #5).

While MFM faculty were recognized as being very supportive and offering mentorship, participants described a void in Canadian leadership for education about MFM residency and career. Participants suggested that a national strategy for education about MFM practice patterns and future directions should be considered. Often residents are only aware of the practice pattern in their own centre, despite there being significant variation in MFM practice patterns across Canada. Participants suggested establishing a central method for dissemination of information about MFM residency and practice in Canada, rather than relying on candidates finding out by chance or word of mouth.

> "I don't know if a lot of people know how different the practice is across the country. I mean, people do tend to focus only on what they know and what's close to them, but I think it's important for people to know how different the MFM practice is in different provinces. Like that kind of

> surprised me. I only found out because I was talking to a [MFM resident] and he'd done electives elsewhere, and so that's how I sort of heard" (Participant #11).

As more of the newer MFM positions are viewed by residents as primarily clinical and often located in the community, additional education about these practice variations would be valued.

> "The one thing that I was thinking about today is the role of our, like the SOGC for example in helping residents or medical students choose subspecialty versus generalist careers. So, I just wonder, like as a resident, I actually never looked into whether or not there were resources. I never felt that I was told about resources that would be available and I'm just wondering, you know, for example, I kind of mentioned that as a resident, I didn't feel a lot of support in pursuing MFM and I just wonder if there was some kind of network that was set up where you could, you know, have a mentor at a different site or a different centre who was in the career that you hoped to model that could, you know, you could be matched up with and you could kind of have them as a resource point person. I think that would be hugely beneficial to residents and that would apply to all subspecialties. So, if there was some kind of networking, you know, tool available, you know. I just think that would be really great" (Participant #7).

Participants called for a systemic approach to workforce planning and a national strategy for recruiting interested trainees and education about MFM careers available following completion of training.

> "I think either an individual who would fill that role or a kind of systemic overhaul that, that career planning and sort of long-term … So, whether it's an individual or just a change in mentality overall. I don't know which would be better. Either one would probably help, because it's just not happening now" (Participant #6).

Residents who had early exposure to ultrasound and or to MFM in their residencies expressed far more favourability to MFM. With traditional MFM rotations occurring in PGY-3 or even PGY-4, residents might not experience MFM until later in

training. Participants expressed their frustration with not having received exposure sooner, especially given the extensive obstetrical experience gained in the first two years of residency.

> "Okay, it's MFM, or a separate block, it should be integrated throughout your learning at an appropriate level but if you're asking us to use certain skills, and then if you're not going to teach them to us in any formal setting until two years in, three years in, then it's just ridiculous and it leaves a bad taste in your mouth" (Participant #1).

Given the present structure of O&G residency, residents often don't have exposure to subspecialties, including MFM, until PGY-3 or -4, by which time they may already be applying to and interviewing for residency positions. Residents suggested creating an opportunity to gain earlier exposure to MFM and other subspecialties, and thus permit time for mentoring and networking, and better direction for research and electives.

> "I don't know, you know, when you have these PGY-1s and they're doing their core obstetrics and gynecology rotations, maybe they should be rotating through subspecialties. Maybe they should be doing two weeks of urogynecology, two weeks of MFM, two weeks of REI, just to get some kind of exposure to it, right?" (Participant #18).

> "I was trying to think like what influences our decision. I feel like there's sometimes pressure to start thinking about [residencies] earlier and earlier on in training, and I was thinking that I wonder if how your residency program sets up when you do your MFM rotation might influence … because if you were exposed to it earlier on versus later on in your training, it might change how you felt about it. I don't know if you wanted to look at that but I thought it might be interesting to see if you didn't have MFM so late in your training, then you might feel that it's too late to set up electives to get a [residency] and so therefore, you have to consider it seriously" (Participant #5).

4.4.3.2 Within MFM residency

At the level of the MFM residency, participants identified potential opportunities for modification that might increase the attractiveness of the MFM residency, including research and scholarly project RCPSC requirements, and consideration for individualization or a community stream of training.

The current RCPSC MFM requirements of six months of protected time for research and completion of a scholarly project were identified as potential deterrents for resident participants. While participants supported educational experience around research as being critical in training, many suggested that the requirement was rigid, and did not permit program personalization. "[The mandatory research] is a slight deterrent. It's kind of a mandatory time period … just adding time onto the residency" (Participant #14).

> "I think that you should be able to have the opportunity to do research if you are inclined to do so, but I also think that sometimes it is a little bit tedious and can be a deterrent or negative factor of the extra training" (Participant #17).

Flexibility and personalization with respect to trainee needs and goals may permit residents to meet their learning needs, and even to prepare specifically for their planned practice pattern. A resident planning an academic career in research likely has different needs and objectives than a resident planning a clinical career in the community, and participants suggested that less rigid requirements would be attractive, while acknowledging this issue was complex and "that I don't think there's a perfect answer" (Participant #21).

> "I would maybe put a bit more option on the research so just 'cause now it's mandatory six months by the Royal College. I think maybe having a bit more or less, depending on the [resident's] interest would be a good idea. It might be a bit more flexible" (Participant #21).

Resident participants noted that an opportunity for either development of a community "stream" for MFM, or even an alternate fellowship program for gaining high-risk obstetric skills for community practice would be valued and very attractive. Within the sub-group of residents favourable to MFM, participants expressed interest in enhanced skills in high-risk obstetrics and ultrasound, rather than the full academic requirements of a two-year MFM residency.

> "This as a subspecialty would be interesting because I think that there are a lot of people who are interested in high-risk obstetrics, but who don't necessarily want to do that academic part of it, because sometimes I wonder whether they should have like a different type of opportunity, like a different type of stream or something like that" (Participant #15).

Resident participants were cognizant of the perceived shifting demographic of MFM positions in Canada, as it is an emerging trend for the subspecialty to have increasing community MFM positions, and they proposed examining the RCPSC training goals and objectives for MFM residency for alignment with current and future MFM practice in Canada.

4.4.3.3 The question of gynecology

While exclusion of gynecology practice in MFM is the norm in Canada and thus would usually be considered intrinsic to the specialty, participants identified the exclusion of gynecology as a significant deterrent to MFM subspecialisation, and raised

it as a question. Residents expressed that while they were very interested and inspired by a career in MFM, "it's basically my passion for surgery that is kind of deterring me from pursuing MFM" (Participant #14). Participants stated that "the not appealing thing would be that you are foregoing part of your gynecologic training" (Participant #19), and that the "biggest thing is I don't want to lose the surgical side of things" (Participant #17). With substantial time and emphasis placed on gynecologic surgery in O&G residency, residents are conflicted about either pursuing MFM or continuing a gynecologic surgery practice, seeing these options as mutually exclusive.

> "The biggest limiting factor for me is that I went through this residency because of, in part because I love gynecologic surgery, so by the time I was exposed to MFM, it was like, 'Wow, this is a great career; I really like the practice that they have; I really like the types of patients that they're exposed to, the complex medical cases' but there's that big component of my residency, which is gynecologic surgery, that was missing from MFM for me" (Participant #14).

Participants were also concerned about maintaining surgical skill while in MFM residency: "I think it would be hard to balance keeping your skills in gynecology up while doing just the subspecialty training in MFM" (Participant #9). Resident participants proposed a solution of early streaming to obstetrics or gynecology as a potential mechanism to permit focus in training, so residents would not spend valuable time training for procedures that they would not be performing after graduation.

> "You know, it's interesting too because for years now, they've been talking about splitting the O&G program in half and sort of doing a one year general. I don't know if you've heard this, but like they would take a general, you know, internship year and then they split, so people who are more inclined to do an MFM would do like an [obstetric] oriented training program and then people who want to do sort of general stuff or

> subspecialized gynecological stuff would focus on the [gynecology] track. They've been thinking about implementing this, I think, for a long time but it just hasn't happened" (Participant #11).

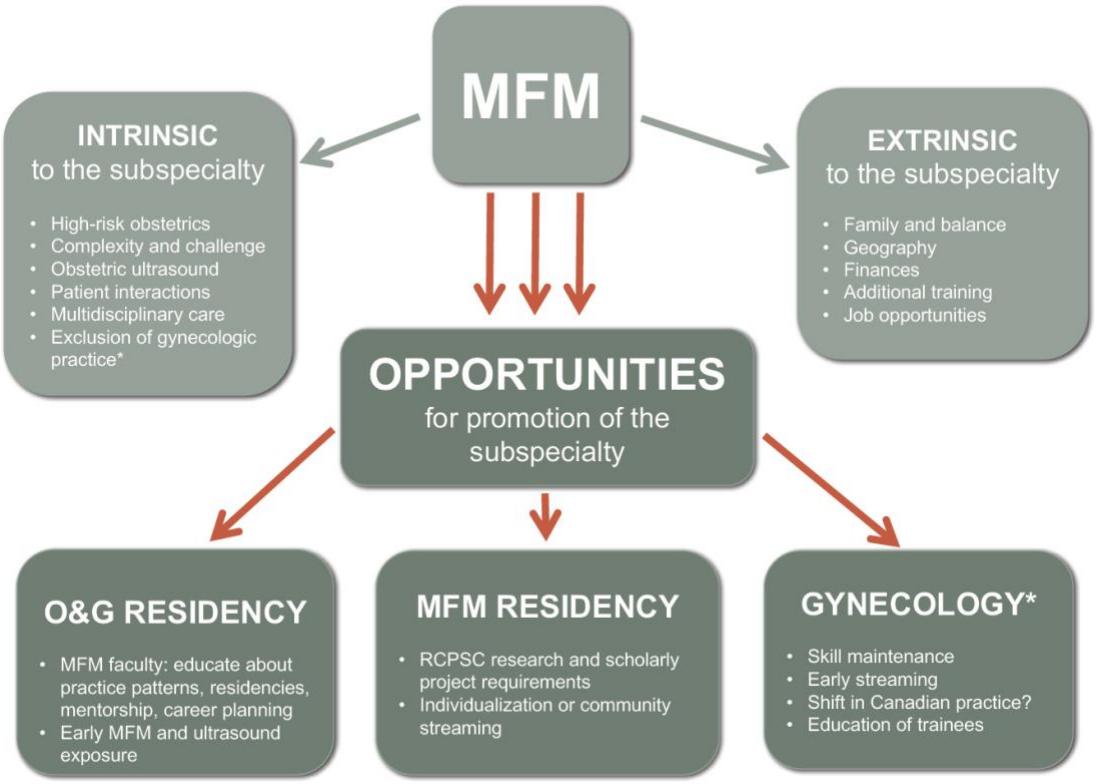
From the resident's perspective, it is very difficult to "walk away" from gynecologic surgery, when years of study and practice have been spent developing advanced operative skills.

> "But I think that, you know, after you do both obstetrics and gynecology for five years, it's always still hard to think about, you know, never really like doing a, you know, laparoscopic hysterectomy again or these procedures that you've trained a long time to be able to do" (Participant #15).

From the resident's perspective, an option to pursue MFM while still practicing gynecology was viewed as a very attractive career option.

In summary, factors intrinsic to MFM subspecialty and personal factors extrinsic to the subspecialty are not likely able to be modified to attract additional residents to MFM residency. However, several opportunities for change, and thus promoting MFM subspecialisation, were identified, and are illustrated in Figure 2 below. Opportunities exist at the level of the O&G residency, MFM residency, and to either educate about or offer options for gynecologic practice within MFM.

FIGURE 2: Opportunities for promotion of the subspecialty



CHAPTER FIVE: DISCUSSION AND CONCLUSIONS

This chapter will present a discussion of the study results described in Chapter Four. The aim of this study was to explore the factors influencing Canadian-trained residents' career choice of MFM, to better understand why trainees are and are not choosing to pursue additional training and a career in MFM. This study identified seven major themes influencing resident perceptions of MFM residency and career: (1) the field of MFM itself, (2) O&G residency MFM experiences, (3) the impact of MFM residency program, (4) variety of MFM practice, (5) lifestyle of MFM, (6) academic career, and (7) finances. Current trainees identified the field itself, a dislike of gynecology, academic practice, and mentorship from MFM faculty as positive factors influencing their choice of MFM. On the other hand, residents viewed the emotional toll of MFM practice, increasing demand and burnout, patient complexity, the exclusion of gynecology, and their O&G residency MFM experience as negative factors leading them away from MFM. The resident perception of positive and negative influencing factors varied by their general favourability towards MFM. Participants identified opportunities for the promotion of MFM as a career choice for residents who view MFM favourably, including changes within the O&G residency, within MFM residency, and the opportunity for gynecology practice. The implications of the research, potential future directions, and the strengths and limitations of the study will then be discussed. To the research team's knowledge, this is the only recent study of Canadian residents' perceptions about MFM, as well as the first study to employ a qualitative approach.

Additionally, several novel factors influencing resident career decision-making were identified.

5.1 Discussion

5.1.1 Resident perception of MFM residency and career (Research Question 1)

Seven major themes influencing resident perception of MFM residency and career were identified. First and foremost, the field of MFM itself was the primary factor for choosing MFM subspecialisation. Participants were both generally and quite accurately aware of the depth, breadth, and complexities unique to the subspecialty. This suggests that trainees have adequate MFM exposure to appreciate the nuances of the discipline prior to completion of the O&G residency. Interestingly, the field of MFM itself was not previously identified as factor influencing resident decision-making, nor has it been studied in the existing predominantly survey-based literature. While seemingly intuitive, this is a novel finding from this study, and has now been described in rich detail by the study participants.

The other leading theme contributing to the participant perception of MFM was the resident experience of MFM during their O&G residency. The influence of the resident experience of a subspecialty during residency has been previously noted in the literature, in both gynecologic[6] and other[30,39] subspecialties, but has never been explored in depth. This theme relates to the style of MFM practice residents experienced at their centre of training, mentorship by MFM physicians, and exposure to obstetric ultrasound. In the limited available literature, mentorship has been linked to

both O&G resident decision-making,[6,26,28] other resident decision-making, [30,32,35] and MFM fellowship trainee perceptions,[25] and was similarly identified as an influencing factor in this study.

Participants who had experienced adequate exposure to obstetric ultrasound were more favourably disposed to a MFM career. In addition, participants cited obstetric ultrasound experience and exposure early in training as important influences. The participants' perception of confidence in performing obstetric ultrasound influenced career choice, particularly among residents who lacked confidence in performing ultrasound. Experience with ultrasound has not been previously published as a factor influencing O&G resident career choice, noted only in the unpublished work of Bos.[26] There is little information in the literature regarding how best to approach ultrasound training in O&G residency. A lack of curriculum and faculty time have been found to be the greatest obstacles to O&G residents learning ultrasound,[84] and the existing literature suggests that resident ultrasound skills and learning needs cannot be accurately assessed by traditionally used metrics, such as the number of supervised scans completed.[85] As obstetric ultrasound experience and confidence influence decision-making, additional research is needed into how these skills can best be both taught and assessed during O&G residency. Both early exposure to ultrasound and achieving procedural comfort and competence are important for residents to believe that they could pursue a future career in MFM.

Aspects of the MFM residency program were also identified as factors influencing career choice. O&G residents exposed to MFM residents at their training site were influenced by their observations of and interaction with the MFM residents. This factor has not been previously described in the literature as influencing either MFM or other subspecialisation decision-making; exposure to fellows was investigated in only one study, and was not found to be an influencing factor for choosing nephrology subspecialisation.[31] While exposure to a subspecialty field while in residency has been documented to influence decision-making,[30,39] experience with a subspecialty residency program or educational requirements influencing decision-making has not been previously described, and is a novel finding of this study. Not all Canadian postgraduate O&G training centres also offer residency programs in MFM; only ten medical schools offer MFM residency at present. Thus, not all O&G residents will have direct experience with MFM residents. However, all residents do have access to MFM residency training requirements, as these are available through the open access RCPSC website.[12] Issues specific to RCPSC MFM training requirements were identified as factors influencing career choice. Participants favoured MFM when they had witnessed both individualization of learning opportunities in MFM residency and programs embracing principles of adult learning. The mandatory RCPSC examination in MFM is not beloved by trainees, but appeared to be accepted by this cohort. Thus, while a consideration for many, the required exam was not seen as a major deterrent to the pursuit of MFM. Nonetheless, the RCPSC requirement of six months of dedicated research and

completion of a scholarly project[12] drew mixed responses. While most PGY-6 and -7 residency programs require a variation on a scholarly research, education, or quality assurance project, a minority of programs mandate six months protected time for scholarly activity.[86] MFM remains somewhat unique in such a lengthy mandated protected time for research in residency.

Separate from the O&G residency MFM experience is the "brand" of MFM practice that trainees are exposed to. This study revealed that trainees might suffer from a degree of tunnel vision with respect to MFM practice patterns. For instance, they became familiar with the practice style at their centre, but were often unaware of the variety of MFM practice patterns in Canada. For several participants, their perception of MFM would have been far more favourable had they been aware of all the options available for MFM clinical practice, such as a consultation-only imaging practice, or a practice with in-house labour and delivery on-call. Additionally, trainees are often not exposed to community-based MFM practice in residency, and these employment opportunities are believed to be increasing.[9] The reasons for these practice differences have not been studied either in Canada or elsewhere, and are undoubtedly complex. The varied practice patterns are hypothesized to relate to needed clinical services in a particular community, patient volume, local diagnostic imaging expertise and leadership in obstetric ultrasound, and or provincial remuneration strategies. As a subspecialty, it is unusual that MFM has evolved along so many profoundly different paths in Canada, and the variations in practice have never been described, let alone understood. As such, it is

both expected and unfortunate that current O&G residents are not aware of the variety of MFM practice options across Canada.

Resident perceptions of MFM were also influenced by lifestyle as a factor. Various issues related to lifestyle have been described as factors influencing O&G residents,[7,8,27] but have not previously been described in as rich detail. In this study, the role and relative importance of lifestyle frequently related to trainee-specific issues, and were often unrelated to the discipline of MFM itself. Lifestyle preferences instead reflected on issues of significant others, family needs, and geographic location of practice desired. While less specific to the field of MFM, the perceptions explored in this theme were illuminating as to decision-making of O&G residents with respect to their individual freedom to pursue subspecialisation in their field of choice, or even to pursue subspecialisation at all.

Participants identified academic aspirations as influencing their perception of MFM, with many expecting eventual careers in academia. The sub-themes identified for this factor are consistent with the published literature about academic medicine as a career choice, including completion of research, a desire to teach, and the influence of a mentor or role model.[87] Indeed, the current MFM specialty training requirements include well-defined academic expectations.[12] However, there are likely fewer academic positions[25,88] for graduates as compared to previous cohorts, but this issue does not appear to have been reviewed for Canada, in either the existing published literature, or by the RCPSC and APOG.[89,90] Canadian universities are hiring fewer PhDs,[91] but

information about physician academic employment, and in particular for RCPSC specialists or subspecialists, is not available. In personal communication among MFM program directors, a trend to community or non-academic Level III positions in Canada for new MFM graduates is evident.[92] It thus remains unknown if current MFM residency training requirements are still aligned with the future career directions of MFM graduates in Canada.

Financial issues were perhaps least important of the identified themes, but were significant for some participants. MFM was viewed more favourably when residents were aware of local employment opportunities in the discipline. Given the more recent issues of unemployment in O&G,[93] the resident perception of MFM employability in their region of choice may be significant, in particular for residents with specific personal financial concerns. An expected significant shortage of MFM physicians in Canada was reported in both 2008[9] and in 2015,[16] with the most recent report remaining unpublished and without detailed data available. While unstudied, there is confidence expressed among national O&G leadership that many physicians deferred planned retirements due to personal financial losses in the financial crisis of 2007-2008.[90] As such, the projected MFM shortage may still be to come. Given the available reports suggest a significant need for MFM physicians in Canada, a complete reassessment of MFM need is currently indicated. Additionally, residents were generally unaware of either local or national remuneration strategies in MFM, expecting that they would financially "do OK" when in clinical practice. Significant gaps in knowledge were

identified in resident education about national MFM remuneration and MFM workforce planning.

5.1.2 Positive and negative factors influencing trainee choice of MFM residency (Research Question 2)

MFM faculty are generally admired and respected by trainees as both clinicians and teachers, and residents nearly uniformly viewed MFM faculty as positively influential for considering a career in MFM. Regardless of the trainee's interest in MFM, MFM faculty were nationally seen as an asset to the discipline in Canada. Otherwise, the perceived positive and negative factors influencing trainee decision-making varied by their interest in the discipline: trainees committed to a career in MFM, trainees adverse to a career in MFM, and trainees who viewed MFM favourably, but were not planning to pursue MFM residency.

For trainees committed to MFM, the positive influencing factors included a love of the field, a dislike of gynecology, having academic aspirations, and MFM faculty mentorship and role modelling. These positive influences are similar to influences observed in the literature regarding O&G residents,[6-8,26,28] as well as in studies of other specialty residents.[30,32,35,39] For this group, the negative influencing factors were of particular interest, as trainees identified the emotional toll of the field, as well as increasing physician demands and burnout. Neither of these factors has previously been described in the literature as specifically related to either O&G or MFM. MFM physicians manage the most complex obstetrical cases, and deliver bad news routinely, ranging

from diagnosing severe fetal malformations, to treating women with life-threatening medical or obstetric complications. The discipline of MFM is unique compared to other specialties, and the emotional toll of the field has not been well described. An Australian paper described the emotional toll of fetal medicine, including impact on life and well-being outside of work, unique difficulties for physicians working while pregnant, and identified a lack of support to address these issues.[94] Residents who noted staff MFM physicians in difficulty, or who "seemed burned out," were concerned about pursuing careers in MFM. Physician burnout and well-being in O&G is of rising concern,[95] with 50% of O&G physicians reporting burnout. Burnout has not been specifically assessed in the discipline of MFM. Additionally, the influence of physician burnout on trainee educational experience or career choice has not previously been described, and may be a factor of significance widely applicable in both undergraduate and postgraduate medical education.

Trainees adverse to MFM expressed a reasonable perspective for residents whose interests simply lie elsewhere. This group of participants were dedicated to careers with a focus on gynecology and gynecologic surgery, and generally disliked complex obstetrical care, obstetrical ultrasound, and or the field of MFM itself. An intriguing influencing negative factor identified the profound role of a negative experience on a MFM rotation during O&G residency, again illustrating the importance of a positive experience with MFM and obstetrical ultrasound during residency.

The last group of trainees reviewed were those who were favourable to MFM, but who were not planning to pursue this as a career. The perspective of this group was particularly interesting, as it included residents that could have potentially become MFMs. Dodge[6] found that 35% of O&G residents considered MFM, but only 10% eventually pursued the subspecialty. As such, the MFM-favourable group of residents may include approximately 15% of O&G residents. These trainees were positively influenced by factors similar to trainees committed to MFM, including a love of the field and of clinical complexity, perceptions of obstetric ultrasound, and experience in O&G residency with faculty mentorship. This group was positively influenced to MFM for all the "right" reasons. The primary negative influencing factor for this group was the exclusion of gynecology practice from MFM careers, which will be discussed in detail with the third research question.

5.1.3 How MFM residency training and future career could be perceived as more attractive to trainees (Research Question 3)

If the discipline of MFM in Canada is concerned about graduating enough MFMs for an adequate workforce, answering this question is of critical importance. How can MFM become more attractive to those that strongly considered the career path, but could not commit? The limited existing literature suggests falling interest in MFM in compared to other subspecialties. Coolen[8] found that while Canadian O&G resident interest in subspecialisation had increased from 30% to 53% between 2002 and 2006, plans for that subspecialisation to be MFM fell from 25% to only 12%, demonstrating a

larger decrease in interest than any other O&G subspecialty. These findings were supported in a Canadian 2006 study, where there was again seen increasing desire among residents for O&G subspecialisation, but stagnant interest in MFM at 12%.[7] These figures are supported by a USA survey of medical students planning O&G specialization that found 69% of these students already planned to subspecialise, with 24% of these students already planning MFM.[48] Until this study, both what influences residents to move away from MFM during O&G residency and how the field can become more attractive to residents were unknown. In this study, factors affecting the perceived attractiveness of MFM were identified as intrinsic to MFM, extrinsic to MFM, and as opportunities to influence change for the subspecialty.

Factors intrinsic to the subspecialty constitute features of the field of MFM itself, including high-risk obstetrics, clinical complexity and challenge, ultrasound, patient interactions, and multidisciplinary care. These factors are inherent to the subspecialty; in the absence of a preference for MFM clinical practice, it is unlikely that a resident ever would or should pursue MFM. It is also unlikely that these factors could be modified by any initiative. The traditional exclusion of gynecology and gynecologic surgery from MFM practice should be considered an intrinsic part of the subspecialty in Canada at present, but will be discussed further as a potential opportunity for change.

Factors influencing decision-making that are extrinsic to MFM were identified. These factors were unrelated to the field of MFM itself, and included themes related to individual personal factors, such as issues with significant others, family, work-life

balance, geography, finances, feasibility of pursuing additional training, and job opportunities in their region of choice. These individual personal issues may limit decisions to pursue additional training for a specific subspecialty career, or even additional training at all. There are likely systemic issues that contribute to some of these extrinsic factors, such as increasing medical school tuition[96-98] and median student debt,[99] and a widely postulated but as yet unstudied trend towards increased postsecondary education prior to entry to medical school, described as the "pre-med arms race."[100,101] To address this issue, programs to facilitate early streaming to medical school have been described.[102] While there may be areas for systemic improvements, such as regulating tuition for medical school, reducing debt burden, creating opportunities for moonlighting during residency, and improving resident education about national job opportunities, these issues remain personal to the residents, and are somewhat outside the influence of the discipline of MFM.

Three opportunities for change, themes with potential to educate or influence interested residents, were identified: (1) opportunities in O&G residency, (2) opportunities in MFM residency, and (3) the issue of gynecology practice. Within O&G residency, although already viewed positively, mentorship and encouragement by MFM faculty could still be enhanced to include earlier and enhanced career counselling, mentorship programs, and recruitment efforts. Lu[28] drew similar conclusions, noting the impact of positive reinforcement and guidance by faculty, and identifying opportunity to increase resident interest in MFM. In the present study, residents reported needing

more support in the MFM residency application process, as well as in understanding the varied MFM practice patterns across Canada. Residents would positively view the opportunity for mentorship from and contact with MFMs from various Canadian sites and type of practice, a novel finding of this study. MFM practice is remarkably flexible in Canada, and it is unfortunate that many trainees remain unaware of the variety of possibilities. Experience could be gleaned from the SOGC, who in 2002 launched a successful "promotion of the specialty" campaign[103] in response to a trend of increasing unmatched positions in O&G residency programs, which culminating in 11 unmatched O&G positions in 2002.[104] The literature suggests that 67% of O&G residents decide to pursue MFM during their O&G residency.[27] Combined with the novel findings of this study, MFM experience during O&G residency is an important influencing factor open to further improvements.

O&G participants linked sufficient ultrasound exposure in residency with gaining enhanced ultrasound skills and confidence, which in turn leads residents to be more inclined towards a career in MFM. For residents that gained confidence and competence with the "technical aspect of ultrasound," a career in MFM seemed possible, and even exciting. Experience with ultrasound in residency permits trainees to understand the role of prenatal diagnosis, along with the challenges and rewards of a career in MFM. Recently, the RCPSC O&G specialty committee indicated their intent to modify the specialty training requirements to include a mandatory rotation in ultrasound,[105] and thus dedicated ultrasound rotations are presently being incorporated

in all Canadian O&G residency programs. Ultrasound mentorship and structured training have been found to be associated with MFM resident skill and confidence.[106] Similar factors may also relate to O&G resident ultrasound training. With this change, O&G residency may provide additional opportunities for residents to be educated about the varied opportunities available in a MFM career, and for assisting residents with more mentoring and career planning.

Within MFM residency, potential opportunities also exist to improve the attractiveness of additional training in MFM. A focus on learning over service was highly valued by participant residents, and this feedback could be shared with all MFM residency programs. The requirement of completion of a scholarly project and six months protected time for research during residency was viewed as a roadblock for some otherwise interested residents. Participants questioned if a more personalized approach could be offered, especially given the short duration of a MFM residency. Alternatives to mandated resident research requirements have been proposed,[107] and perhaps could better meet the educational needs of current MFM residents. Most graduates of O&G residencies have experience with research given the O&G residency training requirements,[105] and should already know if they intend to pursue a research career. Other opportunities for development of non-clinical expertise are possible and may be even more appropriate for many subspecialty residents, including additional training in medical education, quality assurance and patient safety, and administration or leadership. Any of these other pursuits could be incorporated into the two-year MFM

residency program, perhaps even more reasonably so than the current six months protected time for research.

The issue of gynecology and gynecologic surgery will likely remain a challenge for the discipline of MFM, but perhaps there are opportunities for practice change, and or for improved trainee education. An unwillingness to abandon gynecologic surgery has previously been identified as an influencing factor,[26,27] but has not previously been described in as rich detail as in the present study. As residents are expected to master increasingly complex and specialized gynecologic surgery during their O&G residency,[108] graduates may be more reluctant and even unlikely to their relinquish advanced gynecologic surgical skills, acquired with years of hard work, to disuse in order to pursue MFM. Much of the later years of O&G residency are spent in achieving competence in increasingly complex gynecologic surgery. While gynecologic practice would appear to be unrelated to a career in MFM, it is common and even sometimes expected for gynecologic subspecialists to continue with obstetric practice and intrapartum care in their careers. In this study, some participants were aware of recently filled community MFM positions near their centre that included the option of a gynecology practice, and this opportunity was viewed by participants as very attractive and even exciting. Given that there appears to be a predominance of MFM positions available in the community, it is not presently known if these positions could more often include gynecologic surgery practice.

Alternatively, perhaps the root issue may be that O&G residents are not being realistic as to the day-to-day practice of a community MFM physician. With activities such as prenatal clinic, intrapartum care, obstetric ultrasound, consultations, and fetal diagnostic procedures, there may be few "days of the week" left potentially available for gynecology clinic and performing gynecologic surgery. Also, maintenance of current gynecologic surgical skills, both during MFM residency and in eventual practice, may become an issue, with the advent of increasingly complex laparoscopic and robotic surgery, and with adoption of principles of Competency By Design.[109] Improved outcomes for hysterectomy have been found to be associated with higher volume surgeons in larger centres.[110,111] Thus, while the idea a lower-volume gynecology practice within a MFM career was attractive to residents, such an arrangement may not actually benefit patient care. Evidence suggests improvements in high-risk obstetric care when care is provided by MFM specialists, and thus residents may be underestimating the improved clinical outcomes that a local MFM specialist could be bring to at-risk obstetric patients in a community setting.[2,3] In this study, participants favourable to MFM were attracted to the field of MFM for all the "right" reasons – a love of high-risk obstetrics, complex patient care, and ultrasound – but the exclusion of gynecology was often seen as a "deal breaker." This profile of graduates may be ideal for community practice with MFM or otherwise enhanced obstetric or imaging skills, and there is opportunity for the specialty to address and resolve the important the issue of gynecology.

5.2 Implications

5.2.1 For postgraduate medical education

This study illuminates several findings of importance for both O&G and MFM postgraduate education. To optimize perceptions of a career in MFM, both early exposure to obstetric ultrasound and a positive MFM working environment in O&G residency are key. Relevant to residency programs is the need to optimize trainee experience during MFM rotations, such as permitting the resident to take an active role in complex patient care and to take ownership over patients. For centres with a dysfunctional MFM team dynamic, resolving disputes and developing a healthy workplace would be paramount to the resident experience and perceptions. With anticipated increased MFM community practice, there could also be a role for introducing experience with community-based MFM practice into mandatory MFM rotations, to allow for both a deeper understanding of the variety of MFM practice, and an opportunity for role modeling.

Parallel to this study, the RCPSC O&G specialty committee recently amended the specialty training requirements for O&G[105] to include a new mandatory four-week rotation in obstetric ultrasound, replacing an optional selective opportunity. Early exposure to ultrasound offers acquisition of a skill set that is clinically useful in early obstetric rotations, and might then lead the junior resident to both value the role of the MFM physician and to more favourably perceive a career path in MFM. Going forward, how early ultrasound experience can best be introduced in early O&G residency would

benefit from further study, including curriculum development, use of simulation, and standardized assessment.

Early streaming towards MFM and obstetrics in O&G residency, such as the existing model in internal medicine, is another consideration for postgraduate medical education and the RCPSC. The opportunity for streaming might be viewed favourably for MFM-committed residents, particularly those with a dislike for gynecology, but would be not likely to help residents otherwise "on the fence" about MFM. Information about streaming on O&G is limited, but a previous Canadian study found that only 18% of Canadian O&G residents were in favour of streaming in residency, with 63% of residents concerned about employment opportunities for graduates with more limited skill sets.[7] The concept of streaming in O&G was debated at an APOG annual meeting approximately thirty years ago, and has been subsequently been only informally discussed by leadership of APOG and RCPSC.[90] At present, there are no known plans for O&G streaming, or any available documentation about O&G streaming in Canada.

There is an opportunity to attract graduates to MFM at the level of MFM residency. The RCPSC MFM subspecialty training requirements and objectives could be reviewed as to the contemporaneous concerns identified in this study. There would be value in graduating MFM residents with enhanced knowledge and skills in medical education, leadership, or quality assurance, and this knowledge would be valuable in both academic and community centres. Residents are interested in individualization of training, and there could be opportunity for more flexibility in MFM residency

requirements, such as developing an alternative to prolonged protected time for research and mandated project completion. The findings of this study are currently informing discussions at the RCPSC MFM subspecialty committee with respect to potential changes. A major review and update could occur concurrently with planning for the MFM transition to Competence By Design,[109] scheduled for MFM in 2021 as part of cohort six. The upcoming competency-based curriculum is well suited to the concept of individualization, and to meeting the needs of self-directed adult learners.

Data has not been collected as to applicants to MFM, and until very recently the RCPSC MFM subspecialty committee was not attuned to how many potential MFMs were not matching to MFM. It is also unknown if these unmatched residents continue to seek MFM residency, in Canada or elsewhere, or if they remain lost to MFM training and instead pursue an alternate career path. Thirteen percent of American O&G residents chose to pursue MFM after completion of the O&G residency.[27] In the United States, data on O&G residents matched and unmatched to MFM are collated annually through the National Residency Matching Program, and have been studied.[112] As the match is a smaller and more informal process in Canada, data regarding unmatched residents has rested with individuals, and has not been collated prior to the conception of this study. Unmatched residents as a group may be an untapped resource of potential MFMs, and it is possible that follow-up with or mentorship of these physicians could recruit additional MFMs. Research into the perceptions and plans of residents unmatched to MFM is indicated, as is data collection and future analysis of the Canadian MFM

residency match with respect to applications, matched residents, and unmatched residents.

As an alternate approach to issues identified with MFM residency, a new postgraduate program in advanced obstetrics and basic obstetric ultrasound could be developed, perhaps a "mini-MFM" residency. This program could be specifically designed to prepare O&G graduates for enhanced obstetrics community practice, and could include competencies suitable for community practice, such as care of higher-risk pregnancy and routine ultrasound fetal assessment. O&G graduates interested in MFM and obstetrics, but who are planning a community career, may be interested in an alternative to a two-year program requiring a scholarly project and a RCPSC exam. There has already been resident interest in such a program. MFM program directors in Canada have noted a new trend in residents interested in a one-year program in obstetric ultrasound, who are decidedly not interested in a traditional two-year MFM RCPSC residency.[92] Presently, MFM is the only option for graduates interested in advanced training in obstetrics. The optimal direction for the field remains unknown, but could include modification of current MFM requirements versus creation of a new fellowship.

5.2.2 For MFM physicians in Canada

There is no published data for Canada as to MFM practice patterns. A study from the USA demonstrated a significant decrease in MFMs in full-time academic practice, along with increased MFMs in community practice.[25] A similar trend might be suspected in Canada. As many MFM graduates will likely be taking either clinical positions in the

community or clinical positions at tertiary centres, the concept of a "community stream" could be considered, perhaps allowing for individual tailoring of programs to meet resident-specific needs. In Alberta, quality assurance reviews have identified issues related to obstetrical imaging provincially, and resulted in targeted continuing medical education for radiologists, as well as new obstetrical imaging guidelines for Alberta.[113] One could postulate that community access to quality fetal assessment would improve perinatal care and outcomes for women in Alberta. At present, there is no MFM physician support in Alberta centres outside of Edmonton and Calgary. Perhaps patient access to local high-risk obstetric care and quality ultrasound fetal assessment could be improved with the ability to offer a "community MFM stream," individualization of training, and or an alternate targeted training program. Are the present training requirements in line with the opportunities available to graduates? Is an alternate training program potentially a better approach? At present the answers are not known, but the question merits study and review as to feasibility, attractiveness to residents, and clinical needs to be met.

From the issues that inspired this study to the findings therein, it is evident that national workforce planning for both O&G and MFM would be of benefit. Farine[9] postulated an upcoming shortage of MFM physicians nearly ten years ago, with numbers needed far beyond the MFM training capacity of Canada. There is no current or ongoing accurate assessment of Canada's need for MFM physicians, and thus it is unknown if Canada is recruiting and training enough MFMs to meet the expected

clinical demand. Additionally, it has been postulated that physicians who were planning retirement in Farine's study may have instead deferred their retirements due to personal losses during the financial crisis of 2007-2008, and that the expected shortage of MFMs may still be to come. Various routes to "promotion of the specialty" are possible, but are the workforce needs for MFM known? Physician wellness and burnout in MFM has not been adequately studied, and may be an important issue in both recruiting and retaining MFM physicians in Canada. A better understanding of current and expected Canadian MFM needs is of utmost importance.

Not only has the evolution of MFM practice patterns in Canada not been studied, there is presently no subspecialty-led national resource available for residents to learn about the variety of Canadian MFM career paths. National leadership for developing and distributing educational materials regarding the depth and breadth of practice options, including varied remuneration strategies, for Canadian MFM practice is indicated. In addition to providing potential applicants with more information, this study identified an opportunity for national leadership and advocacy regarding the MFM residency application process, including a providing a national resource about MFM residencies in Canada, and contacts for mentors with various MFM practice patterns and regions. These roles could potentially be filled by the SOGC or RCPSC. The CSMFM is a relatively new organization, and may be an appropriate home for this mandate.

5.3 Future directions

A national identity of "what is a Canadian MFM practice and career" remains unclear, and may be the common underlying theme to the many influencing factors identified by this study. Significant research to define a national MFM identity is needed. Defining the various MFM practice patterns, practice locations, and remuneration strategies, and then having this information readily available for interested residents, would benefit promotion of the subspecialty, and eliminate some current resident misconceptions. There is a role, perhaps through a national professional organization, for research, workforce planning, centralization of job opportunities, and rollout of an educational campaign. If there truly is a need for more MFMs, or for enhanced high-risk skills and or fetal ultrasound in community practice, national strategies for training programs and recruitment will be needed. Job security and specialist unemployment are concerning issues for O&G graduates,[93] so education about need for and opportunities with MFM career could potentially enhance interest in the subspecialty.

A thorough assessment of the current Canadian MFM workforce is indicated, as is assessment of the anticipated need for MFM physicians within the next ten years. The last published study was undertaken more than ten years ago,[9] and it is unknown what are the current needs for MFM physicians, and in what kind of centre MFMs are needed. Additionally, research is needed into the academic landscape for MFM, and perhaps for other subspecialties as well. While possibly challenging to determine given differing academic terminology, what is the distribution of current and future MFM positions with respect to academic positions, clinical appointments, and community

roles? Only by understanding the current academic landscape can the residency training requirements be assessed as to if residents are being graduated with the appropriate experience and skills. It is possible that residency programs do trainees a disservice by training residents for academic positions that they might never have, but presently there is no available data to either confirm or deny this concept. This study has demonstrated the importance of resident knowledge of employment opportunities. Should a national need for MFMs be identified, and prospective residents educated to the opportunities afforded by MFM, interest in the field would likely increase.

The current cohort of graduating O&G residents may well be facing different challenges as compared to the earlier cohorts previously studied. Additionally, Canadian resident issues may be different than those of their USA counterparts, as demonstrated by Daniels[39] in Canadian internal medicine residents. Current challenges for graduating residents might include escalation of medical school tuition and student debt,[114,115] more mature students with dependents, recent physician unemployment,[93] and physician financial uncertainty.[116] Additional research into the challenges facing current graduating residents, from O&G as well as other specialties, is needed. This information could inform faculties and educational programs in better supporting the needs of their residents.

A new finding of this study was that even trainees committed to MFM were concerned about the emotional toll of working in the field and about MFM physician burnout. The emotional toll of MFM practice has not been well defined, and more

research is needed into stressors specific to the field, if MFM physicians are to be optimally supported. The incidence of burnout among MFM physicians is unknown, as are any factors unique to the field that could lead to physician burnout. Given advancing diagnostic capabilities and increased maternal obstetric complexity, in addition to the identified impact on the resident experience, stressors such as patient volume and clinical complexity are poised to increase. Physician well-being in MFM warrants further investigation, as well as investigation into optimal supports for MFM physicians. MFM practice is multidisciplinary; the function of the team is paramount in complex maternal-fetal care, and burnout can negatively affect a team dynamic. Both functional MFM team relationships and healthy physicians are of importance, and MFM-specific research is needed.

This study identified the novel finding of physician burnout influencing trainee experience, learning, and perception of a subspecialty. Burnout has been studied at the staff, resident, and medical student levels, but the impact of staff burnout on trainees has not been studied, and as well has not previously been identified as influencing career choice. The impact of physician burnout on trainee learning and career choice appears to be critical concept, and is deserving of wide study to both characterize the full educational impact of burnout, and to find solutions for both staff and trainees. While this factor was identified in the current MFM-specific study, as physician burnout is so widespread, other specialties and subspecialties are likely similarly affected. Future study is needed about the impact of physician burnout on the physician interest in,

commitment to, and enthusiasm for teaching, as well as the effectiveness of that teaching. The resident's perception of staff (or even senior resident) burnout as influencing their clinical experiences, learning, and career choice additionally warrants further study, in not only MFM and O&G, but potentially in all residencies and undergraduate medicine.

This study revealed several novel and contemporaneous factors influencing MFM subspecialisation decision-making. Novel factors identified include the field itself and the influence of both exposure to a subspecialty program and the subspecialty program requirements themselves. While these factors were significant for MFM subspecialisation, they may also relate to decisions for subspecialisation (or even specialization) in general. While personal and lifestyle issues have previously been identified as factors influencing career choice, knowledge of contemporaneous issues faced by Canadian residents is also lacking, and is much needed. Research is indicated to better elucidate the extent of these novel factors influencing career choice for both O&G subspecialties and other fields, particularly for Canadian trainees.

This study has proposed a number of opportunities for change that might improve resident perception of MFM, and that could influence more residents to choose a MFM career. Should changes be implemented, there is opportunity to study the impact of any changes, with respect to changing both resident perceptions of MFM, and the volume of applications to MFM programs. For example, as new mandatory ultrasound rotations are introduced into the O&G national curriculum, assessments of

resident competence, confidence, and perceptions of MFM should be assessed. If changes are made to the RCPSC subspecialty training requirements, such as reducing the mandatory protected time for research and or the scholarly activity expectations, feedback from MFM residents in programs and new graduates in practice should be assessed, as well as O&G resident interest in and applications to MFM.

The complex issue of gynecology practice for MFM physicians has been described in detail in this study, providing the first in-depth assessment of the factor. However, the most appropriate approach or solution for this issue remains unclear. More research into the typical role of MFMs, particularly in the community, may elucidate the issues further. Could MFM residency programs be modified to somehow permit for maintenance of gynecologic surgical skills during residency? Would community MFMs perform enough surgery to maintain their skills? Given the increasing complexity of the obstetric population and need for obstetric imaging, should a specialist in MFM be dedicating days to gynecologic practice, when other specialists could provide this service? Is a shift in the Canadian MFM practice model even possible? Or is the real issue that residents need better education about MFM practice, remuneration, and lifestyle in Canada? The issues surrounding gynecology practice for MFM physicians in Canada have been described, but future research is needed to determine the best approach to addressing this issue.

The literature review for this study found very little previous research about MFM subspecialisation. The current study has identified a wealth of information that

was previously either unknown or not well described that can now be directly applied for future study in MFM, as well as potentially in other specialties, or even to postgraduate residency education in general.

5.4 Strengths and limitations

This study's design and execution demonstrated several strengths. With the qualitative study design, an in-depth of understanding of issues facing residents was achieved, with the ability to immediately follow-up and delve deeper during interviews. This study offers rich insight, far beyond previously published simple surveys,[13,27,28] with several novel factors influencing career choice identified.

Given the study design, and in particular the design of the interview guide, participants were asked open-ended questions, and were free to explore questions in depth with the interviewer. This study is unique, as the few existing studies about perception of MFM by trainees all involved administering a questionnaire usually developed by faculty, and the majority of these studies were entirely quantitative (Table 2). Only one study[28] included the option for and analysis of narrative comments after the survey, and new information such as identifying an unwillingness to abandon gynecologic surgery, dislike of a specific aspect of a specialty, and negative experiences with MFM staff were identified only from the qualitative analysis of the narrative comments. Given the strict attention to maintaining participant confidentiality, residents were able to speak freely, free from fear of repercussion, again adding to the

breath of data collected. In the discussions that followed, resident participants were able to make their own connections between their influencing factors.

Study participation was limited to interviewing in only the English language, which may have restricted francophone participation. On the advice of Québec program directors, the interview guide was provided to all residents in advance of the interview, with the intent of improving francophone trainee comfort with the interview. There were fewer study participants from eastern Canada, and it is unclear if this related to smaller and or inactive programs in the east, an unwillingness to participate in an English interview, or other unknown factors. An understanding of the issues surrounding choice of subspecialty in Québec may be of particular interest, given the current restriction in subspecialty training positions for Québec graduates in the province of Québec, with the requirements of a plans régionaux d'effectifs médicaux (PREMs) for all prospective subspecialists.[117] At present, there are no PREMs available in Québec for MFM, and none are expected in the next five years.[118] As such, interested residents may opt to not pursue MFM if they intend to find a staff position in Québec. This special circumstance would benefit from additional study.

Compared to the total number of O&G and MFM residents at PGY-3 and beyond, this study sampled a relatively small proportion of residents. It is possible that residents who chose to participate held different viewpoints than the residents who choose not to participate. The study team was reassured by both the diversity of gender, regions of training, and range of favourability to MFM demonstrated within the group of study

participants. Additionally, on initial review of the interview transcripts, thematic saturation was reached well before the twenty-first interview. While confidentiality was of paramount concern, there is a possible bias of resident participation, considering the study participants included only residents who were enthusiastic to participate in the study.

This research may be limited by the gender of participants. The study participants were predominantly female. This is in keeping with the known predominance of female physicians in O&G residency programs.[119] Of US O&G residents in 2015-2016, 74.5% were female.[120] While gender of current O&G residents in Canada have not been described, the results of the 2017 CaRMS match found that 87% of students matched to O&G were female.[121] Resources from the Canadian Medical Association[122] describe 56% of all O&G specialists as female, with much higher proportions in younger specialists; of O&G specialists between 35 and 44 years old, 80% are female, and of O&G specialists less than 34 years old, 90% are female. Such a profile is not published for MFM physicians in Canada, but is likely similar. Given the predominantly female study participation, this study was unable to assess any differences between perceptions of female and male trainees. It is unknown if gender influences the perception or attractiveness of a career in MFM, as this has not been previously studied. Trainee gender has been found to be a factor, and often the most significant factor, influencing medical student decision-making about a career in O&G,[40,42,43,45-47] but only noted to not be an issue in one study of O&G residents.[6]

Gender may be an unexplored factor in decisions about subspecialisation after O&G residency, and warrants further study.

While all members of the research team participated in coding and discussion of themes, AR contributed leadership in the qualitative analysis. Given that she shares a common experience and background with the study participants, it is possible that her experiences influenced the analysis. However, many of the study findings were unanticipated by AR, with novel influencing factors identified. Some factors of concern to her training cohort from a decade ago, such as resident discontent with the then-new RCPSC examination, were not the leading factors influencing decision-making for current residents. Additionally, the study team was diverse, consisting of another MFM physician, a physician from another specialty, and non-clinical medical education researchers. All team members participated in and brought their perspectives to the process of data analysis. An understanding of the complex field of MFM, as well as variations in MFM education and practice across Canada, was particularly beneficial in understanding the nuances of participant perspectives.

5.5 Conclusions

Understanding why residents choose MFM is important in ensuring adequate access to MFM clinical care for Canadian women. As the volume of complex pregnancies in Canada increases, the need for MFM physicians is great. This study has identified factors that both lead residents to pursue MFM, and cause residents to turn away from MFM career paths. The present study has provided a contemporaneous picture of the

current trainee perceptions of MFM in Canada. With seven major themes identified describing the trainee's perceptions of MFM, it is evident that residents are greatly influenced by their experiences with clinical practice in the field, particularly by their experiences with MFM and ultrasound during O&G residency, their understanding of MFM residency programs, and the practice pattern of MFM that they are exposed to in residency. Positive and negative factors influencing decision making around MFM varied significantly with the resident's favourability to MFM, and of particular interest was the perception of trainees favourable to MFM, but who chose to not pursue the subspecialty. This group was deeply influenced by a positive experience with ultrasound, the intricacies of the field of MFM, and by MFM faculty during O&G residency, but had ambivalence to managing the most complex of patients, and were troubled by the exclusion of gynecology practice in a usual MFM career.

These findings have demonstrated a potential path to improving resident perception of MFM by optimizing experience and exposure to MFM during O&G residency, potentially modifying aspects of MFM residency training requirements, and either an opportunity for or education about gynecology practice as part of a career in MFM. For the subspecialty to inspire more residents to pursue MFM, opportunities for change and education were identified within O&G residency, within MFM residency programs and requirements, and, perhaps most importantly, around the issue of gynecology. The solution to the question of gynecology practice remains unclear, but possible options include early streaming to MFM in residency, increased opportunity for

gynecologic surgery skill maintenance in MFM residency, MFM career opportunities in the community including the provision of gynecologic surgery, as well as developing additional education about the variety of MFM practice options, detailing why usual MFM practice no longer includes gynecology. With enhanced understanding of both the resident perceptions of MFM and perceived roadblocks, this study provides a path forward for the subspecialty for promotion, education, and recruitment of future subspecialists. For residents who are inspired by complex pregnancy care, MFM as a subspecialty in Canada has an opportunity to enhance trainee MFM experience and perception, to address their concerns either through change or education, and to then grow the field of MFM, to the benefit of Canadian women's health care.

REFERENCES

1. RCPSC. Objectives of training in the subspecialty of Maternal-Fetal Medicine, 2014, version 1.0. 2014; http://www.royalcollege.ca/cs/groups/public/documents/document/y2vk/mdaw/~edisp/tztest3rcpsced000911.pdf. Accessed October 17, 2017.
2. Eden RD, Penka A, Britt DW, Landsberger EJ, Evans MI. Re-evaluating the role of the MFM specialist: lead, follow, or get out of the way. *J Matern Fetal Neonatal Med.* 2005;18(4):253-258.
3. Sullivan SA, Hill EG, Newman RB, Menard MK. Maternal-fetal medicine specialist density is inversely associated with maternal mortality ratios. *Am J Obstet Gynecol.* 2005;193(3 Pt 2):1083-1088.
4. Gagnon A. Discussion with RCPSC MFM subspecialty committtee chair. In:2017.
5. CAPER. Individual specialty reports. 2017; https://caper.ca/en/post-graduate-medical-education/individual-specialty-reports/. Accessed October 18, 2017.
6. Dodge JE, Chiu HH, Fung S, Rosen BP. Multicentre study on factors affecting the gynaecologic oncology career choice of canadian residents in obstetrics and gynaecology. *J Obstet Gynaecol Can.* 2010;32(8):780-793.
7. Burrows J, Coolen J. Future career plans and practice patterns of Canadian Obstetrics and Gynaecology residents in 2011. *J Obstet Gynaecol Can.* 2016;38(1):67-74.
8. Coolen J, Wells T, Young C, Singh SS, Liu K. Society of obstetricians and gynaecologists of Canada junior member committee survey: future career plans of Canadian obstetrics and gynaecology residents. *J Obstet Gynaecol Can.* 2008;30(12):1140-1145.
9. Farine D, Gagnon R, SOGC MCot. Are we facing a crisis in maternal fetal medicine in Canada? *J Obstet Gynaecol Can.* 2008;30(7):598-599.
10. SMFM. Specializing in the un-routine. 2017; https://www.smfm.org/. Accessed October 17, 2017.
11. SMFM. What is a Maternal-Fetal Medicine specialist? 2017; https://www.smfm.org/members/what-is-a-mfm. Accessed October 17, 2017.
12. RCPSC. Subspecialty training requirements in Maternal Fetal Medicine, 2014, verision 1.0. 2014; http://www.royalcollege.ca/cs/groups/public/documents/document/y2vk/mdaw/~edisp/tztest3rcpsced000666.pdf. Accessed October 17, 2017.
13. Sciscione AC, Colmorgen GH, D'Alton ME. Factors affecting fellowship satisfaction, thesis completion, and career direction among maternal-fetal medicine fellows. *Obstet Gynecol.* 1998;91(6):1023-1026.
14. Akinwumi O. Administrator of RCPSC specialty committees. In:2016.

15. RCPSC. Maternal Fetal Medicine: Program Directors. 2017; http://www.royalcollege.ca/rcsite/documents/arps/maternal-fetal-e. Accessed October 17, 2017.
16. Allen V. Results of the 2015 APOG Canadian Obstetrics and Gynecology subspecialists needs survey. In:2016.
17. Johnson JA, Tough S, Sogc Genetics C. Delayed child-bearing. *J Obstet Gynaecol Can.* 2012;34(1):80-93.
18. RCOG. Royal College of Obstetrics and Gynecology statement on late maternal age. 2009; https://www.rcog.org.uk/en/news/rcog-statement-on-later-maternal-age/. Accessed October 18, 2017.
19. Bushnik T, Garner R. The children of older first-time mothers in Canada: their health and development. 2008:65. http://www.statcan.gc.ca/pub/89-599-m/89-599-m2008005-eng.pdf. Accessed October 18, 2017.
20. Leader A. Pregnancy and motherhood: The biological clock. *Sexuality, Reproduction and Menopause.* 2006;4(1):3-6.
21. Cleary-Goldman J, Malone FD, Vidaver J, et al. Impact of maternal age on obstetric outcome. *Obstet Gynecol.* 2005;105(5 Pt 1):983-990.
22. Luke B, Brown MB. Contemporary risks of maternal morbidity and adverse outcomes with increasing maternal age and plurality. *Fertil Steril.* 2007;88(2):283-293.
23. Blickstein I. Motherhood at or beyond the edge of reproductive age. *International journal of fertility and women's medicine.* 2003;48(1):17-24.
24. Rayburn WF, Gant NF, Gilstrap LC, Elwell EC, Williams SB. Pursuit of accredited subspecialties by graduating residents in obstetrics and gynecology, 2000-2012. *Obstet Gynecol.* 2012;120(3):619-625.
25. Sciscione A. The effect of board-imposed changes on maternal-fetal medicine fellowships. *Obstet Gynecol.* 2004;103(1):143-147.
26. Bos H. A Canadian survey regarding factors influencing choice of MFM residency and career. In:2009.
27. Fang YM, Egan JF, Rombro T, Morris B, Zelop CM. A comparison of reasons for choosing obstetrician/gynecologist subspecialty training. *Conn Med.* 2009;73(3):165-170.
28. Lu G, Owen J, Wenstrom K. Obstetrics and gynecology residents' attitudes toward maternal-fetal medicine fellowship training. *J Matern Fetal Neonatal Med.* 2004;16(5):259-263.
29. Garibaldi RA, Popkave C, Bylsma W. Career plans for trainees in internal medicine residency programs. *Acad Med.* 2005;80(5):507-512.
30. Horn L, Tzanetos K, Thorpe K, Straus SE. Factors associated with the subspecialty choices of internal medicine residents in Canada. *BMC Med Educ.* 2008;8:37.
31. Daniels MN, Maynard S, Porter I, Kincaid H, Jain D, Aslam N. Career interest and perceptions of nephrology: A repeated cross-sectional survey of internal medicine residents. *PLoS One.* 2017;12(2):e0172167.

32. Trindade AJ, Gonzalez S, Tinsley A, Kim M, Dimaio CJ. Characteristics, goals, and motivations of applicants pursuing a fourth-year advanced endoscopy fellowship. *Gastrointest Endosc.* 2012;76(5):939-944.
33. Frintner MP, Mulvey HJ, Pletcher BA, Olson LM. Pediatric resident debt and career intentions. *Pediatrics.* 2013;131(2):312-318.
34. Adams S, Ginther DN, Neuls E, Hayes P. Attitudes and factors contributing to attrition in Canadian surgical specialty residency programs. *Can J Surg.* 2017;60(4):247-252.
35. Klingensmith ME, Cogbill TH, Luchette F, et al. Factors influencing the decision of surgery residency graduates to pursue general surgery practice versus fellowship. *Ann Surg.* 2015;262(3):449-455; discussion 454-445.
36. Langston JP, Kirby EW, Nielsen ME, et al. Economic impact of training and career decisions on urological surgery. *J Urol.* 2014;191(3):755-760.
37. Mok PS, Probyn L, Finlay K. Factors Influencing Radiology Residents' Fellowship Training and Practice Preferences in Canada. *Can Assoc Radiol J.* 2016;67(2):99-104.
38. Wilson MN, Vila PM, Cohen DS, et al. The Pursuit of Otolaryngology Subspecialty Fellowships. *Otolaryngol Head Neck Surg.* 2016;154(6):1027-1033.
39. Daniels VJ, Kassam N. Determinants of internal medicine residents' choice in the Canadian R4 fellowship match: a qualitative study. *BMC Med Educ.* 2011;11:44.
40. Gariti DL, Zollinger TW, Look KY. Factors detracting students from applying for an obstetrics and gynecology residency. *Am J Obstet Gynecol.* 2005;193(1):289-293.
41. Tay J, Siddiq T, Atiomo W. Future recruitment into obstetrics and gynaecology: factors affecting early career choice. *J Obstet Gynaecol.* 2009;29(5):369-372.
42. Scott IM, Nasmith T, Gowans MC, Wright BJ, Brenneis FR. Obstetrics and gynaecology as a career choice: a cohort study of canadian medical students. *J Obstet Gynaecol Can.* 2010;32(11):1063-1069.
43. Hammoud MM, Stansfield RB, Katz NT, Dugoff L, McCarthy J, White CB. The effect of the obstetrics and gynecology clerkship on students' interest in a career in obstetrics and gynecology. *Am J Obstet Gynecol.* 2006;195(5):1422-1426.
44. Chin-Quee AL, Yaremchuk K. Medical residents' circadian preferences across specialties. *Laryngoscope.* 2017;127(10):2236-2238.
45. Ismail SI, Kevelighan EH. Graduate medical students' perception of obstetrics and gynaecology as a future career specialty. *J Obstet Gynaecol.* 2014;34(4):341-345.
46. Fogarty CA, Bonebrake RG, Fleming AD, Haynatzki G. Obstetrics and gynecology--to be or not to be? Factors influencing one's decision. *Am J Obstet Gynecol.* 2003;189(3):652-654.
47. Schnuth RL, Vasilenko P, Mavis B, Marshall J. What influences medical students to pursue careers in obstetrics and gynecology? *Am J Obstet Gynecol.* 2003;189(3):639-643.

48. Alston MJ, Autry AM, Wagner SA, Winkel A, Allshouse AA, Stephenson-Famy A. Obstetricians and Gynecologists of the Future: A Survey of Medical Students Applying to Residency. *Obstet Gynecol.* 2017;130 Suppl 1:1s-7s.
49. Braun V, Clarke V. *Using thematic analysis in psychology.* Vol 3. London: Taylor & Francis Group; 2006.
50. Braun V, Clarke V. What can "thematic analysis" offer health and wellbeing researchers? *International Journal of Qualitative Studies on Health and Well-being.* 2014;9:26152.
51. Sandelowski M. What's in a name? Qualitative description revisited. *Res Nurs Health.* 2010;33(1):77-84.
52. Clarke V, Braun V. *Successful qualitative research: a practical guide for beginners.* Thousand Oaks, Calif;London;: Sage; 2013.
53. Braun V, Clarke V, Gareth T. Thematic Analysis. In: Rohleder P, Lyons AC, eds. *Qualitative research in clinical and health psychology.* New York, NY;Houndmills, Basingstoke, Hampshire;: Palgrave Macmillan; 2015:95-113.
54. Glaser BG, Strauss AL. *The Discovery of grounded theory: strategies for qualitative research.* Chicago: Aldine Atherton; 1967.
55. Charmaz K. *Constructing grounded theory.* 2nd ed. Thousand Oaks, Calif;New Delhi;Washington, D.C;London;Los Angeles;Singapore;: SAGE Publications Ltd; 2014.
56. CaRMS. Obstetrics and Gynecology 2018 R-1 main residency match - first iteration. 2017; https://phx.e-carms.ca/phoenix-web/pd/main?mitid=1367. Accessed October 17, 2017.
57. RCPSC. Obstetrics and Gynecology: Program Directors. 2017; http://www.royalcollege.ca/rcsite/documents/arps/obstetrics-e. Accessed October 18, 2017.
58. RCPSC. Subspecialty examination affiliate program (SEAP). 2017; http://www.royalcollege.ca/rcsite/credentials-exams/exam-eligibility/assessment-imgs/subspecialty-examination-affiliate-program-seap-e. Accessed November 19, 2017.
59. Kvale S, ebrary I. *Doing interviews.* London: SAGE Publications; 2007.
60. Rubin HJ, Rubin I. *Qualitative interviewing: the art of hearing data.* 3rd ed. Thousand Oaks, Calif: Sage; 2012.
61. Rossman GB, Rallis SF. *Learning in the field: an introduction to qualitative research.* 3rd ed. Thousand Oaks, Calif: SAGE; 2012.
62. Aday LA. *Designing and conducting health surveys: a comprehensive guide.* 2nd ed. San Francisco, CA: Jossey-Bass Publishers; 1996.
63. Novick G. Is there a bias against telephone interviews in qualitative research? *Research in Nursing and Health.* 2008;31(4):391-398.
64. Aquilino WS. Interview Mode Effects in Surveys of Drug and Alcohol Use: A Field Experiment. *The Public Opinion Quarterly.* 1994;58(2):210-240.

65. Pridemore WA, Damphousse KR, Moore RK. Obtaining sensitive information from a wary population: A comparison of telephone and face-to-face surveys of welfare recipients in the United States. *Social Science & Medicine.* 2005;61(5):976-984.
66. Mealer M, Jones Rn J. Methodological and ethical issues related to qualitative telephone interviews on sensitive topics. *Nurse researcher.* 2014;21(4):32-37.
67. Sturges JE, Hanrahan KJ. Comparing Telephone and Face-to-Face Qualitative Interviewing: a Research Note. *Qualitative Research.* 2004;4(1):107-118.
68. Greenfield TK, Midanik LT, Rogers JD. Effects of telephone versus face-to-face interview modes on reports of alcohol consumption. *Addiction.* 2000;95(2):277-284.
69. Watling CJ, Lingard L. Grounded theory in medical education research: AMEE Guide No. 70. *Med Teach.* 2012;34(10):850-861.
70. Boyatzis RE. *Transforming qualitative information: thematic analysis and code development.* Thousand Oaks, California: Sage Publications; 1998.
71. Corbin JM, Strauss AL. *Basics of qualitative research: techniques and procedures for developing grounded theory.* Fourth ed. Thousand Oaks, California: SAGE; 2015.
72. Green J, Thorogood N. *Qualitative methods for health research.* 3rd ed. Los Angeles, California: SAGE; 2014.
73. Patton MQ. *Qualitative research & evaluation methods.* 3rd ed. Thousand Oaks, Calif: Sage Publications; 2002.
74. Green J, Thorogood N. *Qualitative methods for health research.* 2nd ed. Los Angeles: SAGE; 2009.
75. Morse JM. The significance of saturation. *Qualitative Health Research.* 1995;5(2):147-149.
76. Thomas E, Magilvy JK. Qualitative rigor or research validity in qualitative research. *J Spec Pediatr Nurs.* 2011;16(2):151-155.
77. Lincoln YS, Guba EG. *Naturalistic inquiry.* Beverly Hills, Calif: Sage; 1985.
78. Krefting L. Rigor in qualitative research: the assessment of trustworthiness. *American Journal of Occupational Therapy.* 1991;45(3):214-222.
79. Morse JM. Critical analysis of strategies for determining rigor in qualitative inquiry. *Qualitative Health Research.* 2015;25(9):1212-1222.
80. Cumming-Potvin W. "New basics" and literacies: deepening reflexivity in qualitative research. *Qualitative Research Journal.* 2013;13(2):214-230.
81. Berger R. Now I see it, now I don't: researcher's position and reflexivity in qualitative research. *Qualitative Research.* 2015;15(2):219-234.
82. Elliott R, Fischer CT, Rennie DL. Evolving guidelines for publication of qualitative research studies in psychology and related fields. *British Journal of Clinical Psychology.* 1999;38(3):215-229.
83. Finlay L. Negotiating the swamp: the opportunity and challenge of reflexivity in research practice. *Qualitative Research.* 2002;2(2):209-230.

84. Lee W, Hodges AN, Williams S, Vettraino IM, McNie B. Fetal ultrasound training for obstetrics and gynecology residents. *Obstet Gynecol.* 2004;103(2):333-338.
85. Tolsgaard MG, Ringsted C, Dreisler E, et al. Sustained effect of simulation-based ultrasound training on clinical performance: a randomized trial. *Ultrasound Obstet Gynecol.* 2015;46(3):312-318.
86. RCPSC. Information by Discipline. 2017; http://www.royalcollege.ca/rc/faces/oracle/webcenter/portalapp/pages/ibd.jspx?_afrLoop=20408026473769680&_afrWindowMode=0&_afrWindowId=null-!%40%40%3F_afrWindowId%3Dnull%26_afrLoop%3D20408026473769680%26_afrWindowMode%3D0%26_adf.ctrl-state%3Duu7703mgw_4. Accessed October 31, 2017.
87. Straus SE, Straus C, Tzanetos K, International Campaign to Revitalise Academic M. Career choice in academic medicine: systematic review. *J Gen Intern Med.* 2006;21(12):1222-1229.
88. Wing DA, Quilligan EJ. Fellowship training: the ever-changing subspecialty of maternal-fetal medicine. *Obstet Gynecol.* 2008;112(6):1288-1293.
89. Gagnon A. Academic positions in MFM, discussion with the RCPSC MFM subspecialty committee chair. In:2017.
90. Wilson RD. Academic O&G positions over time. In:2017.
91. Fullick M. Who will hire all the PhDs? Not Canada's universities. *The Globe and Mail.* April 12, 2013.
92. Program Directors M. Discussion at 2016 RCPSC MFM subspecialty committee meeting. In:2016.
93. Frechette D HD, Shrichand A, Jacob C, Datta I. . What's really behind Canada's unemployed specialists? Too many, too few doctors? Findings from the Royal College's employment study. 2013. http://www.royalcollege.ca/rcsite/documents/health-policy/employment-report-executive-summary-2013-e.pdf. Accessed October 20, 2017.
94. Menezes MA, Hodgson JM, Sahhar M, Metcalfe SA. "Taking its toll": the challenges of working in fetal medicine. *Birth (Berkeley, Calif).* 2013;40(1):52-60.
95. Atallah F, McCalla S, Karakash S, Minkoff H. Please put on your own oxygen mask before assisting others: a call to arms to battle burnout. *Am J Obstet Gynecol.* 2016;215(6):731 e731-731 e736.
96. Merani S, Abdulla S, Kwong JC, et al. Increasing tuition fees in a country with two different models of medical education. *Medical education.* 2010;44(6):577-586.
97. Morra DJ, Regehr G, Ginsburg S. Anticipated debt and financial stress in medical students. *Med Teach.* 2008;30(3):313-315.
98. Kwong JC, Dhalla IA, Streiner DL, Baddour RE, Waddell AE, Johnson IL. Effects of rising tuition fees on medical school class composition and financial outlook. *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne.* 2002;166(8):1023-1028.

99. AFMC. Graduation questionnaire national report 2017. 2017 https://afmc.ca/sites/default/files/documents/en/Publications/2017_GQ_National_Report_en.pdf. Accessed November 13.
100. Walker I. Discussion with Cummings School of Medicine Director of Admissions. In:2017.
101. Statistics CME. Applicants to MD programs in Canadian Faculties of Medicine. 2016; https://afmc.ca/sites/default/files/CMES2016-Section8-Applicants.pdf. Accessed November 13, 2017.
102. Dehaas HJ. A doctor by age 24? In. *Macleans*2012.
103. SOGC. Promotion of the specialty. 2017; https://sogc.org/membership/residents/promotion-of-the-specialty.html. Accessed October 17, 2017.
104. CaRMS. Positions vacant after first iteration by faculty of medicine & discipline, 2002 match. 2002; https://www.carms.ca/fr/donnees-et-rapports/r-1/statistiques-2002/. Accessed October 18, 2017.
105. RCPSC. Specialty training requirements in Obstetrics and Gynecology, March 2016, version 3.1. 2016; http://www.royalcollege.ca/rc/faces/oracle/webcenter/portalapp/pages/viewDocument.jspx?document_id=RCP-00124206&_afrLoop=18053509106909680&_afrWindowMode=0&_afrWindowId=1fhu1cjyn_23 - !%40%40%3F_afrWindowId%3D1fhu1cjyn_23%26document_id%3DRCP-00124206%26_afrLoop%3D18053509106909680%26_afrWindowMode%3D0%26_adf.ctrl-state%3D1fhu1cjyn_39. Accessed October 17, 2017.
106. Blumenfeld YJ, Ness A, Platt LD. Maternal-fetal medicine fellowship obstetrical ultrasound experience: results from a fellowship survey. *Prenat Diagn.* 2013;33(2):158-161.
107. O'Brien J, D'Eon M. Re-thinking clinical research training in residency. *Can Med Educ J.* 2014;5(1):e58-61.
108. Rajakumar C. Reconceptualizing Benchmarks for Residency Training. *Cureus.* 2017;9(3):e1072.
109. RCPSC. Competence by design implementation. 2017; http://www.royalcollege.ca/rcsite/cbd/cbd-implementation-e. Accessed October 18, 2017.
110. Vree FE, Cohen SL, Chavan N, Einarsson JI. The impact of surgeon volume on perioperative outcomes in hysterectomy. *JSLS.* 2014;18(2):174-181.
111. Mehta A, Xu T, Hutfless S, et al. Patient, surgeon, and hospital disparities associated with benign hysterectomy approach and perioperative complications. *Am J Obstet Gynecol.* 2017;216(5):497 e491-497 e410.
112. Tyner JE, Rayburn WF. Long-term trends in applicants for maternal-fetal medicine fellowship positions. *Am J Perinatol.* 2014;31(10):923-925.

113. AMA. Toward Optimized Practice Alberta Medical Association Clinical Practice Guideline. Third trimester fetal well-being studies: criteria and managing results clinical practice guideline. 2017. http://www.topalbertadoctors.org/download/2129/Third Trimester Fetal Well-Being Studies.pdf?_20171018165640.
114. CMA. Tuition fee escalation and deregulation in undergraduate programs in medicine (update 2009). *CMA Policy* 2009; https://www.cma.ca/Assets/assets-library/document/en/advocacy/policy-research/CMA_Policy_Tuition_fee_escalation_and_deregulation_in_undergraduate_programs_in_medicine_Update_2009_PD09-06-e.pdf. Accessed October 22, 2017.
115. StatsCan. Tuition fee deregulation: who pays? http://www.statcan.gc.ca/pub/81-004-x/2006001/9183-eng.htm. Accessed November 13, 2017.
116. Whatley S. OMA statement: Proposed federal tax changes create uncertainty among doctors. *National Post* 2017; https://www.oma.org/sections/news-events/news-room/all-news-releases/oma-statement-proposed-federal-tax-changes-create-uncertainty-among-doctors/. . Accessed November 13, 2017.
117. Government C. 2017-2018 list of needed speciallties for issuing statements of need under category B: Section two - endorsement by Quebec. 2017; https://www.canada.ca/en/health-canada/services/health-care-system/health-human-resources/statements-need-postgraduate-medical-training-united-states/2017-2018-list-needed-specialties-issuing-statements-need-under-category.html - a2. Accessed October 18, 2017.
118. Morency A-M, Iglesias M-H. PREMs for MFM in Québec, discussion with Québec MFM program directors. In:2017.
119. Gerber SE, Lo Sasso AT. The evolving gender gap in general obstetrics and gynecology. *Am J Obstet Gynecol.* 2006;195(5):1427-1430.
120. AAMC. Table B3. Number of active residents, by type of medical school, GME specialty, and gender, 2015-2016 active residents. 2016; https://www.aamc.org/data/448482/b3table.html. Accessed November 19, 2017.
121. CaRMS. CaRMS R1 Match Report, Table 19: First choice discipline preference and match restuls of CMGs by gender. 2017; http://carms.ca/wp-content/uploads/2017/05/Table_20_First_Choice_Subdiscipline_Preference_and_Match_Results_of_CMGs_by_Gender_English.pdf. Accessed November 13, 2017.
122. CMA. Candian Medical Association Obstetrics / Gynecology profile. 2015; https://www.cma.ca/Assets/assets-library/document/en/advocacy/ObGyn-e.pdf. Accessed October 31, 2017.
123. Sandy EA, 2nd, Kaminski R, Simhan H, Beigi R. Contemporary Obstetric Triage. *Obstet Gynecol Surv.* 2016;71(3):165-177.

APPENDICIES

APPENDIX A: RCPSC MFM accreditations and certifications 1998-2016

Year	Accreditation without Certification	Certification (by examination)
1988	1	n/a
1989	1	n/a
1990	3	n/a
1991	1	n/a
1992	2	n/a
1993	3	n/a
1994	1	n/a
1995	4	n/a
1996	5	n/a
1997	3	n/a
1998	1	n/a
1999	4	n/a
2000	5	n/a
2001	7	n/a
2002	2	n/a
2003	5	n/a
2004	6	n/a
2005	6	n/a
2006	4	n/a
2007	6	n/a
2008	4	7
2009	n/a	7
2010	n/a	12
2011	n/a	8
2012	n/a	8
2013	n/a	3
2014	n/a	12
2015	n/a	10
2016	n/a	15*
TOTAL	74	67

* Denotes that this year includes certification of SEAP[58] candidates, in addition to Canadian MFM residency graduates.

Data from: personal communication from Olu Akinwumi, administrator, RCPSC specialty committees.[14]

APPENDIX B: Summary of MFM post-MD trainees in Canada 2005-2016

Summary of MFM Post-MD Trainees: Canadian or Permanent Resident Trainees

YEAR	Residents			Clinical Fellows	TOTAL
	PGY-6	PGY-7	SUBTOTAL		
2005-2006	2	2	4	7	11
2006-2007	3	2	5	4	9
2007-2008	4	3	7	2	9
2008-2009	11	4	15	3	18
2009-2010	10	11	21	1	22
2010-2011	10	8	18	1	19
2011-2012	7	6	13	1	14
2012-2013	9	4	13	0	13
2013-2014	7	9	16	4	20
2014-2015	10	6	16	5	21
2015-2016	6	8	14	2	16
2016-2017	13	5	18	4	22

Summary of MFM Post-MD Trainees: Visa Trainees

YEAR	Residents			Clinical Fellows	TOTAL
	PGY-6	PGY-7	SUBTOTAL		
2005-2006	0	1	1	11	12
2006-2007	0	0	0	21	21
2007-2008	0	0	0	19	19
2008-2009	3	0	3	8	11
2009-2010	0	3	3	14	17
2010-2011	3	0	3	17	20
2011-2012	1	1	2	21	23
2012-2013	3	0	3	21	24
2013-2014	3	1	4	19	23
2014-2015	4	2	6	17	23
2015-2016	2	4	6	20	26
2016-2017	3	3	6	21	27

Data from: The Canadian Post-MD Education Registry.[5]

APPENDIX C: Letter of invitation to O&G program directors

O&G Program Director name
Residency Program
Address
City, Province, Postal code
email

Dear Dr. Program Director name,

I am writing to you to ask for your assistance in recruitment of resident participants for our research study "What are the factors influencing Canadian-trained residents' choice of pursing the subspecialty of Maternal-Fetal Medicine (MFM)?"

The purpose of the study is to assess why trainees are choosing to pursue additional training and a career in MFM. We hope to better understand what factors are leading trainees either towards or away from a MFM career path. The results are anticipated to assist in understanding resident's choices, and perhaps indicate needed action for the specialty of MFM in Canada.

We are hoping to recruit a variety of senior residents from across Canada in both Obstetrics and Gynecology residencies (PGY-3, PGY-4, and PGY-5 residents) and Maternal-Fetal Medicine residencies (PGY-6 and PGY-7) for this study. We would of course like to hear from residents planning on applying (or already matched) for MFM residency. But to fully answer our research question, it is critical that we also have residents participate who are not considering applying to MFM, and are instead planning to pursue a general practice or a gynecologic subspecialty, or who are still undecided. Resident participants in this study must currently be either Canadian citizens or permanent residents of Canada.

If residents agree to participate in this research, the study administrative assistant (unrelated to the Section of MFM) will request only the most basic demographic information from them [age, gender, postgraduate year of training, and region of current training (with programs labeled as to either West, Central, or East)]. A research assistant (unrelated to the Department of Obstetrics and Gynecology) will then contact participants at a time convenient to the trainee for one 30 to 45-minute telephone interview in English about their perceptions about MFM residency and career. The interview will be recorded for transcription and qualitative analysis. Participant confidentiality is of utmost importance to us – all identifying information will be removed before the research team reviews the interview transcripts. Following the

telephone interview, a gift will be provided to the resident in thanks for your time and participation (an Amazon Gift Card valued $40).

This study was reviewed and approved by the University of Calgary Conjoint Health Research Ethics Board (REB 16-0027), and is funded by a DEAR / Leadership Circle 2015-2016 Pilot Grant from the Department of Obstetrics and Gynecology, University of Calgary.

I am presently a MFM Specialist in Calgary and the program director for the MFM Residency Program at the University of Calgary. I am also a graduate student at the University of Calgary pursuing a Master's degree in Medical Education. This research study will comprise my thesis project, and I hope that you will consider assisting our work by circulating information about this study to your eligible residents via email. I would also be available to briefly (5 minutes) speak to your residents about the study, either in person (if feasible) or via FaceTime or Skype, perhaps when your residents are gathered for an academic half-day.

Thank you for taking the time to consider assisting in this important research. Please feel free to contact any members of the research team listed below if you have any questions about the research study:

Dr. Jocelyn Lockyer, PhD
Departments of Community Health Sciences and Surgery, Faculty of Medicine, University of Calgary
Email; phone

Dr. Elizabeth Oddone Paolucci, PhD
Departments of Community Health Sciences and Surgery, Faculty of Medicine, University of Calgary
Email; phone

Dr. Anne Roggensack, MD, FRCSC
Department of Obstetrics and Gynecology, Faculty of Medicine, University of Calgary
Graduate Student, Department of Community Health Sciences, Faculty of Medicine, University of Calgary
Email; phone

Sincerely,

Dr. Anne Roggensack, MD, FRCSC

Graduate Student, Department of Community Health Sciences, University of Calgary
Clinical Associate Professor, Department of Obstetrics and Gynecology, University of Calgary
Address; email; phone

APPENDIX D: Letter of invitation to MFM program directors

MFM Program Director name
Residency Program
Address
City, Province, Postal code

Dear Dr. Program Director name,

I am writing to you to ask for your assistance in recruitment of resident participants for our research study "What are the factors influencing Canadian-trained residents' choice of pursing the subspecialty of Maternal-Fetal Medicine (MFM)?"

The purpose of the study is to assess why trainees are choosing to pursue additional training and a career in MFM. We hope to better understand what factors are leading trainees either towards or away from a MFM career path. The results are anticipated to assist in understanding resident's choices, and perhaps indicate needed action for the specialty of MFM in Canada.

We are hoping to recruit a variety of senior residents from across Canada in both Obstetrics and Gynecology residencies (PGY-3, PGY-4, and PGY-5 residents) and Maternal-Fetal Medicine residencies (PGY-6 and PGY-7) for this study. To best answer our research question, it is critical to hear from residents currently pursuing a MFM residency. As there are relatively few Canadian MFM residents, I hopeful that MFM residents will be enthusiastic to participate and express their perceptions for this study. Resident participants in this study must currently be either Canadian citizens or permanent residents of Canada.

If residents agree to participate in this research, the study administrative assistant (unrelated to the Section of MFM) will request only the most basic demographic information from them [age, gender, postgraduate year of training, and region of current training (with programs labeled as to either West, Central, or East)]. A research assistant (unrelated to the Department of Obstetrics and Gynecology) will then contact participants at a time convenient to the trainee for one 30 to 45-minute telephone interview in English about their perceptions about MFM residency and career. The interview will be recorded for transcription and qualitative analysis. Participant confidentiality is of utmost importance to us – all identifying information will be removed before the research team reviews the interview transcripts. Following the telephone interview, a gift will be provided to the resident in thanks for your time and participation (an Amazon Gift Card valued $40).

This study was reviewed and approved by the University of Calgary Conjoint Health Research Ethics Board (REB 16-0027), and is funded by a DEAR / Leadership Circle 2015-2016 Pilot Grant from the Department of Obstetrics and Gynecology, University of Calgary.

I am presently a MFM Specialist in Calgary and the program director for the MFM Residency Program at the University of Calgary. I am also a graduate student at the University of Calgary pursuing a Master's degree in Medical Education. This research study will comprise my thesis project, and I hope that you will consider assisting our work by circulating information about this study to your eligible residents via email. I would also be available to briefly (5 minutes) speak to your residents about the study, either in person (if feasible) or via FaceTime or Skype, perhaps when your residents are gathered for an academic half-day.

Thank you for taking the time to consider assisting in this important research. Please feel free to contact any members of the research team listed below if you have any questions about the research study:

Dr. Jocelyn Lockyer, PhD
Departments of Community Health Sciences and Surgery, Faculty of Medicine, University of Calgary
Email; phone

Dr. Elizabeth Oddone Paolucci, PhD
Departments of Community Health Sciences and Surgery, Faculty of Medicine, University of Calgary
Email; phone

Dr. Anne Roggensack, MD, FRCSC
Department of Obstetrics and Gynecology, Faculty of Medicine, University of Calgary
Graduate Student, Department of Community Health Sciences, Faculty of Medicine, University of Calgary
Email; phone

Sincerely,

Dr. Anne Roggensack, MD, FRCSC

Graduate Student, Department of Community Health Sciences, University of Calgary
Clinical Associate Professor, Department of Obstetrics and Gynecology, University of Calgary
Address; email; phone

APPENDIX E: Letter of invitation to O&G residents

Dear O&G Resident,

I am writing to you to invite you to participate in our research study "What are the factors influencing Canadian-trained residents' choice of pursing the subspecialty of Maternal-Fetal Medicine (MFM)?"

The purpose of the study is to assess why trainees are choosing to pursue additional training and a career in MFM. We hope to better understand what factors are leading trainees either towards or away from a MFM career path. The results are anticipated to assist in understanding resident's choices, and perhaps indicate needed action for the specialty of MFM in Canada.

We are hoping to recruit a variety of senior residents from across Canada in both Obstetrics and Gynecology residencies (PGY-3, PGY-4, and PGY-5 residents) and Maternal-Fetal Medicine residencies (PGY-6 and PGY-7) for this research. We would of course like to hear from residents planning on applying (or already matched) for MFM residency. But to fully answer our research question, it is critical that we also have residents participate who are not considering applying to MFM, and are instead planning to pursue a general practice or a gynecologic subspecialty, or who are still undecided. Resident participants in this study must currently be either Canadian citizens or permanent residents of Canada.

I am presently a MFM Specialist in Calgary and the program director for the MFM Residency Program at the University of Calgary. I am also a graduate student at the University of Calgary pursuing a Master's degree in Medical Education. This research study will comprise my thesis project, and I hope that you will consider participating.

If you agree to participate in this research, the study administrative assistant will request only the most basic demographic information from you [age, gender, postgraduate year of training, and region of current training (with programs grouped as to either West, Central, or East)]. A research assistant (unrelated to the Department of Obstetrics and Gynecology) will then contact you at a time convenient to you for one 30 to 45-minute telephone interview in English about your perceptions about MFM residency and career. The interview will be recorded for transcription and analysis. Participant confidentiality is of utmost importance to us – all identifying information will be removed before the research team reviews the interview transcripts. Following the telephone interview, a gift will be provided to you in thanks for your time and participation (an Amazon Gift Card valued $40).

This study was reviewed and approved by the University of Calgary Conjoint Health Research Ethics Board (REB 16-0027), and is funded by a DEAR / Leadership Circle 2015-2016 Pilot Grant from the Department of Obstetrics and Gynecology, University of Calgary.

Thank you for taking the time to consider participating in this important research. Please see the attached consent form for more information about your role in this study.

If you would like to participate in the research study, or would like more information about the study, please contact our Administrative Assistant Jill Vaughan (by email or phone) to arrange a convenient time for a telephone interview:

Jill Vaughan
Administrative Assistant, Section of Research, Department of Obstetrics and Gynecology, University of Calgary
Address; email; phone

Please also feel free to contact any members of the research team listed below (by email or phone) if you have any questions about participating in the research study:

Dr. Jocelyn Lockyer, PhD
Departments of Community Health Sciences and Surgery, Faculty of Medicine, University of Calgary
Email; phone

Dr. Elizabeth Oddone-Paolucci, PhD
Departments of Community Health Sciences and Surgery, Faculty of Medicine, University of Calgary
Email; phone

Dr. Anne Roggensack, MD, FRCSC
Department of Obstetrics and Gynecology, Faculty of Medicine, University of Calgary
Graduate Student, Department of Community Health Sciences, Faculty of Medicine, University of Calgary
Email; phone

Sincerely,

Dr. Anne Roggensack, MD, FRCSC

Graduate Student, Department of Community Health Sciences, University of Calgary
Clinical Associate Professor, Department of Obstetrics and Gynecology, University of Calgary
Address; email; phone

APPENDIX F: Letter of invitation to MFM residents

Dear MFM Resident,

I am writing to you to invite you to participate in our research study "What are the factors influencing Canadian-trained residents' choice of pursing the subspecialty of Maternal-Fetal Medicine (MFM)?"

The purpose of the study is to assess why trainees are choosing to pursue additional training and a career in MFM. We hope to better understand what factors are leading trainees either towards or away from a MFM career path. The results are anticipated to assist in understanding resident's choices, and perhaps indicate needed action for the specialty of MFM in Canada.

We are hoping to recruit a variety of senior residents from across Canada in both Obstetrics and Gynecology residencies (PGY-3, PGY-4, and PGY-5 residents) and Maternal-Fetal Medicine residencies (PGY-6 and PGY-7) for this research. To best answer our research question, it is critical to hear from residents currently pursuing a MFM residency. As there are relatively few Canadian MFM residents, I hope that you all consider participating, letting your voice be heard. Resident participants in this study must currently be either Canadian citizens or permanent residents of Canada.

I am presently a MFM Specialist in Calgary and the program director for the MFM Residency Program at the University of Calgary. I am also a graduate student at the University of Calgary pursuing a Master's degree in Medical Education. This research study will comprise my thesis project, and I hope that you will consider participating.

If you agree to participate in this research, the study administrative assistant will request only the most basic demographic information from you [age, gender, postgraduate year of training, and region of current training (with programs grouped as to either West, Central, or East)]. A research assistant (unrelated to the Department of Obstetrics and Gynecology) will then contact you at a time convenient to you for one 30 to 45-minute telephone interview in English about your perceptions about MFM residency and career. The interview will be recorded for transcription and analysis. Participant confidentiality is of utmost importance to us – all identifying information will be removed before the research team reviews the interview transcripts. Following the telephone interview, a gift will be provided to you in thanks for your time and participation (an Amazon Gift Card valued $40).

This study was reviewed and approved by the University of Calgary Conjoint Health Research Ethics Board (REB 16-0027), and is funded by a DEAR / Leadership Circle 2015-

2016 Pilot Grant from the Department of Obstetrics and Gynecology, University of Calgary.

Thank you for taking the time to consider participating in this important research. Please see the attached consent form for more information about your role in this study.

If you would like to participate in the research study, or would like more information about the study, please contact our Administrative Assistant Jill Vaughan (by email or phone) to arrange a convenient time for a telephone interview:

Jill Vaughan
Administrative Assistant, Section of Research, Department of Obstetrics and Gynecology, University of Calgary
Address; email; phone

Please also feel free to contact any members of the research team listed below (by email or phone) if you have any questions about participating in the research study:

Dr. Jocelyn Lockyer, PhD
Departments of Community Health Sciences and Surgery, Faculty of Medicine, University of Calgary
Email; phone

Dr. Elizabeth Oddone Paolucci, PhD
Departments of Community Health Sciences and Surgery, Faculty of Medicine, University of Calgary
Email; phone

Dr. Anne Roggensack, MD, FRCSC
Department of Obstetrics and Gynecology, Faculty of Medicine, University of Calgary
Graduate Student, Department of Community Health Sciences, Faculty of Medicine, University of Calgary
Email; phone

Sincerely,

Dr. Anne Roggensack, MD, FRCSC
Graduate Student, Department of Community Health Sciences, University of Calgary
Clinical Associate Professor, Department of Obstetrics and Gynecology, University of Calgary
Address; email; phone

APPENDIX G: Interview Guide

Thank you for agreeing to participate in this research project, by undertaking this interview. My name is _____ and I am a research assistant with the University Of Calgary Cummings School Of Medicine. I am conducting interviews on behalf of Dr. Anne Roggensack, University of Calgary Maternal-fetal Medicine physician and residency program director, who is also a student in graduate studies under the supervision of Drs. Jocelyn Lockyer and Elizabeth Oddone Paolucci. We are going to be talking about factors influencing your decision to pursue a career in Maternal-fetal Medicine, or "MFM." I understand that you have previously completed a written consent to participate, and had the opportunity to contact the research team with any questions. A Department of Obstetrics and Gynecology Leadership Circle Grant is funding this study.

The interview should take approximately 30-45 minutes. In order to capture everything you say, I will be recording our conversation. Please refrain from stating your name or the name of your faculty, hospital, or university during this interview. Neither the interview recording nor the transcript of this discussion will include any personal information that could be used to identify you – it will only include your study identification number. All data collected for this study will be confidential, meaning that this information will not be shared with anyone outside the research team. While information or quotations from this interview may be used in publications or presentation, your identity will never be revealed to anyone outside the research team. Only a professional transcriptionist, Dr. Roggensack, and I will have access to this audio interview recording. The research team (including Drs. Anne Roggensack, Jocelyn Lockyer, and Elizabeth Oddone Paolucci) will have access to the written documentation of this interview for analysis (including only your study identification number). Both the recordings and written copy of our conversation will be kept in a secure location when not in use. You do not have to talk about anything you don't want to, and you can decline to answer any question. At any point during the interview, you may withdraw from this study simply by stating to me that you wish to withdraw. If you wish to withdraw from the study after today's interview, please email or call our Administrative Assistant Jill Vaughan at [email] or [phone]. Should you opt either to participate or to withdraw from this study, there will be neither any benefits nor repercussions or risk of jeopardizing either current training status with the University of Calgary Department of Obstetrics and Gynecology, or future applications for residency or staff positions. Do you have any questions or concerns about the study, the interview, or your participation?

I have a guideline of the questions I want to ask you, but at any point if you want to add something, or you feel something is relevant that I haven't brought up, please feel free to do so. Are you ready to begin?

1) What are your current career aspirations?

- Probes (if needed): What type of a career are you planning? Are you considering an academic career? Would your ideal career include Research or Medical Education? Are you considering a clinical career in the community?

2) I am going to ask you questions about MFM careers and about MFM residency. Tell us what you think about MFM residency and career.

3) Have you ever considered pursuing a career in MFM? Why or why not? What factors were most influential in your decision?

4) Please tell us what you think about a career in MFM. What aspects of MFM career do you find attractive? What aspect of a MFM career do you find least attractive?

5) Please tell us what you think about a Canadian residency (or fellowship) in MFM. What aspects of a residency in MFM do you find attractive? What aspect of a residency in MFM do you find least attractive?

6) Tell us about any part of your O&G residency experience that may be influencing your desire to pursue a career in MFM.

- Probes (if needed): Encouragement or support from MFM faculty? Presence of a role model in MFM? Experience on MFM rotation? Exposure to ultrasound during residency? Other clinical experience?

7) Please describe any aspect of the MFM required training program that is influencing your decision to pursue MFM.

- Probes (if needed): Length of training? Types of clinical experiences during training? Required 6 months of scholarly activity or research? Required completion of a scholarly project? Required written Royal College Exam?

8) After graduation from residency, what parts of a career in MFM would you see as attractive or unattractive?

- Probes (of needed): Availability of positions in MFM? Type / location of positions? Opportunity for participation in labour and delivery?

8) Please describe any factors related to your personal life or desired lifestyle that are influencing your career choice.

- Probes (if needed): Perceived (good or bad) lifestyle of MFM? Family life issues? Frequency of on-call (good or bad)?

9) Almost done! Are any financial factors influencing your decisions?

- Probes (if needed): Student debt? Cost of travelling to interviews? Personal financial obligations? Salary during residency? Availability of moonlighting during training? Perceived eventual practice income?

10) That's all of my questions. Is there anything else that you would like to add?
If you have any further questions, comments, or would like to withdraw from the study, please don't hesitate to contact Dr. Jocelyn Lockyer or Dr. Elizbeth Oddone Paolucci by phone or email.

Thanks again for your time and participation in this study. You will shortly receive a gift via your contact email from our Administrative Assistant in thanks for your participation. Good-bye!

APPENDIX H: Participant consent form

TITLE: What are the factors influencing Canadian-trained residents' choice of pursing the subspecialty of Maternal-Fetal Medicine (MFM)?

FUNDED BY: DEAR / Leadership Circle 2015-2016 Pilot Grant
Department of Obstetrics and Gynecology, University of Calgary

INVESTIGATORS:

Supervisors:
Dr. Jocelyn Lockyer, PhD
Professor, Department of Community Health Sciences
Senior Associate Dean, Education
Faculty of Medicine, University of Calgary, Calgary, Alberta
Email; phone

Dr. Elizabeth Oddone Paolucci, PhD
Assistant Professor, Departments of Community Health Sciences and Surgery
Graduate Program Director, Department of Community Health Sciences
Faculty of Medicine, University of Calgary, Calgary, Alberta
Email; phone

Student Investigator:
Dr. Anne Roggensack, MD, FRCSC
Graduate Student, Department of Community Health Sciences
Clinical Associate Professor, Department of Obstetrics and Gynecology
Faculty of Medicine, University of Calgary, Calgary, Alberta
Email; phone

Other Researchers:
Dr. Sujata (Sue) Chandra, MD, MSc, FRCSC
Associate Professor, Dept. of Obstetrics and Gynecology
Division Director, Maternal-fetal Medicine
Faculty of Medicine, University of Alberta, Edmonton, Alberta

Dr. Pamela Veale, MD, MSc, FRCSC
Assistant Professor, Dept. of Pediatrics
Assistant Dean Undergraduate Medical Education Program
Faculty of Medicine, University of Calgary, Calgary, Alberta

INTRODUCTION

We invite you to take part in this research study about residents' choice to pursue residency and eventual career in Maternal-Fetal Medicine (MFM). Taking part in the research is up to you; it is entirely your choice. Even if you do take part, you may leave the study at any time and for any reason. The information below summarizes what is involved in the research, what you will be asked to do, and any benefit or risk that you might experience. This consent form is only part of the process of informed consent. If you would like more detail about something mentioned here, or information not included here, please feel free to contact the lead researcher(s). Please ask as many questions as you like. You will receive a copy of this form for your records and reference.

BACKGROUND FOR THE STUDY

This research subject was prompted by a perception of decreasing applicants to the annual MFM residency "match" over recent years. A review of existing data did not support these fears - while there are annual variations, in most years, resident matching to MFM remained generally high (7-10 starting per year). However, it was clear that there was no contemporaneous data specific to Canada as to resident choice of MFM, that this information was not being tracked, and that an assessment as to why O&G residents are choosing (or not choosing) to pursue MFM residency and career was indicated.

There is clearly still a need for physicians skilled in the management of high-risk pregnancy. With increasing maternal age, BMI, multiple gestation, and medical disorders for Canadian mothers, pregnancy care is only becoming more complex. There is increasing need for quality obstetric ultrasound and fetal assessment, and initiatives for fetal imaging are being primarily lead by Maternal-Fetal Medicine in Canada. Unfortunately, job insecurity and specialist unemployment are concerning issues for new graduates across specialties in Canada. While the concern regarding decreasing trainees in MFM was perhaps unfounded, we do not have any data to suggest if we are training enough MFMs to serve Canada's future. Thus, determining why residents are choosing to pursue additional training in our subspecialty is of utmost importance.

The body of published literature surrounding the resident's choice of MFM subspecialty training has been developed using exclusively survey research. While these surveys have identified some factors thought to influence choice of subspecialty training (primarily in the USA), the existing body of research is based upon surveys developed by faculty. A qualitative approach will permit us to fully explore the resident's perceptions of MFM

residency and career, and new themes may well be developed that have not been previously identified or surveyed.

WHAT IS THE PURPOSE OF THE STUDY?

The aim of the study is to assess why trainees are choosing to pursue additional training and a career in MFM. Our focus is on Canadian-trained Canadian citizens or permanent residents of Canada, the majority of whom will plan to practice in Canada. We hope to better understand what factors are leading trainees either towards or away from a MFM career path. The results are anticipated to assist in understanding of resident's choices, and perhaps indicate needed actions for the specialty of MFM in Canada.

With this project, our main research objective is to explore the factors influencing Canadian-trained residents' career choice of MFM. Specific questions include:

1) What are the perceptions of Canadian-trained Obstetrics and Gynecology (O&G) residents regarding Maternal-Fetal Medicine (MFM) residency and career?

2) What do current trainees in O&G and MFM residency see as the positive and negative factors influencing their choice of MFM residency and career?

3) What aspects of MFM residency training and future career are perceived as attractive or unattractive to residents?

WHO CAN TAKE PART IN THIS STUDY?

You can participate in this study if you are:

- Currently a PGY-3, PGY-4, or PGY-5 Resident in a Canadian Obstetrics and Gynecology Residency Program, or
- Currently a PGY-6 or PGY-7 Resident in a Canadian Maternal-fetal Medicine Residency Program, and
- Currently a Canadian citizen or permanent resident of Canada.

HOW MANY PEOPLE ARE TAKING PART IN THE STUDY?

The study will continue until data saturation (when no new themes arise from analysis of resident interviews). We are estimating that 20-25 residents will participate in the study.

WHAT WOULD I HAVE TO DO?

If you agree to participate in this research, the study administrative assistant (unrelated to the MFM residency or section) will request only the most basic demographic information from [age, gender, postgraduate year of training, and region of current training (with programs grouped as to either West, Central, or East)], and assign you a study number.

A research assistant (unrelated to the Department of Obstetrics and Gynecology) will then contact you at a time convenient to you for one 30 to 45 minute telephone interview in English about MFM residency and career. The interview will be recorded for transcription and analysis. There will be no identifying information recorded during the telephone interview – only a study number will identify you, linked to only the basic demographic data collected.

WHAT ARE THE RISKS?

As the study design keeps the participant's identity confidential from the study investigators in Obstetrics and Gynecology, breach of confidentiality is not expected to be a risk of participation in this study. Quotations from individual interviews will be included in reports or publications from this study, with all identifying information will be removed from these quotations.

The student investigator (Dr. Anne Roggensack) is presently the Program Director for the University of Calgary MFM Residency Program, and is a non-voting member of the Royal College of Physicians and Surgeons of Canada MFM Committee. Given her leadership position, she will not be performing the interviews with O&G and MFM residents, to protect confidentiality and to collect the most honest data possible from residents. An administrative assistant (from the Department of Obstetrics and Gynecology, but unrelated to the Section of MFM) will be the primary contact for participants, and participants will be assigned a study number. A research assistant will be trained to perform interviews with participants, and transcripts of these interviews will only include the participant's study number. Dr. Roggensack will review the audio interview tapes (to ensure quality in interviewing and accurate transcription), but the participant's identity will be kept confidential from Dr. Roggensack and the rest of the study team (as the only demographic data collected will be age, gender, postgraduate year of training, and region of current training, with this information assigned to a study number). Interview questions are specific to career choice and national requirements of the training program, and judging or comparing individual programs will not be performed. The potential for ethical conflict exists for PGY-4 or -5 O&G residents applying to the University of Calgary MFM Residency Program, residents currently in the University of Calgary MFM Residency Program, and MFM residents applying for a faculty position in MFM at the University of Calgary. The University of Calgary MFM Residency Program Committee as a group determines resident selection, assessment, and

promotion, and the confidential information collected in this study would absolutely have no role in this process. Dr. Roggensack is not a member of the Royal College MFM Exam Board, so will not participate in the development or marking of the RCPSC Short-Answer Question Certifying Examination. Neither the O&G Department Head nor the MFM Section Head are participating in this study, and the University Of Calgary Department Of Obstetrics and Gynecology determines hiring of graduated physicians by a search committee and specific criteria. We are confident that participation in this study will not affect admission or promotion in the University of Calgary (or other national MFM Residency Program), or applications for MFM employment at the University of Calgary.

WILL I BENEFIT IF I TAKE PART?

If you agree to participate in this study, there will not be a direct benefit to you. Your decision to participate in this study will not influence the likelihood of MFM residency match or later employment at the University of Calgary other institution – you identity will be not be revealed to the researchers. The information we get from this study may help us to encourage future residents to pursue MFM as a residency and career.

DO I HAVE TO PARTICIPATE?

Participation in this study is entirely voluntary. There are no negative repercussions to either you or your future career aspirations in Obstetrics and Gynecology and / or Maternal-Fetal Medicine should you decline to participate in this study.

HOW DO I WITHDRAW FROM THE STUDY?

You may choose to withdraw from the study at any time without jeopardizing your future training and career. There are no negative repercussions to withdrawing from the study. During the interview, you may choose to withdraw from the study by simply stating that you wish to withdraw. You may also withdraw prior to or after the interview by contacting the Administrative Assistant Jill Vaughan by phone or email, and indicating you wish to withdraw. Should you wish to withdraw from the study, all of your data will be removed from the study.

WHAT ELSE DOES MY PARTICIPATION INVOLVE?

Your participation in the study only involves the telephone interview.

WILL I BE PAID FOR PARTICIPATING, OR DO I HAVE TO PAY FOR ANYTHING?

You will not have to pay anything to participate in this study. The cost of long-distance phone calls will be covered by the research study.

Following the telephone interview, a gift will be provided to you in thanks for your time and participation. An Amazon Gift Card valued $40 will be provided to you via your contact email by the project administrative assistant, after the interview.

WILL MY RECORDS BE KEPT PRIVATE?

When you contact our administrative assistant, she will collect very basic demographic information (age, gender, postgraduate year of training, and region of current training), and assign you a study number. No personal identifiers will be linked to the data, or to your responses. We are endeavouring to not include any identifying information (beyond the study identification number) in the telephone interview, but the transcriptionist will be instructed to strip any personal identifiers from the interview transcript prior to review of the transcript by the study team. Only the study identification number will be used to identify participants. No participant names will appear on transcripts used for analysis or in published documents. All personal information will be kept confidential. After the interviews have been completed, all emails to the administrative assistant and the interviewer from participants will be deleted. All digital audio files and transcripts documents will be kept on a password-protected computer with access limited to the student investigator and supervisors. Any paper copies or copies of digital files will be kept in a locked drawer within the Department of Obstetrics and Gynecology. All data will be destroyed after study completion as per the University of Calgary's data retention rules (i.e. 5 years after the project is closed or in accordance with the terms and conditions of the research agreement or funding agency). All members of the research team that are in direct contact with you will sign confidentiality agreements. The University of Calgary Conjoint Health Research Ethics Board will have access to the records.

HOW CAN I OBTAIN THE RESULTS OF THE STUDY?

We can provide of you a summary of the findings from all the resident's interviews at the conclusion of the study. No individual results will be provided. You can obtain these results by including your contact information at the end of the signatures.

QUESTIONS OR CONCERNS?

If you have further questions, or would like clarification regarding this research and / or your participation, please feel free to contact either of the lead investigators (via email or phone), as listed below:

Dr. Jocelyn Lockyer, PhD
Department of Community Health Sciences
Faculty of Medicine, University of Calgary, Calgary, AB
Email; phone

Dr. Elizabeth Oddone Paolucci, PhD
Departments of Community Health Sciences and Surgery
Faculty of Medicine, University of Calgary, Calgary, Alberta
Email; phone

If you have any questions concerning your rights as a possible participant in this research, please contact:

Conjoint Health Research Ethics Board, University of Calgary
Email; phone

SIGNATURES

Your signature on this form indicates that: (1) you understand to your satisfaction the information regarding your participation in the research project, and [123] you agree to participate in the research project.

In no way does this waive your legal rights, nor release the investigators or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time without jeopardizing your education or career. You should feel free to ask for clarification or new information throughout your participation.

Participant's Name: (please print) _____

Participant's Signature: _____ Date: _____

Researcher's Name: (please print) _____

Researcher's Signature: _____ Date: _____

I consent to the use of non-identifying quotations in any report of publication resulting from this research.

Participant's Signature: _____ Date: _____

I wish to be provided with a copy of the study results via email.

Participant's Signature: _____ Date: _____

Participant's email address: _____

The University of Calgary Conjoint Health Research Ethics Board has approved this research study.

A signed copy of this consent form has been given to you to keep for your records and reference. The investigators have kept a copy of the consent form.