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The MFMU VBAC Success Calculator: statistical prediction and race in an ethnography of obstetric thinking.

by
Nicholas Rubashkin

DISSERTATION
Submitted in partial satisfaction of the requirements for degree of
DOCTOR OF PHILOSOPHY

in
Global Health Sciences

in the
GRADUATE DIVISION
of the
UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

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by

Nicholas Rubashkin

Acknowledgments

This dissertation happened in the in-between spaces of life, most intensively over the past three years. Truthfully though, I've been working on the ideas in this dissertation for a significant portion of my life. So, I want to acknowledge my parents, Susan and (the late) Michael Rubashkin, whose spirit for adventure early in their marriage took them to a remote island where it was still typical for births to happen at home, as did my own. I grew up with the story of my home birth and its impact on my parents. That unique origin story for an obstetrician set me on a lifelong path of working on issues of gender, race, and power. I would especially like to acknowledge Professor Amy Agigian who rocked my world as an undergraduate in her feminist studies courses, as she too set me on a course for this dissertation.

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Abstract

The MFMU VBAC Success Calculator:

statistical prediction and race in an ethnography of obstetric thinking

Nicholas Rubashkin

In 2015 some 29.7 million women gave birth via cesarean, the majority of whom will subsequently give birth via repeat cesareans. The steep rise in surgical births might outpace the abilities of health systems to safely conduct the surgery, potentially reversing hard fought gains in reducing maternal mortality in low- and middle-income countries. The United States too has witnessed a sharp increase in cesarean use over the last 20 years, now accounting for 1 in 3 births, or 1.2 million per year. Even in California, the state that leads the nation in reducing avoidable maternal morbidity and mortality, 37% of the rise in maternal morbidity over the last 20 years can be explained by cesarean overuse, with Black women most seriously affected. After decades of advocating for universal facility-based childbirth, the global health community must now deal with the consequences of a sometimes necessary but often overused surgery.

The U.S. cesarean rate is sustained by increases in primary cesareans and decreases in the number of women attempting a Vaginal Birth After Cesarean (VBAC). Down from a peak of 28% in the late 1990s, the VBAC rate is persistently low at 13%. After a first cesarean, most women in the U.S. continue to schedule an Elective Repeat Cesarean Delivery (ERCD). In a 2010 consensus statement the NIH found that several prediction models could accurately predict VBAC using varying combinations of individual risk factors. The rationale for the development of accurate VBAC prediction models was to support clinicians in identifying those candidates with the highest chance for a successful VBAC. The VBAC rate might increase if only those

candidates assessed to have the highest chance for success went on to attempt VBACs, on the assumption that a proportion of these women currently underwent repeat cesareans.

One VBAC prediction tool rose to prominence in the United States: The Maternal-Fetal Medicine Units (MFMU) VBAC Success Calculator. The VBAC calculator predicted the probability for a successful VBAC by combining the indication for the prior cesarean with a woman's age, Body Mass Index (BMI), and her race or ethnicity, categorized as White, Black, or Hispanic. All these factors were known at the first prenatal visit, allowing clinicians and women to make an early plan for the ultimate mode of birth. On average the VBAC calculator gave scores to Black and Hispanic women that were 5-15 points lower than White women with similar risk factors.

The MFMU VBAC calculator was invented and widely disseminated without seeking input from those who were thought to most benefit from the tool, namely pregnant women and birthing individuals who have had a prior cesarean. The aims of this dissertation were two-fold. First, I critically evaluated the invention of the VBAC calculator, paying attention to scientific paths not taken and to the ways in which practices that sustained the calculator silenced alternative approaches to the uncertainty of planning a VBAC. Second, I assessed the impact of the VBAC calculator on the pregnancy and birth experiences of a diverse group of women with varying birth histories and racial/ethnic identifications.

The methodological approach for the study was critical and ethnographic, including an 18-month immersion in scientific papers, blog posts, podcasts, visual artifacts, interviews, audio recordings of prenatal visits, and observations. In order to obtain the full range of engagements with this technology, I purposively selected 22 key informants as users and non-users of the calculator based on their research publications or public statements. In order to understand the

practical applications of the calculator, I interviewed 17 providers (perinatologists, general obstetrician-gynecologists, and Certified Nurse Midwives or CNMs) who worked across 4 different institutions. I enrolled 27 pregnant and 4 postpartum women who spoke Spanish or English, were over 18-years old, and had at least one prior cesarean. Women had diverse birth histories and racial/ethnic identifications, whose calculated likelihood of successful VBAC ranged from 12% to 95%. Ultimately, 13 women went on to have VBACs, 10 had unplanned cesareans, and 8 had ERCDs. Qualitative data were analyzed thematically on multiple levels, using modified grounded theory.

In Chapter 1, I argue that the VBAC calculator marginalized the diverse ways in which VBAC candidates approached risk and uncertainty. I present evidence from VBAC candidates whose experiences run counter to the calculator, including women who saw their pregnancies as an embodied and unfolding process rather than as a pre-ordained statistical fact. In Chapter 2, I directly address the racial dimensions and consequences of the calculator. I argue that the VBAC calculator automated the reproduction of racism by foreclosing the possibility that racism, not race, explained the differences in successful VBAC rates between White, Black, and Hispanic women. In Chapter 3, I examine how non-numeric elements influence the decision to attempt a VBAC or a repeat cesarean.

That VBAC prediction models appear to be a globally ascendant approach to counseling should concern Global Health scholars. Under conditions of cesarean overuse, which is rapidly becoming most of the world, VBAC prediction models turn more prior cesareans into recurring indications, thus challenging Global Health efforts to safely reduce cesarean use. To date, the Global Health discussions around mistreatment of women in birth facilities has largely focused on measuring and describing experiences of mistreatment, violence, and abuse. In the

mistreatment research literature, violations of autonomy are among the most common, and many recommend that women worldwide transition into the decision making role in order to fulfill their fundamental right to self-determination in childbirth. However, due to the ways that the VBAC calculator both engaged women as decision makers and reproduced racism in the process, the VBAC calculator complicates the notion that mistreatment, violence, and abuse during childbirth is adequately addressed through the concept of choice.

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List of Abbreviations

ACOG (American College of Obstetricians and Gynecologist)

AHRQ (Agency for Healthcare Research and Quality)

BMI (Body Mass Index)

CEDAW (Committee on the Elimination of Discrimination Against Women)

CHC (Cultural Health Capital)

CNM (Certified Nurse Midwife)

eGFR (estimated Glomerular Filtration Rate)

HER (Electronic Health Record)

ERCD (Elective Repeat Cesarean Delivery)

ICU (Intensive Care Unit)

IRB (Institutional Review Board)

LMIC (Low and Middle Income Countries)

MFMU (Maternal Fetal Medicine Units network)

NIH (National Institutes of Health)

Ob/Gyn (Obstetrician/Gynecologist)

OCR (Office of Civil Rights)

PCC (Person Centered Care)

PFT (Pulmonary Function Tests)

PMR (Perinatal Mortality Rate)

QI (Quality Improvement)

RCOG (Royal College of Obstetricians and Gynaecologists)

RCT (Randomized Controlled Trial)

List of Abbreviations (continued)

RMC (Respectful Maternity Care)

TOLAC (Trial of Labor After Cesarean)

UCSF (University of California, San Francisco)

U.N. (United Nations)

U.S. (United States)

VBAC (Vaginal Birth After Cesarean)

WHO (World Health Organization)

Introduction

In October 2018 *The Lancet* published a series of articles alerting the global health community to the threat of an “epidemic” of cesarean births that if left unaddressed, could threaten hard-won reductions in maternal morbidity and mortality. In 2015, the most recent year for which there is global data, some 29.7 million women gave birth via surgery (Boerma et al., 2018). Cesarean births at that time accounted for 21% of all births globally, a number that already surpassed the upper healthy limit as defined by the WHO, which has found no benefit for mothers or newborns above a population cesarean rate of 15% (A. P. Betran et al., 2015). After decades of advocating for universal facility-based childbirth, the global health community now must deal with the consequences a sometimes necessary but often overused surgery.

The United States too has witnessed a sharp increase in cesarean use over the last 20 years, to a stable population rate of 31.7%, or 1.2 million pregnant women per year who give birth surgically (CDC, 2019). The U.S. cesarean rate is sustained by increases in primary cesareans and decreases in vaginal births after cesareans (VBAC). Both globally and in the United States, the majority of women who undergo a first cesarean will give birth via Elective Repeat Cesarean Delivery (ERCD) (Vogel et al., 2015). In a dose-response manner with each cesarean the risk of uterine rupture, placenta accreta, hysterectomy, ectopic pregnancy, stillbirth, preterm birth, and maternal morbidity/mortality. In the long term, cesarean birth has been associated with an increased risk of childhood atopy, allergy, asthma, and reduced gut microbiome diversity (Sandall et al., 2018). In U.S. hospitals Black women are 2-3 times more likely to be injured or die from childbirth compared to White women (Howell, 2018). Even in California, the state that leads the nation in reducing avoidable maternal morbidity and mortality,

40% of Black women's avoidable morbidity can be attributed to the rise in cesarean overuse (Leonard, Main, & Carmichael, 2019).

As a result, in 2010 the NIH declared increasing the VBAC rate in the United States to be a public health priority. In their consensus statement from that same year, the NIH noted that several statistical models had been developed to accurately predict the probability for a successful VBAC using varying sets of individual risk factors. The rationale for the development and utilization of VBAC prediction models was to support providers and patients in making more informed decisions around the mode of birth, be it VBAC or repeat cesarean (Cunningham et al., 2010). Furthermore, the VBAC rate might increase if only those women assessed to have the highest probability for a successful also attempted a VBAC, assuming that a proportion of these women were scheduling repeat cesareans despite a high probability for success (Metz et al., 2013a).

The Maternal Fetal Medicine University Network developed a "VBAC calculator" to support a person-centered discussion about the risks and benefits of VBAC and ERCD. The calculator predicted successful VBAC by combining a woman's clinical history with her age, race/ethnicity, and BMI. In the calculator's algorithm, Black and Hispanic women had a 50% lesser odds of successful VBAC, equaling a loss of 5-15 points off their scores compared to White women with similar risk factors (Grobman et al., 2007). The MFMU calculator dominates the domestic and international research literature (Chaillet, Bujold, Dube, & Grobman, 2013), appeared in the 2010 ACOG national VBAC guidelines (ACOG, 2010), and is now used in many clinical settings in the United States (Thornton, Liese, Adlam, Erbe, & McFarlin, 2020).

The ethnographic literature extensively documents the variable ways in which women and providers deal with risk and uncertainty in pregnancy and childbirth (Adams, 2013; Galvez,

2012; Rapp, 2000; Wendland, 2016). As a field, obstetrics often deals with risk through the most invasive treatments, marginalizing less-invasive approaches (Wendland, 2007). This research's objective was to use ethnographic methods to explore the MFMU VBAC calculator's invention and rise to prominence as well as to assess its impact on prenatal and birth care in the United States. My specific aims were:

Aim 1: To subject the calculator to critical examination by identifying scientific paths not taken, marginalized perspectives, and unintended consequences.

Aim 2: To assess the impact of the calculator on the pregnancy care of a diverse group of women with varied birth histories and racial/ethnic backgrounds.

The U.S. Cesarean Rate: An Urgent Public Health Matter

The problem of what some have called cesarean *overuse* in the United States has risen to critical levels with the potential to increase even further the maternal mortality rate, which is already the worst among industrialized nations (Howell, Egorova, Balbierz, Zeitlin, & Hebert, 2016; Kozhimannil, Interrante, Tofte, & Admon, 2020). In the last three decades cesarean use increased in the United States across all demographic groups and gestational ages (MacDorman, Declercq, & Menacker, 2011). Numerous professional statements and NIH consensus conferences have reduced only slightly the U.S. cesarean rate, which continues to hover just below 32% (ACOG & SMFM, 2014; Cunningham et al., 2010). Repeat cesareans account for approximately 8% of all U.S. deliveries (CDC, 2019), and the risk of maternal morbidity and mortality, including placenta accreta, bowel injury, and blood transfusion increases with each cesarean (Sandall et al., 2018).

Optimizing the Decision-Making Process to Increase VBAC Rates

Since the mid-1990s the number of institutions and obstetricians who provide VBAC as a supported service has decreased (Barger, Dunn, Bearman, DeLain, & Gates, 2013). Fewer women attempted VBACs even within VBAC-offering institutions, a decrease unexplained by changes in women's clinical risk factors. Many believed individual women were making the decision to forgo attempting a VBAC (Grobman et al., 2011). New data supported undue influence on women's mode-of-birth decisions. In the 2013 the *Listening to Mothers III* survey, 97% of mothers with a prior cesarean had a discussion with their provider about ERCD, while only 60% had some discussion about VBAC. When providers expressed an opinion about mode of delivery, women reported that 88% of the time providers favored ERCD (Declercq, Sakala, Corry, Applebaum, & Herrlich, 2014).

In its VBAC consensus report the NIH concluded that “the informed consent process for [VBAC] and ERCD should be evidence-based, minimize bias, and incorporate a strong emphasis on values and preferences of pregnant women” and recommended steps to “implement decision-making and risk assessment tools (Cunningham et al., 2010).” In the setting of biased information provided to women with a prior cesarean the first interventions to increase VBAC rates sensibly sought to optimize women's decisions by providing objective information about the numeric risks and benefits of VBAC and ERCD. However, a Cochrane systematic review of RCT's found no effect on VBAC rates when women in the intervention arm underwent a standardized informed shared decision-making process (Horey, Kealy, Davey, Small, & Crowther, 2013). The first decision-support trial to be conducted in the United States, and the to include the VBAC calculator, recently showed no impact on VBAC rates (Kuppermann et al., 2020). Achieving informed shared decision making in the context of VBAC is laudable, but it is

not clear that giving more information about numeric risks and benefits will compel more women to attempt a VBAC.

The Need to Evaluate the MFMU VBAC Success Calculator: a help or a hindrance?

The MFMU group intended that their VBAC calculator would facilitate a person-centered decision process by giving objective information about population risk factors associated with successful VBAC (Grobman et al., 2007). Due to the ways in which the calculator utilizes race as a demographic factor, the calculator may unduly influence providers to coerce Black and Hispanic women to choose an ERCD due to a perceived low chance of success (Thornton et al., 2020). Maykin and colleagues found that in a diverse sample of women the calculator lost predictive value at their institution especially for scores below 35% (Maykin, Mularz, Lee, & Valderramos, 2017), raising questions about whether clinicians should even apply the calculator in these lower ranges. Despite the potential challenges of translating the VBAC calculator into clinical practice, several domestic and international groups have moved to validate the MFMU calculator (Chaillet et al., 2013; Fagerberg, Marsal, & Kallen, 2015; Haumonte et al., 2018), and the MFMU VBAC calculator is poised to become one of the most influential VBAC prediction models in the world.

The obstetric scientific community deems that testing a new tool like the calculator in an RCT as the *only* necessary step prior to its implementation in large populations of women. In the past when clinicians introduced new obstetric technologies without a comprehensive, trans-disciplinary examination, some of these technologies, like electronic fetal heart rate monitoring, unintentionally increased cesarean overuse (Sartwelle, Johnston, & Berna, 2017). Social science methods could delineate the VBAC calculator's unintended and potentially harmful effects. In particular, critical ethnography has been used to evaluate the complex impacts of new

reproductive technologies, from fetal surgery to amniocentesis (Casper, 1998; Rapp, 2000). As a research method ethnography can expose how an emergent technology establishes its scientific authority and conceals side effects (Floyd & Sargent, 1997). Ethnography can demonstrate how pregnant women sometimes reject quantitative estimates of obstetric risk and seek alternative information (Galvez, 2012).

Literature Review

I entered this area of inquiry through discussions in Global Health around what has come to be called respectful maternity care, or RMC. In 2010 Bowser and Hill conducted a landscape analysis that applied a new framework to naming the long-standing problem of mistreatment of women in birth facilities (Bowser & Hil, 2010). In 2015 Bohren and colleagues conducted a broader literature review and cemented a framework for naming and measuring various forms of mistreatment in childbirth facilities (Bohren et al., 2015). These two reviews set in motion a series of studies to measure the prevalence of mistreatment (Baji, Rubashkin, Szebik, Stoll, & Vedam, 2017; Sando et al., 2017; S. Vedam et al., 2019) and combined with numerous qualitative studies that sought to understand the experience of mistreatment (Bohren et al., 2016; N. Rubashkin, Torres, Escuriet, & Dolores Ruiz-Berdun, 2019). Over the course of the last decade, concerted efforts by researchers and civil society groups resulted in the United Nations recognizing mistreatment during birth as a form of gender-based violence (Simonovic, 2019).

For my qualifying exam, I conducted a systematic review that summarized the global evidence on person-centered care (PCC) interventions in birth facilities in which I used a current definition of PCC in the Global Health literature. I used these sub-domains of PCC to categorize interventions' objectives and outcomes: dignity, autonomy, privacy/confidentiality, communication, social support, supportive care, trust, and the health facility environment. The

most common domain which PCC interventions sought to improve was autonomy, through a variety of approaches that included: continuity midwifery models, giving women access to their own case notes, childbirth education classes, or crafting birth plans (N. Rubashkin, Warnock, & Diamond-Smith, 2018).

VBAC decision support interventions were a common PCC intervention that intended to enhance women's autonomy (Horey et al., 2013). Two VBAC decision-support interventions utilized qualitative work to solicit feedback from women on an already designed design support tool. The qualitative work that accompanied these decision-support trials tended focus on soliciting women's feedback on the decision tool's form and content. Many women shared that the decision tool helped them to understand the components of mode-of-birth decisions and to reconcile their preferences with their ultimate mode of birth. Of note, some women did suggest that the decision-support intervention should be broadened to include personal stories (Frost, 2009).

Obstetric Science as Process of Authoritative Knowledge

In addition to the above Global Health sources, I immersed myself in the historical, sociological, and anthropological literatures, which broadly critique the field of obstetrics' claim to objectivity (Floyd & Sargent, 1997; Murphy-Lawless, 1998). Anthropologist Brigid Jordan argues that the obstetric and technological model of birth achieved supremacy through a collective process she calls "authoritative knowledge." Jordan writes, "For any particular domain several knowledge systems may exist, some of which by consensus, carry more weight than others, either because they explain better the state of the world...or because they are associated with a power base (Jordan, 1993)." Midwives and some pregnant women may more commonly question obstetric authoritative knowledge, but their perspectives are often

discounted for not understanding truly how risky pregnancy can be (Galvez, 2012; Healy, Humphreys, & Kennedy, 2016).

The Role of Vision in Obstetric Authoritative Knowledge

The sense of vision played a key role in the achievement of the obstetric profession's authoritative knowledge about the pregnant female body. In the 17th century male anatomists and physiologists mapped the normal and abnormal organ systems of the human body, including the pregnant female body. Visual representations of organ systems trained the gaze of physicians and surgeons, who came to believe that the body's interior was fixed and concrete, a place where pathologies developed *de novo*, disconnected from external factors (Duden, 1991). Historian Barbara Duden shows how anatomists rendered woman's reproductive system into component parts separate from herself. Anatomic dissection revealed the mysteries of the body's interior and relegated other human senses and ways of knowing to the margins. Duden writes that "touch, taste, proprioception, smell, hetero-ception are lumped together as *impressions* [Duden's emphasis] (page 20) (Duden, 1993)." For the four centuries only educated white men would study, interpret, and explain a woman's interior to herself (Ehrenreich & English, 2005).

Historian Jo Murphy-Lawless details how men-midwives used visual anatomic knowledge to marginalize midwives in 18th-century England. Due to the primacy of anatomic knowledge, men-midwives assigned scientific value to dissecting all cases of septic maternal death, which they believed resulted from the inherently dangerous process of labor and the weak constitutions of women. In fact, unhygienic and unnecessarily frequent vaginal exams performed in the hospital were to blame. Nonetheless, men-midwives argued that ever more invasive techniques would prevent sepsis. Murphy-Lawless maintains that in early obstetrics "a practice

of invasiveness was established in order to save life...but other directions were seldom explored (page, 98) (Murphy-Lawless, 1998).” Not exploring other avenues had deadly consequences, as epidemics of maternal sepsis roiled through European hospitals as birth transitioned out of the home.

Race and Anatomy in the Establishment of American Obstetrics

The early study of obstetrics and gynecology in America continued the British emphasis on visual knowledge and used anatomic drawings to divide white and enslaved women into distinct races. White women were thought to have more painful labors than enslaved African women due to the different orientation of their uterine muscle fibers or the shape of their pelvises (Rich, 2016). Historian Deirdre Cooper-Owens documents how enslaved women represented “medical super bodies,” and as a result, the founders of the American profession felt justified in performing surgical experiments on them un-anesthetized. Visual anatomic knowledge derived from enslaved bodies, who were simultaneously pathologic and exemplary medical specimens, expanded the possibilities for the budding surgical specialty of obstetrics and gynecology in 19th-century America (Cooper Owens, 2017).

Beliefs in racial differences in childbirth pain grounded in visual anatomic knowledge, accelerated the transfer of births from home to hospital in the United States. In the early 20th century wealthy, White women began to pursue an anesthetic regimen called “twilight sleep” that required hospitalization (Rich, 2016). By mid-20th century 95% of White women gave birth under twilight sleep. Historian Miriam Rich argues that “American obstetrics and gynaecology as male-dominated specialties [are] predicated on the care of white women’s bodies and also on medical experimentation on Black women’s bodies (page 67) (Rich, 2016).” The issue of White women’s childbirth pains preoccupied the inaugural issue of *The American Journal of Obstetrics*

and Gynecology (DeLee, 1920), and the needs of white women laboring under twilight sleep even informed the architecture of American labor wards (Sandelowski, 1984).

From Anatomy to Perinatal Risk: Reorganizing Obstetric Authority

Feminist health movements in the second half of the 20th century ushered in a new model of care in which the obstetrician collaborated to manage perinatal risk with an alert and autonomous pregnant woman. Visual obstetric knowledge remained authoritative even as the emphasis shifted from anatomy to risk. Historian William Arney called the new model of care “surveillance obstetrics,” and by the 1980’s surveillance obstetrics offered an array of visual technologies designed to detect risks to the fetus. Arney observed that female empowerment and surveillance obstetrics were not mutually exclusive, in that “births should occur within a flexible system of obstetrical alternatives in which a woman’s experiences can take prominence against a backdrop of obstetrical experience and safety (page 220) (Arney, 1982).”

Historian Lorna Weir argues that clinicians laid the foundations for surveillance obstetrics in the 1920s and 1930s when the concept of perinatal health first emerged. The invention of perinatal health relied on visual anatomic knowledge derived from the dissection of stillborn fetuses. Based on their dissections, clinical scientists hypothesized a continuous relationship between fetal and neonatal health and joined the two into one, the *perinatal*. The concept of the perinatal represented a radical historical departure from previous medical and legal codes which approach health and conferred legal personhood after birth. The idea that perinatal health existed prior to birth had the effect of separating fetal from maternal health (Weir, 2006) and fetal rights from maternal rights, setting the stage for debates around maternal-fetal conflict in the second half of the 20th century (Kukura, 2010).

In a second radical departure, the emerging discipline of epidemiology extrapolated the diseases of individual stillborn fetuses into a population metric, the perinatal mortality rate (PMR). The PMR caused a shift in the ways in which risk was applied to populations of pregnant women; all parties involved in perinatal health would come to share the language of risk. Epidemiology identified population-level risk factors to inform state projects to reduce perinatal mortality. Obstetricians sutured epidemiology to clinical reasoning, and risk factors came to stand in for objective clinical signs (Giffords, 1986). Finally, the pregnant woman monitored her personal perinatal risk and changed her behaviors to avoid harming her unborn fetus. Weir argues that the translation of epidemiologic risk (a population-level concept) into a clinical sign (an individual- diagnostic concept) is inherently unstable and that the concept of clinical risk “aggregates heterogenous and incommensurable forms of health reasoning (page 65).” She cites the concept’s instability as a key driver of overdiagnosis and overtreatment in obstetrics (Weir, 2006).

Precisely at the time when White women were waking up from twilight sleep, their empowerment as decision makers morphed into becoming the guardians of fetal health. Obstetrician and bioethicist Anne Lyerly describes how in the current era “The dominant idea of a ‘good mother’ in America requires that women abjure personal gain, comfort, leisure, time, income, and even fulfillment” in the name of fetal health, while neither holding male partners nor parents who have born children to the same standard (Lyerly et al., 2009). In regards to the American VBAC situation, scheduling a repeat cesarean is cast as the responsible choice to avoid the fetal risk of a uterine rupture (Phelan, 1998), while discounting the future maternal/newborn risks of cesarean surgery.

Thus, the concept of “maternal-fetal conflict” artificially pits maternal and fetal health in opposition, and serves as a tool of gendered and racialized social control during pregnancy. Some women who decline obstetric care that is recommended to benefit the fetus describe experiencing coercion through “morbid threats,” or the practice of providers raising the specter of perinatal death to gain consent (Niles, Stoll, Wang, Black, & Vedam, 2021). Those women whom obstetrics deems to be poor managers of fetal health can be subjected to forced and even court-ordered interventions (Diaz-Tello, 2016). The women subjected to these unwanted, and even illegal interventions, have often been Black, Indigenous, and other women of color, poor women, and religious minority women (Irwin & Jordan, 1987; Paltrow & Flavin, 2013).

Epidemiology, Risk, and the Re-making of Race

In the second half of the 20th century, the population sciences of epidemiology and genetics promised a break from past forms of medical racism founded on the notion of anatomic difference. Instead, genetics and epidemiology breathed new life into the biological study of race by replacing “race” with “population” as a supposedly less racist measure of aggregate humanity (Murphy, 2017; Obasogie, Harris-Wai, Darling, Keagy, & Levesque, 2015). From the 1950s onward, the inclusion of race in multi-variate epidemiologic statistical modeling became routine (Shim, 2002), and scientists evolved to understand race as an aggregate variable correlated with poor individual health, as in health “disparities” research (Obasogie, Headen, & Mujahid, 2017). In the first decade of this century, the time period during which the MFMU network collected and analyzed their data, obstetricians, borrowing from the multi-factorial disease model, began to identify race as a demographic factor associated with poor obstetric outcomes. Many concluded that changes in women’s risk factors—often cited as age, race/ethnicity, and BMI—were driving

the trend of increased cesarean use and increased maternal morbidity/mortality (Grobman et al., 2014; K. A. Scott, Britton, & McLemore, 2019).

Because many believed disparities in maternity care to represent a population health difference between races, scientists have animated race with baseless biological, genetic, and cultural explanations (Bridges, 2020). Critical-race scholars have worked to re-frame the practice of epidemiology by identifying the ways in which racism, and not race, produces poor obstetric outcomes (Crear-Perry et al., 2020). These scholars define racism as a historical and social process that structures inequity through differences in opportunity, wealth, and health. Racism in maternity care denies agency to women of color (Altman et al., 2019), and especially exposes Black women to the negative consequences of cesarean overuse and underuse (Campbell, 2021).

Perinatal Risk, Evidence, and Women

In the second half of the 20th century the field of obstetrics oriented its priorities almost exclusively around reducing perinatal risk. Many new interventions to improve fetal health went untested prior to their routine use (Alfirevic, Devane, Gyte, & Cuthbert, 2017). The lack of proof for efficacious treatments led many in the profession to call for more evidence. Professional organizations, medical schools, and the NIH endorsed a new evidence-based approach to assess clinical efficacy, endorsing a hierarchy of knowledge from the least scientific case reports, followed by the middle ground of observational cohort studies, all the way up to the gold standard of RCTs and systematic reviews (Adams, 2013).

Obstetrician/anthropologist Claire Wendland argues that pregnant women “vanished” from evidence-based obstetrics in that evidence all too often supported performing cesareans to benefit fetal health. Wendland analyzes how the design of RCTs and prospective cohort studies, the two risk instruments that perch highest on top of the evidence-based hierarchy, structure what

is possible to measure in childbirth (Wendland, 2007). Now 25 years into the evidence revolution, we see that evidence in obstetrics did not challenge the single-minded focus on perinatal health nor Arney's "background of obstetric safety (Arney, 1982)." Wendland concludes that, "When obstetricians are able to present their decisions about cesarean section as value-neutral noncontingent givens that simply reflect 'the data,' we can suspect that a great deal of interest is being swept under the evidence-based rug and that careful analysis of the assumptions embedded in the data will be revealing (Wendland, 2007)."

It should be noted that the privileging of cesarean section to deal with the risks and dangers of childbirth are intimately connected to economic considerations and liability concerns. According to numbers gathered by legal scholar Elizabeth Kukura, when cesarean rates began to rise in the 1990s, the average cost for a vaginal delivery was \$4,720 while the cost for a cesarean was \$7,826. By 2010, when the VBAC calculator began to enter widespread practice, cesareans cost \$14,000-\$17,000, whereas charges for a vaginal delivery fell in the \$6,000-\$8,000 range. The difference in cost can yield higher hospital revenues. Finally, compensation often accrues only to the physician attending the birth, which creates a disincentive to attending a woman in labor and potentially favoring scheduled cesarean. These cost considerations dovetail with liability concerns. In the courtroom, cesarean section is considered the best defense against a birth injury case, for instance to avoid the fetal risk of uterine rupture (Kukura, 2010).

Wendland would concur with many other observers of contemporary maternity care in Western Europe and North America who have argued that evidence-based obstetrics has saturated childbirth with notions of risk (Healy et al., 2016). Far from supporting the judicious use of rigorously tested and evidence-based interventions, risk saturation has

produced new kinds of over-medicalization. With ever expanding terrain of risk into normal pregnancies, which can result in more women perceiving the need to involve obstetricians in their care, midwives face new struggles over autonomous practice (Healy, Humphreys, & Kennedy, 2017). The multitude of risk-benefit analyses in prenatal and birth care effectively shift responsibility for controlling outcomes onto pregnant women (Rapp, 2000), obscuring a range of inequities that empower some women to reproduce while disadvantaging other women's reproduction (Ginsburg & Rapp, 1995).

Approach: a tool or a technology?

The perspectives summarized above encourage an analysis of risk in childbirth that exceeds any narrow clinical formulation. My approach to analyzing risk as it relates to the VBAC calculator can be summarized by the difference between a narrow clinical framing of the calculator as a decision support “tool” compared to a contrasting perspective that considers the calculator as a “technology.” As a tool, the calculator appears to be a neutral and objective device used to measure and manage a real and present danger in childbirth. Such an approach produces the calculator as a scientific fact that precedes social relations, while approaching the calculator as a technology begins from the assumption that scientific objects emerge from and influence a web of social relations. Humans invest meanings into technologies like the calculator such that the object takes on a character of its own, independent from human action. The calculator acquires a “phantom objectivity” that obscures all the messy, contingent, and very human decisions that produced and propelled the calculator into clinical practice (Marx, 1997).

While I present evidence in this dissertation that will challenge the unquestioned facticity of the VBAC calculator, thus connecting the calculator to other kinds of technologies, the VBAC calculator represents a very specific kind of technology. The calculator is a technology designed

to intervene into the health of populations through the concept of risk. Here, I follow a Foucauldian formulation of risk articulated well by Lorna Weir in her analysis of the invention of the perinatal mortality rate (PMR) (Weir, 2006). Weir delineates how the concept of the PMR served as a technology of health governance oriented toward the provision of security, enabling prevention, and arresting future harm before it exists. The concept of the perinatal made it possible to intervene into the prenatal period of pregnancy in order to secure the future health of the newborn. Weir details how the technology of perinatal risk was deployed across multiple domains from the epidemiologic, clinical, actuarial, to the legal in order to govern the health of populations. Liberal governance, which posits that people can choose to improve their health by reducing various risks, can be maintained until an individual's choices go against the grain of the PMR. This is how coercion works through the PMR in ways that are "less spectacular and bloody than genocide," which in Weir's case explains the greater involvement of child welfare authorities in the pregnancies of Indigenous women in Canada (Weir, 2006).

Weir's analytic of risk as a technology is useful because it demonstrates how a measure of aggregate health, in the specific example of the PMR, led to justifications for the governmental regulation of racialized minorities through prenatal interventions. The VBAC calculator too was designed to secure future health by identifying a population of women who had a low probability for a successful VBAC, and therefore, also had a higher risk of a complicated cesarean performed after labor started. If it were possible to identify these women, they could be targeted with a prenatal intervention, a scheduled repeat cesarean. Importantly, as with Weir's analysis of the PMR, the women who the MFMU network thought would most benefit from prenatal intervention in the setting of low probabilities for success, were also racialized minorities. Different from Weir's approach, which was mainly historical and focused

on document analysis, I was interested to use critical ethnographic methods to examine the ways in which providers and pregnant women reflected on and responded to risk and uncertainty in pregnancies that follow a first cesarean.

Critical Ethnography as a Method

I chose ethnography as a method as my aim was to engage, interpret, and record the meanings, values, and actions particular to the domain of human interactions that concerns risk and uncertainty in pregnancies that follow a first cesarean. Ethnography entails a systematic and often open-ended exploration involving multiple qualitative data inputs. I chose a critical approach because I felt an ethical responsibility to address processes of unfairness and injustice experienced by pregnant people who have undergone a first cesarean. I wanted to delve beneath the surface of the VBAC calculator with the specific aim to disrupt the status quo by unsettling taken for granted assumptions and exposing operations of power. I sought to identify those risk epistemologies that informed the truthfulness of the VBAC calculator and foreclosed alternative approaches to risk and uncertainty in pregnancies that follow a first cesarean. Finally, I understood my task as a critical ethnographer to have an activist edge in that the purpose of my research was to intervene into hegemonic practices and expose the effects of such practices on marginalized social locations (Madison, 2020).

The specific hegemonic practices into which I desired to intervene can be collected under the term “obstetric thinking,” which I referenced in the title to this dissertation. Historian Jo Murphy-Lawless coined the term obstetric thinking and used it to refer to several interconnected scientific practices that the field of obstetrics used to forge connections between abstract diagnostic categories and invasive childbirth procedures. Obstetric thinking refers to (1) an almost exclusive focus on invasive procedures to defeat the threat of death in birth, (2) a rational

practice that produces in an objective and verifiable reading of the pregnant body, and (3) a closed knowledge system that operates at the expense of women (Murphy-Lawless, 1998).

While providing a powerful analytic to build on, Murph-Lawless did not connect her gender analysis of obstetric thinking constructions of race. However, I propose that the concept of obstetric thinking is sufficiently flexible and expansive to include how practices of racialization articulate with an obstetric scientific process that turns women into the vehicles for professional rationalizations of excessive interventions, as historian Deirdre Cooper-Owens has described in her concept of the medical superbody (Cooper Owens, 2017). In another modification of Murphy-Lawless, I approached obstetric thinking not only as a concept tied to the field of obstetrics and to those who professionally identify as obstetricians, but I also sought out ways that other groups and individuals subscribed to and perpetuated elements of obstetric thinking.

As a method, critical ethnography contends that there is no neutral and objective observer producing science; essentially, all knowledge production is a situated practice (Haraway, 1988). The critical ethnographer not only questions the status of objectivity, they must also critique the subjectivity of their own position vis a vis the Others about whom the ethnographer is producing knowledge. Through an exercise in reflexivity the critical ethnographer attempts to make transparent how their socio-historical location, their position of authority, and their unique experience of marginalized/privileged identities came to bear on the research process (Madison, 2020).

My own birth story informed my relationship to this research. I was born at home on a remote island in Maine during a time when due to reasons of geographic remoteness all pregnant women gave birth at home under the care of the island doctor. The possibility for a home birth

was an attractive option for my mother, who disliked the isolation she had experienced with my older sister's hospital birth in the early 1970s, a time when spouses were not allowed into the birthing suite. My mother and my father appreciated the family-centered and physiologic aspects of home birth so much so that when they moved back to the mainland they opted to have my brother at home.

As a result of growing up in a family where the experience of childbirth mattered (Lyerly, 2013), I was attuned to those participants in my study who challenged an obstetric approach that privileges morbidity and mortality outcomes at the expense of experiential outcomes (Wendland, 2007). At the same time, I had to be careful to avoid a simplistic division between 'technological' and disempowering hospital births as compared to 'natural' and empowering home births. While certain measures of quality and respectful care do improve in the midwifery care model in the hospital and in the home (S. Vedam et al., 2019), several of my participants embraced technological approaches to their births while also challenging the VBAC calculator's recommendation for repeat cesarean as the best, and sometimes only, option to control the uncertainty of attempting a VBAC.

My ethical stance as a clinician who strives to support a range of childbirth options was challenged early in my career. As a newly minted obstetrician, I conducted an emergency cesarean for a woman who had transferred into the hospital from a planned home birth. Tragically, her baby died soon after birth. In debriefing their baby's death with the parents, it became clear to me how the dysfunctional structures that surround home birth in the United States challenge quality care. I began searching for broader solutions to the hospital-home birth divide and found Professor Saraswathi Vedam's Home Birth Consensus Summit,

a group working toward improving the integration of birth services for all women and families in the U.S (Vedam et al., 2018).

Around the same time, I learned of the criminal prosecution of Hungarian home-birth midwife Ágnes Geréb, who had formerly practiced as an obstetrician but switched to attending home births so she could provide more respectful care (Hill, 2010). In 2010 Geréb was convicted of homicide and would spend four years under house arrest for complications during home births during which two babies died. In a hospital setting, Geréb's complications would have been addressed by quality improvement projects or through civil malpractice litigation. Due to the significant legal barriers to the practice of midwifery in Hungary, a group of Hungarian lawyers successfully argued in front of the European Court of Human Rights to require Hungary to regulate home birth (ECHR, 2010). This legal case sparked an enduring interest of mine in human rights-based approaches to mistreatment and abuse in childbirth, and in 2014 I received a Fulbright research scholarship to study respectful care in Hungary across place of birth (N. Rubashkin, Baji, Szebik, Schmidt, & Vedam, 2021). Since 2015 I have been both a participant and an observer in global human rights advocacy in childbirth, including birth justice organizing in the U.S.

Through these advocacy networks, I continue to be reminded of the power asymmetries between obstetricians and midwives around the world. Globally, midwives who provide supportive and respectful care, especially outside the hospital, have their practice surveilled, restricted, and sanctioned in ways not experienced by obstetricians (Dahlen, Kumar-Hazard, & Schmied, 2020). In my study, a Black midwife participant had a client who planned a home VBAC. As soon as the client reported symptoms in early labor that were concerning for a uterine rupture, the midwife directed her client, who was also Black, to go directly to the hospital. The

client in fact spent no time laboring at home under the midwife's care. Upon arrival, the baby had already died due to a uterine rupture, a tragedy that could have also happened had the woman planned a hospital birth. Compounding this traumatic loss, the medical team summoned the police to investigate the baby's death. The midwife feared for the ongoing viability of her practice as well as for her own personal liberty.

I contrasted this midwife's case with that of a Black woman whom I cared during the period of data collection but was not a participant in my study. She was attempting a VBAC and experienced uterine rupture, an outcome that for several reasons might have been avoidable (Mehta et al., 2020). Still, because the rupture happened in the hospital, we acted quickly to save both mother and baby. The case received internal scrutiny through quality improvement processes but was protected from scrutiny by the police. Even though I recognize the stakes of conducting a critical ethnographic analysis of an obstetric technology, I also acknowledge my own complicity in the racist, sexist, and classist structures that continue to privilege and protect my clinical practice. As a result of this protection, I didn't experience any disruptions to my clinical practice after this case of uterine rupture. Such a disruption would certainly have impeded my research given that my clinical salary provided the financial support required to complete my degree.

My authoritative status as a White, male obstetrician affected data collection in other ways. Early in data collection I noticed that well-resourced women were using the space of the interview to process their own "research" that they had been doing on their birth options. Research for these women included a range of practices from scouring the internet to reading scientific papers. Initially, I found that I more easily engaged these women in conversation, an affinity I soon recognized as my own recognition of these well-resourced women's deployment

of cultural health capital (CHC). Shim defines CHC as socially-transmissible and differentially distributed skills and resources that are critical for engaging and communicating with healthcare providers (Shim, 2010); patients who successfully deploy CHC are rewarded by providers with more person-centered care (Dubbin, Chang, & Shim, 2013). Thus, I had to check myself during data collection and analysis not to privilege those women who deployed CHC in the space of the interview.

The limitations of my positionality on data collection were also apparent during interviews with pregnant and postpartum Black women participants. As was my practice with all participants, during interviews I asked women to share their thoughts on why a group of scientists had found race to be a salient variable in predicting VBAC. If discussions of racism didn't arise as a result of this line of questioning, I would raise the possibility that racism might explain Black and Hispanic women's lower probability for successful VBAC. I noticed that Black women participants were cautious to discuss anti-Black racism with me while the audio recorder was on, preferring instead to discuss racism "off the record."

One participant, a Black woman whom I will call Jasmine, feared that she had shared too much with me. Jasmine was pregnant at the time of the interview, during which she recounted experiences during her prenatal care with what anthropologist Dana-Ain Davis has called obstetric racism (Davis, 2018). Jasmine's experiences with racism were unrelated to the VBAC calculator, as she did not encounter this technology during her prenatal visits. After I wrapped up the first interview and shut the recorder off, she expressed a concern that I might divulge her experiences with colleagues, potentially leading to retaliation. I interviewed Jasmine later in her pregnancy and dutifully documented her ongoing challenges with prenatal care, including a continued sense that her providers were not listening to her (McMillan Cottom, 2019). In a

postpartum interview, I was shocked to find out that Jasmine had developed eclampsia and a placental abruption, which led to the death of her baby and to her being hospitalized in the ICU. Her newborn's death might have been preventable had she not encountered such barriers to accessing life-saving care.

In my role as critical ethnographer Jasmine had granted me access to her private thoughts and challenges, which I recorded and analyzed. Had I encountered Jasmine as a clinician advocate, I might have tried to connect her to a care provider with whom she felt comfortable and heard. Instead, despite my stance as a critical ethnographer, I slipped into the role of a detached White observer, not fully grasping the life and death stakes of obstetric racism in her case. On the other hand, I was ethically bound by my IRB protocol to approach my participants as a researcher and not as a clinician. In the aftermath of her baby's death, I encouraged Jasmine to lodge a complaint with patient relations. Understandably, she did not have the energy or interest to pursue this avenue for bringing her case up for review. Adding another layer of silence, the death of her newborn didn't get flagged for quality improvement. Because she gave birth emergently at a hospital that was different from the one where she experienced racism, her baby's death became another hospital's complication to examine.

I have found no resolution to the self-Other relationship raised by the death of Jasmine's baby, which may be the point. In the pages to come, I have not given space for Jasmine's story in the form of a representative vignette that I use to illustrate my arguments. By not elevating her experience I may be suppressing a piece of my data that demonstrates well how the social process of racism produces inferior outcomes for Black women. Which is not to say that Jasmine did not inform my overall thinking; in Chapter 2, I will discuss how the MFMU network researchers folded Black women's avoidable, inferior outcomes into the design of the calculator.

Jasmine's story challenges how the calculator's racism blames Black women for avoidable morbidity and mortality (McLemore, 2018).

On the other hand, by not foregrounding Jasmine's experience I dedicated more space to the ways in which Black (and Hispanic women) creatively challenged the VBAC calculator. Other researchers have already extensively documented how racism produces inferior outcomes (Davis, 2018). By not centering Jasmine, I potentially side step (in this specific instance, but not in other instances) the politics of translating the Other into a research format consumable by a broader audience. To quote Black feminist social theorist bell hooks on the oppressive relationship between social scientists and the Others they study: "Often this speech about the 'Other' annihilates...Only tell me about your pain. I want to know your story. And then I will tell it back to you in a new way. Tell it back to you in such a way that it has become mine, my own (hooks, 1990)." There is no easy resolution to the self-Other tension, and perhaps the best way to honor Jasmine's story is to strive to make this dissertation a vehicle for social change (Fine, 1994).

Materials and Methods

I provide her a brief summary of my materials and methods, leaving a more detailed summary for each chapter. The methodological approach for the study was ethnographic, including an 18-month immersion in scientific papers, blog posts, podcasts, visual artefacts, interviews with obstetricians, midwives, and pregnant women, as well as audio recordings of prenatal visits, and observations of women engaging with the VBAC calculator.

Sample: In order to obtain the full range of engagements with this technology, I interviewed three groups: key informants, clinicians, and pregnant/postpartum women. Based on their research publications or public statements, I purposively selected 22 key informants as

users and non-users of the calculator who represented a range of professional standpoints (researchers, perinatalologists, general obstetrician/gynecologists, Certified Nurse Midwives and community-based midwives doulas, lawyers, hospital risk managers, and civil society actors who worked in birth advocacy organizations or who worked on writing national VBAC guidelines). The racial/ethnic breakdown of my key informants was: 15 White; 5 Black; 2 Asian/South-Asian-American. The second group of interviewees was clinicians, all of whom had some experience using the calculator. In total, I interviewed 17 providers, including perinatalologists, general obstetrician-gynecologists, and certified nurse midwives (CNMs). Providers had this racial/ethnic breakdown: 11 White, 2 Black, 3 Latina/o, 1 Asian-American.

The third group of participants were pregnant and postpartum women. I enrolled a total of 31 women, 27 of whom were currently pregnant and 4 who had already given birth. Women spoke English or Spanish, were over the age of 18, and were willing to participate in at least one interview. I purposively sampled pregnant women to obtain a range of birth histories and calculator scores. The sample included 4 women who already had a VBAC, and the rest had only one birth and one prior cesarean. Ultimately, as women progressed through their pregnancies, 13 had VBACs, 10 had unplanned cesareans for a variety of reasons, and 8 had scheduled repeat cesareans. The racial/ethnic identifications were as follows: 8 White (two foreign born); 2 Asian/South Asian (one foreign born); 1 Native American; 12 Hispanic (three foreign born); 4 African-American; and 4 who identified as mixed-African, mixed-Hispanic, or mixed-Asian ancestry. Three women spoke Spanish only. Women's VBAC calculator scores ranged from a low of 12% to a high of 95%.

In terms of settings, providers worked in four different institutions. At two institutions, a large academic hospital network in the Northeast and a community practice in the Southwest,

practice policies required that providers use the VBAC calculator. At the two other institutions in Northern California, providers sporadically used the calculator in the absence of any official policy. The majority of the women hailed from the two sites in Northern California, with 27 of the 31 giving birth at these sites. Ultimately, 2 women switched from hospital-based care to planned VBACs with community midwives.

With key informants and with clinicians I conducted a single semi-structured interview during which I asked both groups to detail their involvement with the calculator, to explain how the calculator worked, and to share observations on what they saw as the calculator's main benefits or harms. Settings for the interviews were in person, via the phone or internet.

Pregnant women had the option of participating in multiple data collection events, including interviews, observations, and recordings of prenatal visits. Women participated in a range of 1-5 data collection events with the entire cohort of 31 women participating in 81 data collection events. Interviews were via phone or internet video. Interviews focused on the circumstances that led to the first cesarean, experiences during the cesarean and immediate recovery, their emotional and physical recoveries, significant events between pregnancies, and current experiences with prenatal care, and influential family and social media resources. A total of 13 prenatal care visits were recorded. Prenatal visits were recorded only at 1 Northern California hospital and with 1 community midwife. Prior to COVID restrictions, I conducted in person observation of women interacting with the calculator.

If women didn't encounter the calculator during prenatal care as verified through recordings of prenatal visits, I introduced it during follow-up interviews, often varying the combination of risk factors entered into the calculator in order to make explicit the contribution of each factor to the final score. Either way, if the calculator had or had not been introduced, I

probed women's thoughts and reactions to the tool. As the study progressed interview guides were altered to hone in on emergent findings.

Analysis: All materials including journal articles, interview transcriptions, field notes, and observations were entered into Atlas.ti. The analysis followed the method of grounded theory (Charmaz, 2014). Analysis began from the very start of data collection and continued throughout. An open coding process was used in order to ascertain preliminary themes, and using the constant comparative method, preliminary themes were tested within and across interviews as more data was gathered. Data were analyzed thematically on multiple levels to identify points of convergence. I also pursued silences, divergences, and marginal perspectives in order to identify challenges to the calculator (A. E. Clarke, 2005). With ongoing data collection these preliminary themes were assembled into codes. Then, codes were merged and clustered through additional re-readings of transcripts. Toward the end of the study, I conducted theoretical sampling, which entails collecting new data to examine and fine tune near-final codes (Charmaz, 2014). Data saturation was reached as no new information emerged with additional recruitment of participants. I present my findings using representative ethnographic cases with pseudonyms to protect participants' identities.

Reliability and Validity: Despite the contextual aims of qualitative methods, Whitemore and colleagues have proposed that several primary criteria can be followed in order to demonstrate and assess the rigor of qualitative analysis: credibility, authenticity, criticality, and integrity (Whitemore, Chase, & Mandle, 2001). I strove for *credibility*, or the accurate interpretation of meanings in the data, by continuously evaluating data quality through real-time checks of interpretation with participants and with members of my dissertation committee. Credibility was also enhanced by using multiple data sources to triangulate findings.

Triangulation was especially important for analyzing interview data gathered from providers. Possibly because I am myself an obstetrician, providers tended to give me pat answers about how they discuss the VBAC calculator with patients. Contrasting providers' interviews with prenatal visit recordings proved essential, as what providers said in interviews differed in important ways from what they actually did in front of patients.

The next criteria, closely related to credibility is *authenticity*, which concerns the portrayal of research findings that reflect the meanings and experiences of participants. Because I conducted data collection on multiple levels and with participants who had conflicting positions, I strove to identify and represent this multiplicity. As a critical ethnographer, I paid attention to alternative and suppressed risk epistemologies. While midwives and VBAC-interested women were more likely to voice risk epistemologies that challenged the VBAC calculator, I also identified ways in which obstetricians challenged dominant approaches. The next criteria called *criticality*, not to be confused with critical ethnography, involved seeking out alternative hypotheses and pursuing negative cases. Criticality helped to add nuance to the application of feminist theory. For instance, while the VBAC calculator in many ways “vanished” elements of the birth process important to women (Wendland, 2007), use of the calculator sought to engage women as decision makers. Paying attention to the ways in which the calculator engaged women, while also circumscribing the terms of that engagement, challenged me as a researcher to move beyond an uncritical verification of theoretical claims. Finally, the criteria of *integrity* was pursued through exercises in reflexivity as discussed earlier (Whittemore et al., 2001).

In the chapters that follow, I present findings from my ethnographic research. In Chapter 1, I argue that the VBAC calculator marginalized the diverse ways in which VBAC candidates approached risk and uncertainty. I present evidence from VBAC candidates whose experiences

run counter to the calculator, including women who saw their pregnancies as an embodied and unfolding process rather than as a pre-ordained statistical fact. Many VBAC candidates sought to influence their chances for a successful VBAC and cited their own motivation for a VBAC as a predictive resource. The ways in which the VBAC calculator established itself as an authoritative obstetric tool made it possible to discourage, or even prohibit, a VBAC candidate from attempting a VBAC. Especially for women with low scores, who were more likely to be Black or Hispanic, the VBAC calculator set up a tension between a low score and a woman's sense of her own capabilities to achieve a vaginal birth.

In Chapter 2, I directly address the racial dimensions and consequences of the calculator. I argue that the VBAC calculator automated the reproduction of racism by foreclosing the possibility that *racism*, not race, explained the differences in successful VBAC rates between White, Black, and Hispanic women. In this chapter, I detail how providers and pregnant women reproduced and resisted the calculator's discriminatory design. A new calculator was just published that excludes race as a variable, and I conclude this chapter with a discussion around the possibilities for a more just and fairer VBAC calculator. In Chapter 3, I examine how non-numeric elements influence the decision to attempt a VBAC or a repeat cesarean.

In the conclusion, I circle back to the Global Health literatures that brought me to this line of inquiry. That VBAC prediction models appear to be a globally ascendant approach to counseling should concern Global Health scholars. Under conditions of cesarean overuse, which is rapidly becoming most of the world, VBAC prediction models turn more prior cesareans into recurring indications, thus challenging Global Health efforts to safely reduce cesarean use. To date, the Global Health discussions around mistreatment of women in birth facilities has largely focused on measuring and describing experiences of mistreatment, violence, and abuse. In the

mistreatment research literature, violations of autonomy are among the most common, and many recommend that women worldwide transition into the decision making role in order to fulfill their fundamental right to self-determination in childbirth. However, due to the ways that the VBAC calculator both engaged women as decision makers and reproduced racism in the process, the VBAC calculator complicates the notion that mistreatment, violence, and abuse during childbirth is adequately addressed through the concept of choice.

Chapter 1: How Women's Preferences Challenge VBAC Prediction

Introduction

Beginning in the mid-1990s, the U.S. saw increases in primary cesareans and fewer Vaginal Births After Cesarean, or VBACs, bringing the U.S. cesarean rate to 1 in 3 births. After undergoing a first cesarean, approximately 90% of women will give birth via repeat cesarean (CDC, 2019). Over that same time period severe maternal morbidity and mortality increased in tandem, and the rise in cesarean use explains some 40% of the increase in maternal injuries related to pregnancy, with Black women disproportionately at risk (Leonard et al., 2019). Due to the escalating morbidity of multiple repeat cesareans, in 2010 the NIH declared increasing the VBAC rate to be a priority, part of a broader effort to reduce cesareans and improve outcomes. At the same time, the NIH noted that several statistical models could accurately predict VBAC. The NIH posited that an accurate VBAC prediction model might help increase the VBAC rate if only those women with the highest probability for a successful VBAC went on to attempt a VBAC (Cunningham et al., 2010), based on the assumption that some of these women were scheduling repeat cesareans (Metz et al., 2013a).

One VBAC prediction tool rose to prominence in the United States: The Maternal Fetal Medicine Units (MFMU) network VBAC Success Calculator. By using factors known at the first prenatal visit, the MFMU calculator proposed to provide clinicians and women with reliable data to support an early decision about whether to schedule a repeat cesarean or plan a VBAC.¹ The

¹ The calculator used six factors, three demographic and three clinical, to predict the probability for a successful VBAC. Increasing age and BMI decreased the probability for a successful VBAC, as did race/ethnicity. A prior cesarean for a labor arrest disorder decreased the probability, while any prior vaginal birth increased it. The

calculator combined six maternal factors to predict the probability for a successful VBAC, including her clinical history, age, Body Mass Index (BMI), and race/ethnicity, defined as either White, Hispanic, or Black (See Table 1.1 next page). The calculator gave scores to Black and Hispanic women that were on average 5-15 points lower than White women (Grobman et al., 2007). Notably, the VBAC calculator proposed to help VBAC candidates who had lower probabilities by affording them the opportunity to avoid a futile labor process. Because of the way the calculator used race/ethnicity as a risk factor, many of the women with low probabilities were also Black or Hispanic (Crear-Perry et al., 2020).

Thirty years into the scientific effort to predict VBAC, no qualitative data exists as to how pregnant people who have undergone a prior cesarean view the science of VBAC prediction.² Similarly, it is not known whether pregnant people find VBAC calculators useful, and if not, what kinds of alternatives they might propose. In this study, I used an ethnographic design to explore how a group of pregnant and postpartum women, all of whom had undergone a prior cesarean, approached the uncertainty of planning a VBAC or a repeat cesarean. I compared and contrasted different approaches to uncertainty with the VBAC calculator's demand that a statistical logic was the best, and sometimes only, way to deal with this uncertainty. I followed a critical approach that considered evidence in obstetrics to result from a process of elevating certain forms of knowledge at the expense of others (Wendland, 2007). In the paper that follows, I begin with a brief overview of my analytic tools and methods. Then, I present observations from my ethnography to demonstrate how the calculator's statistical approach was at odds with a

MFMU network recently developed a new calculator that does not use race as a variable. See Grobman et al. 2021.

² A note on language: all participants in this study identified as "women," so I refer to the study group using this term. I try to vary the language used with the gender-neutral term "VBAC candidate" to refer to all people who have undergone a prior cesarean.

range of VBAC candidates’ experiences. Finally, I situate my results in the broader critical discussions that concern knowledge production in the era of evidence-based obstetrics.

Table 1. 1: Factors associated with VBAC from the MFMU network’s first calculator analysis (Grobman et al., 2007)

Variable	Odds Ratio	95% Confidence Interval
Maternal age (y)	0.96	0.95–0.97
Body mass index (kg/m ²) at first prenatal visit	0.94	0.93–0.95
Maternal race		
White and others	Referent	–
Latina	0.51	0.44–0.59
African American	0.51	0.44–0.59
Recurring indication for cesarean delivery	0.53	0.48–0.60
Any prior vaginal delivery	2.43	2.04–2.89
Vaginal delivery after prior cesarean	2.73	2.21–3.36

Obstetrics and the objectivity of surgical intervention

As a modern science, obstetrics claims a superior ability to measure and intervene upon risks that arise during childbirth (Wendland, 2007). The health benefits of cesarean section are undeniable (Ana Pilar Betran et al., 2015). However, critics of obstetrics note a pattern of over-intervention leading to excess cost, avoidable suffering, and even untimely death as outcomes of the field itself (S. Miller et al., 2016). Since the origins of the profession in 17th-century Europe, obstetricians have legitimized invasive techniques using logics of objectivity based on the visual senses to justify penetrating the body’s surfaces (Duden, 1993). Using history as an example, women become the vehicle for professional rationalizations of excessive intervention. During and after the end of slavery, American obstetricians used racist notions of the “medical superbody” to rationalize the development of surgical techniques, including cesarean section, on the un-anesthetized bodies of enslaved women (Cooper Owens, 2017; Taber Johnson, 1875). From the complex physics of X-ray pelvimetry, to Friedman’s famous sigmoid curve of

cervical dilation during normal labor, and all the way to the VBAC calculator, obstetrics has aligned with the hard sciences in order to claim a verifiable and durable reading of the pregnant body (Murphy-Lawless, 1998).

The statistical notion of prediction is central to the contemporary ways in which obstetrics justifies surgical intervention (Wendland, 2007). Since their emergence in the early 19th century, statistics revealed indeterminacy swirling all around, but the regularity of statistical equations made it possible to control our uncertain future (Hacking, 1990). Over the course of the 20th century, statistics revolutionized nearly all scientific fields, such that their application into new areas seemed unproblematic and always innovative (Adams, 2013; Gigerenzer et al., 1989). Statistical innovations in the mid-20th century produced the notion of perinatal risk and gave rise to the idea that interventions into maternal health prior to birth could improve fetal, and therefore, neonatal health (Weir, 2006). In the last decades of the 20th century, statistical instruments like the randomized controlled trial (RCT) and the VBAC calculator promised improved maternal/fetal outcomes by identifying an asymptomatic population of pregnant individuals who could benefit from a cesarean *before* labor started (Wendland, 2007). Even though obstetrics acknowledges planning a VBAC to be a patient-centered decision, the profession has used statistics, especially the instrument of relative risk, to dictate who should schedule a repeat cesarean and forgo a VBAC (Lyerly & Little, 2010).

From acceptable to exceptional: the VBAC debate in the United States

Today, in the United States 1.2 million women give birth annually by cesarean. Of these, 500,000 are scheduled repeat cesareans compared to 79,000 VBACs, yielding a VBAC rate of

13% (CDC, 2019).³ The causes for the persistently low VBAC rate are the subject of much debate. Within obstetrics, the prevailing practice and debate centers around whether absolute or relative risk should determine whether VBAC should be considered a safe and reasonable option. Numerically small absolute risks translate into an acceptable level of risk for women to assume, while numerically large relative risks construct VBAC as an exceptional risk for women to undertake (Wendland, 2013). Absolute risk is calculated as the number of complications divided by the total population under study. For example, the absolute risk of uterine rupture, a surgical emergency that can happen during a planned VBAC, happens in 0.7% of planned VBACs (ACOG, 2019). Relative risk compares the ratio of two absolute risks, and as a result, can obscure small absolute risks. For instance, new data from the late 1990s suggested that uterine rupture tripled the relative risk to the fetus (Lydon-Rochelle, Holt, Easterling, & Martin, 2001), causing some obstetricians to argue that the responsible choice for women was to forgo a VBAC so as to not put their fetuses at risk (Greene, 2001; Phelan, 1998). Professional standards of care shifted to require that a surgical team be “immediately available” for the unlikely event of a uterine rupture; many hospitals did not have the resources to sustain an in-house surgical team for every planned VBAC (Barger et al., 2013). As a result, the national VBAC rate declined sharply from a peak of 28.3% in 1996 to 10.6% by 2003 (Cunningham et al., 2010). In summary, when obstetricians view the absolute risks of attempting a VBAC as numerically small, they deem VBAC to be acceptable. When they view the relative risks of attempting a VBAC as too high, obstetricians see VBAC as exceptional and favor repeat cesarean.

³ The VBAC rate is defined as the ratio of women who have a VBAC as a percentage of all women with a prior cesarean who give birth in a given year.

Since the late 1990s, many have criticized the fetal bias that informed “VBAC bans” (Kukura, 2010). Bans on VBAC have produced a pervasive environment of coercion where many birthing people who are interested in a VBAC must fight to access this option (Basile Ibrahim et al., 2021). Despite these trenchant critiques, the MFMU researchers approached relative risk in a similar way. Except in this instance, relative risk concerned the issue of avoiding a failed Trial of Labor After Cesarean (TOLAC), and not uterine rupture.⁴ The MFMU researchers thought their calculator could support women with low scores to opt for a repeat cesarean so as not to waste time in a futile labor process. In addition to these notions of efficiency, the MFMU researchers wanted to know whether the calculator could improve maternal/fetal outcomes; here, relative risk entered the picture. The MFMU researchers analyzed whether maternal and newborn morbidity increased with decreasing calculator scores. They found that when calculator scores dropped below 60%, the absolute risk of maternal and newborn complications was 3.1% compared to 1.5% for women who also had scores below 60% but scheduled a repeat cesarean. The MFMU researchers found this relative risk of 2:1 to be statistically significant, and they proposed that a score of 60% could serve as an evidence-based cutoff point below which planning a VBAC became less safe (Grobman et al., 2009). In effect, the 60% threshold magnified the relative risk and concealed the absolute risk of planning a VBAC (Lyerly et al., 2007).

⁴ The discourse on VBAC is dominated by terms that construct VBAC as an uncertain outcome. I agree with Hazel Keedle that the term “trial of labor after cesarean” conveys a lack of faith in the birth process and connotes that women give birth in front of a judge and jury. The VBAC calculator also uses a vocabulary of failure, and I’ve chosen to refer to the “MFMU VBAC success calculator” simply as the VBAC calculator. However, many providers in my study used the term “TOLAC.” So, when not a direct quote from an informant, I replace TOLAC with “labor after a cesarean” or “planned VBAC.” See (Keedle, 2020)

In the next chapter, I will deal with how the MFMU researchers' use of race as a risk factor in combination with their approach to relative risk helped to automate racism. For the purposes of this analysis, I continue to consider how relative risk is used to construct VBAC as an exceptional risk for some women to undertake. On average, after a first cesarean 50% of women are interested in a VBAC. The drivers of preference for a VBAC include: a difficult postoperative recovery, a desire to experience a vaginal birth, and plans for a larger family, as multiple repeat cesareans may make having a larger family more challenging (Kaimal et al., 2019; Masinter, Feinglass, Grobman, & Simon, 2014). In one analysis, 75% of Black women and 54% of Hispanic women preferred a VBAC compared to 43% of White women (Attanasio, Hardeman, Kozhimannil, & Kjerulff, 2017). Thus, the drivers of a preference for VBAC may not be experienced equally. For instance, nurses under-evaluate and under-treat women of color's postpartum pain, and varying concerns about pain control inform a preference for VBAC (Johnson et al., 2019). Because Black and Hispanic women were more likely than White women to fall below the proposed 60% cutoff, the calculator potentially set up a tension between an obstetric definition of safety and a woman's desire for a VBAC.

Materials and Methods

Approach: This study began from the perspective that all scientific products, including the VBAC calculator, are situated forms of knowledge (Haraway, 1988; Wendland, 2007). Thus, I approached the calculator not as a clinical decision-support tool but as a technology. More specifically, I understood the calculator to be a technology of security that used the concept of risk to manage the future health of populations through prenatal intervention (Weir, 2006). The methodological approach for the study was ethnographic, including an 18-month immersion in scientific papers, blog posts, podcasts, visual artefacts, interviews with obstetricians, midwives,

and pregnant women, as well as audio recordings of prenatal visits, and observations of women engaging with the VBAC calculator. During my dissertation training I demonstrated competency in historical and social science approaches to the study of medicalized childbirth. As an obstetrician, I had no experience using the VBAC calculator, though I had extensive experience counseling VBAC candidates. None of the data were gathered from VBAC candidates who were under my care at the time. The study was approved by the University of California, San Francisco Committee on Human Research.

Sample: In order to obtain the full range of engagements with the calculator, I interviewed key informants, clinicians, and pregnant/postpartum women. I purposively selected 22 key informants as users and non-users of the calculator based on their research publications or public statements. Many informants held prominent national positions working on issues related to VBAC. I included scientists, clinicians (perinatalologists, general obstetrician/gynecologists, Certified Nurse Midwives and community-based midwives), doulas, lawyers, hospital risk managers, and civil society actors who worked in birth advocacy organizations or who worked on writing national VBAC guidelines. The racial/ethnic breakdown of my key informants was: 15 White; 5 Black; 2 Asian/South-Asian-American.

The second group of interviewees was clinicians. In order to understand the practical applications of the calculator, I used a short email survey to identify providers who used the calculator through a short email survey. As the study continued, I reached more providers through professional networking and snowball sampling. In total, I interviewed 17 providers, including perinatalologists, general obstetrician-gynecologists, and certified nurse midwives (CNMs). Providers had this racial/ethnic breakdown: 11 White, 2 Black, 3 Latina/o, 1 Asian-American.

The third group of participants were pregnant and postpartum women. I enrolled 31 women who had all undergone a prior cesarean. 27 women were currently pregnant and 4 had already given birth. Study recruitment staff approached pregnant women who spoke English or Spanish, who were over the age of 18, and who were willing to participate in at least one interview. I enrolled postpartum women through social media advertisements and through snowball sampling. I purposively sampled pregnant women to obtain a range of birth histories and calculator scores. Study staff calculated the probability for a successful VBAC using information gathered from the Electronic Health Record and then used this information to target specific women for enrollment.

VAGINAL BIRTH AFTER CESAREAN	
Height & weight optional; enter them to automatically calculate BMI	
Maternal age	18 years
Height (range 54-80 in.)	in
Weight (range 80-310 lb.)	lb
Body mass index (BMI, range 15-75)	25 kg/m ²
African-American?	no
Hispanic?	no
Any previous vaginal delivery?	no
Any vaginal delivery since last cesarean?	no
Indication for prior cesarean of arrest of dilation or descent?	no
Calculate	

A new calculator without race and ethnicity is under development.

Figure 1. 1 Web-hosted VBAC calculator

See Figure 1.1 to the right which captures the webpage that hosted the VBAC calculator until recently. The sample included 4 women who already had a VBAC, and the rest had only one birth and one prior cesarean. Ultimately, as women progressed through their pregnancies, 13 had VBACs, 10 had unplanned cesareans for a variety of reasons, and 8 had scheduled repeat cesareans. The racial/ethnic identifications were as follows: 8 White (two foreign born); 2 Asian/South Asian (one foreign born); 1 Native American; 12 Hispanic (three foreign born); 4 African-American; and 4 who identified as mixed-African, mixed-Hispanic, or mixed-Asian ancestry. Three women spoke Spanish only and were interviewed by myself in Spanish. Calculator scores ranged from a low of 12% to a high of 95%.

Settings: Providers worked in four different institutions. At two institutions, a large academic hospital network in the Northeast and a community practice in the Southwest, practice policies required that providers use the VBAC calculator to counsel women with scores lower than 60% to have a repeat cesarean. At the two other institutions in Northern California, providers sporadically used the calculator without the knowledge of the 60% cutoff. The majority of the women hailed from the two sites in Northern California, with 27 of the 31 giving birth at these sites. Ultimately, 2 women switched from hospital-based care to planned VBACs with community midwives.

Data collection: After informed consent, I conducted a semi-structured interview with key informants and with providers during which I asked them to detail their involvement with the calculator, to explain how the calculator worked, and to share observations on what they saw as the calculator's main benefits or harms. For providers, the interview guide also generally addressed how they counseled women about their birth options and specifically asked about controversial cases in their practices. Settings for the interviews were in person, via the phone or internet.

After informed consent, pregnant women had the option of participating in multiple data collection events, including interviews, observations, and recordings of prenatal visits. Women participated in a range of 1-5 data collection events with the entire cohort of 31 women participating in 81 data collection events. Interviews were via phone or internet video; prior to COVID restrictions, several observations were conducted in person. An initial interview guide was designed after a literature search. The first interview was broad and focused on understanding the context surrounding mode-of-birth decisions, including the circumstances that led to the first cesarean, experiences during the cesarean and immediate recovery, their

emotional and physical recoveries, significant events between pregnancies, and influential family and social media resources. A total of 13 prenatal care visits were recorded. Prenatal visits were recorded only at 1 Northern California hospital and with 1 community midwife. The visits were digitally recorded by leaving the recorder in an unobtrusive place in the exam room; the visit was recorded in its entirety. Recordings were offered as an option only to the first 15 participants; video visits instituted in the wake of COVID-19 proved difficult to arrange additional recordings. Prior to COVID restrictions, several observations took place in person where I observed women doing internet research or we reviewed together how to use the calculator. If women didn't encounter the calculator during prenatal care, I introduced it during follow-up interviews. If the calculator had been introduced, I probed women's thoughts and reactions to the tool. During follow-up interviews, I entered different arrangements of risk factors into the calculator in order to make explicit to women how age, race/ethnicity, and BMI contributed to the final score (See Figure 1.1 above). Varying the combinations of factors often elicited rich discussions about risk, probability, and VBAC. As the study progressed interview guides were altered to hone in on emergent findings.

Analysis: The interviews and prenatal visits were transcribed verbatim and analyzed using Atlas.ti, qualitative analysis software. Observations were entered into field notes which were also managed using the above software. The analysis followed the method of grounded theory (Charmaz, 2014). Analysis began from the very start of data collection and continued throughout. An open coding process was used in order to ascertain preliminary themes, and using the constant comparative method, preliminary themes were tested within and across interviews as more data was gathered. With ongoing data collection these preliminary themes were assembled into codes; these codes were then merged and clustered through additional re-readings

of transcripts. During the analysis I contrasted the calculator's approach to the ways in which VBAC candidates approached uncertainty, prediction, and VBAC. Data were analyzed thematically on multiple levels to identify points of convergence. I also pursued silences, divergences, and marginal perspectives, as these were all key to defining approaches to the uncertainty of planning a VBAC that differed from the calculator (A. E. Clarke, 2005). Data saturation was reached as no new information emerged with additional recruitment of participants. In the findings section, I contrast different approaches to the uncertainty of planning a VBAC by using representative ethnographic cases. All participants were given pseudonyms to protect their identities.

Findings

Finding 1: Trying was succeeding

In interviews, key informants who worked to establish the VBAC calculator and clinicians who used the calculator discussed the calculator's greatest utility in helping to identify VBAC candidates most at risk for failure. Many of the women who opted for a repeat cesarean also shared the concern that labor might be futile and end in another cesarean; they too desired surgical level control over the uncertainty that arose when considering a VBAC.

However, those women who attempted a VBAC had a different relationship to the uncertain possibility for failure, best summarized in the notion that *trying was succeeding*. For example, Chloe, who identified as African-American and whose combination of risk factors yielded a calculator score of 25%, still desired a VBAC despite this low score. Chloe challenged a statistical definition of failure by proposing that trying was succeeding. *"If I try, I'm successful with that. And I successfully tried...I don't want the pressure or feeling like I failed from the*

beginning.” The VBAC calculator could make one feel a failure from the start. By contrast, Chloe had to reframe failure as a necessary first step for considering a VBAC.

The women who desired a VBAC all in some way valued the experience of labor and birth in such a way that outweighed concerns about failure. For instance, Marisa had her first cesarean after an induction of labor didn’t work. Combined with her identifying as Hispanic (Chilean) and at the age of 39, Marisa’s calculator score totaled 38%; some clinicians would use this score to discourage her from trying a VBAC. Because Marisa’s institution supported informed choice, she went into labor, and she did end up with another cesarean. In a postpartum interview Marisa didn’t see the unplanned surgery as a failure. She discovered during the process that her body had been capable to start labor without the help of medications, and this new understanding of her body’s capabilities helped her to cope with the second cesarean. In this way again, trying was an antidote to failure.

According to key informants and providers, the VBAC calculator could help women with low probabilities for success possibly to avoid complications by scheduling a cesarean in advance. However, many VBAC candidates preferred to deal with risks as they arose. For example, Mitzi has a difficult recovery after her first cesarean, including issues with pain control and mental health. Mitzi identified as mixed-African-American and Filipino descent, and with a VBAC calculator score that ranged from 40-57%, some clinicians would recommend that Mitzi schedule a cesarean to avoid complications. Mitzi did end up having a complicated cesarean after labor started. She needed blood transfusions and stayed in the hospital longer to deal with high blood pressures. In the postpartum interview, like Marisa Mitzi didn’t regret her decision to try, even now having experienced a complicated cesarean. *“I mean I’m proud of myself for really attempting to go through the VBAC.”* In fact, Mitzi would still advise other women considering a

VBAC to go for it. *“I mean I would tell them [other women] if they really want a VBAC, I mean, attempt it. If they trust their medical facility that they're having their baby, that they should definitely try to do a VBAC...It doesn't hurt.”* It's striking that Mitzi would say “it doesn't hurt” after having such a complicated cesarean. Attempting a VBAC for her was less a choice to avoid complications, and more about placing trust in her providers to keep her safe if those complications happened. Rather than using the VBAC calculator as a diagnostic tool, Mitzi proposed that the labor process of labor served as the ultimate diagnostic test. Mitzi pointed out that you do not really know if the VBAC is going to work until you try.

Providers often used the calculator to support an early decision about the mode of birth, but this approach prevented the possibility that physical experiences at the end of pregnancy could support the decision. For example, Paula was still unsure about the VBAC as her due date neared. Her perinatologist astutely raised the possibility of waiting and seeing how labor unfolded, reassuring Paula that she could still change her mind at any time about the VBAC. *“Okay. Let's see how things go. That's what I did. So, the baby was born at 40 weeks and 5 days...Labor was started spontaneously. The baby was head down. Everything looked good. And so I decided, ‘Okay. Let's try the VBAC.’”* For Paula, waiting and seeing whether normal labor started, helped her to try for a VBAC, which she eventually did have.

Whereas clinicians used the calculator in attempt to prevent women from failing and having complications, many of the women who desired a VBAC had a more complex relationship to the uncertainty of planning a VBAC and the potential for labor to end in another cesarean. Because many of the women who attempted a VBAC valued the process of labor and birth, just trying to labor was already a success. Those who attempted a VBAC demonstrated a tolerance for the uncertainty that necessarily inhered to planning a VBAC, preferring to keep

cesarean section as a back-up option and to deal with complications as they arose, rather than attempting to prevent them in advance.

Finding 2: Modifying the probability for a successful VBAC

The VBAC calculator worked through a problematic logic of non-modifiability which that the calculator's inputs and its output were fixed statistical entities. As a result, some key informants and clinicians invested the calculator's statistical prediction with an excess of certainty. The non-modifiability of the calculator's inputs arose from several related technological priorities and practices.

First, because the MFMU VBAC calculator had demonstrated its accuracy and precision in domestic and international validation studies, members of the MFMU and many clinicians considered that a consistent and non-modifiable statistical logic must be governing women's chances for a VBAC. Because only six factors were needed to estimate the probability of a successful VBAC, scientists largely believed that the calculator didn't need to be expanded to include additional variables that measured, for instance, provider or hospital contribution to successful VBAC. Second, members of the MFMU and many clinicians considered the demographic variables of age, race/ethnicity, and BMI to be non-modifiable entities rather than bio-social factors possibly amenable to manipulation (Susser, 1998). In particular, the calculator's use of race/ethnicity as a non-modifiable, mutually-exclusive, and essential category problematically obscured the ways in which specific histories of oppression and ongoing process of marginalization produce racial/ethnic categories (Crear-Perry et al., 2020).⁵ The non-modifiability of the calculator's inputs extended to the clinical indication for the prior cesarean.

⁵ The consequences of treating race/ethnicity as "non-modifiable" variable are so significant that I will take up the calculator's racial politics in another paper.

As one perinatologist mused about the calculator's inputs, "*There's not a lot of modifiable things. Like you can't change what the indication was for a prior delivery.*" In other words, the calculator's rubric does not account for contextual circumstances that led to the prior cesarean, and as a result, many providers centered indication for the prior cesarean in their counseling. Finally, if the calculator's inputs were all non-modifiable, then the calculator's output, the probability of successful VBAC, also carried immutable properties. As a result, the members of the MFMU whom I interviewed never asked the scientific question of what could be done to change the probability for a successful VBAC.

However, many VBAC candidates flexibly interpreted the calculator's inputs and did not subscribe to the view that the chance for a VBAC was fixed. Some VBAC candidates questioned the indication for their prior cesarean as having been necessary and argued that the calculator didn't apply to their situation. Still other VBAC candidates accepted the indication for their prior cesarean; for these women the prior cesarean was a jumping off point into changing the course of their subsequent pregnancy. VBAC candidates sought to increase their probability for a successful VBAC by transferring care to a new hospital, seeking out "VBAC-friendly" providers, switching to a community birth setting, hiring a doula, or to the extent that they could, by trying to grow a smaller baby through changes to diet and exercise, postulating that a smaller baby would help labor to move forward more easily.

One of the primary complaints repeatedly voiced by VBAC candidates was that the calculator ignored their level of commitment. In fact, a woman's level of commitment can be statistically modeled and has been shown to predict attempting a VBAC (Kaimal et al., 2019). This does not mean that women did not see the calculator as useful. When women who had strong commitments to VBAC encountered the calculator, they consistently identified their

commitment as a predictive resource. However, using the calculator required an engagement that modified the calculator in ways that matched their own experiences. For example, Rebecca, perceived her VBAC score to be low at 60%. As a White and thin woman, the main contributor to the low score was a prior cesarean for a labor arrest after a failed vacuum-assisted delivery. Although Rebecca lived in a state with few VBAC-offering hospitals, she did her own research and found a supportive Ob/Gyn 200 miles from her home. *“I know the VBAC calculator was only in this 60, maybe 65%, but like I said, I had a supportive doctor and my doula and my husband was on board with it...I feel like my chance of success was higher than what the calculator said.”* Rebecca crossed the large distance to her chosen hospital while in labor, and after arriving, she progressed to a successful VBAC.

It's important to point out that structural factors shaped the ability to actually achieve a VBAC. Rebecca possessed the resources to travel 200 miles to a VBAC-supportive provider. For comparison, another committed VBAC candidate, Destiny, was giving birth in an institution that strongly discouraged, and sometimes prohibited, women with low scores from attempting a VBAC. Luckily Destiny found a provider who supported her plans for a VBAC, but even Destiny herself initially felt like she wouldn't be able to give birth vaginally when she received a calculator score of 12%. Her very low score was due her prior cesarean for a labor arrest disorder, combined with her identifying as African-American, having an elevated BMI, and being in her mid 30's.

Despite this low score, Destiny gathered up her confidence and reminded herself of the difficult recovery from her first cesarean. *“The other part of me was like, ‘Yes, you’re going to do this, you have got to do this. You want to do this.’”* She recommitted to her goals of a healthier diet and preparing her body for labor and birth. *“I did more prenatal exercises, I*

actually worked out on the prenatal ball every single day. I would get on YouTube and would look up prenatal exercises. I ate more healthy...Basically, got my body ready to open up to have the baby.” This time when her providers induced Destiny’s labor, the labor progressed quickly, and she gave birth to a baby that was smaller in size than her first. Destiny cited her diet and exercise adjustments as having made the VBAC possible.

The calculator’s problematic logic of non-modifiability contrasted to the efforts of women like Destiny who worked to change their probability for a successful VBAC. The calculator treated every prior cesarean as an immutable fact, sutured that cesarean to a set of non-modifiable demographic factors, and thus, turned more prior cesareans into recurring indications. For many women, the goal of having a VBAC introduced a relationship of malleability to the prior birth, as they sought to influence the factors that had most contributed to the first cesarean.

Finding 3: Concealed uncertainty and the racialized misapplication of the calculator

While the logic of non-modifiability invested the calculator’s inputs and its output with an excess of certainty, other approaches to the calculator also served to enhance certainty. Many VBAC prediction models, the VBAC calculator included, show decreased predictive ability in the lower score ranges, a decay in precision the MFMU researchers acknowledged in their first paper: *“Only when the empirical chance of VBAC is quite unlikely (less than 35%) does the precision of the predictive model deteriorate.”* However, the MFMU researchers dismissed women with low scores as insignificant in view of the greater functioning of the calculator’s statistical logic. *“Yet, from a clinical standpoint, this imprecision is unlikely to be of great importance because many physicians and their patients would consider any estimate in this range to be a disincentive to attempting a VBAC.”* By concealing the uncertainty surrounding low scores (ACOG, 2019), the MFMU researchers made it possible for providers to discourage

women with scores under 35% from attempting a VBAC (Thornton et al., 2020), a misapplication which had significant effects for Black and Hispanic.

While other scientific groups were more explicit about the limitations of VBAC prediction and recommended against discouraging women with low scores (Metz et al., 2013b), in interviews most providers were unaware of the VBAC calculator's limitations. The problem of low scores became not one of accurately communicating statistics but of managing patient expectations for the greater possibility of failure. The VBAC calculator compounded the decision-making process for women with low scores, many of whom were Black or Hispanic, adding to a challenging situation in which many already faced structural vulnerabilities and racism. Black and Hispanic women who were interested in a VBAC more likely faced a dilemma between their commitment to having a VBAC, which itself was a predictive resource, and a low calculator score.

Amelia's story highlights how multiple elements, including structural vulnerabilities, informed her preference for VBAC. When I raised the issue of the calculator during an interview, Amelia's preference for a VBAC led her to critique a low calculator score. Amelia identified as Hispanic, had an elevated BMI, and was 38 years old at the time of her second pregnancy—a combination of factors that yielded a score of 32%. Of note, Amelia's perinatologist never introduced the VBAC calculator during prenatal care, possibly not to discourage Amelia from her goal of having a VBAC.

Multiple elements informed Amelia's preference for a VBAC, including the clinical circumstances surrounding her first cesarean. Amelia had an emergency cesarean before labor started due to complex health issues her daughter was experiencing in utero. While Amelia stressed the blessing of her daughter's good health, she also felt like the cesarean had robbed her

of a transition to motherhood that she had envisioned. *“I always say that [my daughter] stole my thunder. I wanted to have a natural birth...I wanted to be in labor and feel the pain, and go through the motions that every woman usually goes through when they have a baby. Because it is such an intimate experience.”* While the women who opted for a repeat cesarean valued other elements about their births, Amelia exemplified the value that VBAC-interested women assigned to vaginal birth, which included an intimate connection with their bodies and babies.

Amelia’s first cesarean and transition to motherhood unfolded during an intensely vulnerable time. She became homeless toward the end of the pregnancy and moved back in with her mother, who was struggling with substance use at the time. In addition to recovering from her cesarean and caring for a newborn with complex medical needs, Amelia had to also care for her mother. *“I ended up going home with my daughter seven days after she was born, the same day my mom had gone into cardiac heart failure.”* In large part due to these stresses, five months after the cesarean Amelia landed in the emergency department after trying to overdose on a bottle of antidepressants.

I highlight these structural vulnerabilities not to stereotype Amelia as someone who lacked agency. I share them to demonstrate how “ethnicity” and an ultimate VBAC preference for some women is overdetermined by structural conditions, rather than being a property inherent to individuals. These vulnerabilities were not visible to the MFMU researchers when they argued that low scores below 35% would be a disincentive to attempting a VBAC, an erasure that made it possible to dismiss Black and Hispanic women’s VBAC preferences.

When I first met Amelia, twelve years after her first birth she was in a different place in life with a supportive partner and stable housing. In the intervening years Amelia had developed Type 2 diabetes, and she found a perinatologist who supported her plans for a VBAC. The

perinatologist referred Amelia to a free doula service. With the help of the doula and her partner, Amelia crafted a plan for a VBAC. In the end, Amelia's supportive team helped to carry her through to a successful VBAC, which was the integrated transition to motherhood that she had hoped for. *"It was so beautiful. It was just like I always dreamed [laughter]. You know, to feel my baby and be able to hold her and not be in some traumatic environment where I can't see my baby right away,"* she said, recalling the harried environment in the operating room during her emergency cesarean.

Having achieved her dream of a VBAC, in an interview after her birth I retrospectively input Amelia's factors into the calculator, which revealed a chance of success at 32%. Her immediate reaction was, *"Oh wow. That's sort of not a big percentage. If you would have told me I had only a 32% chance I was going to have a vaginal birth I would be like, 'No way. That's impossible.' I mean it would have been super discouraging."* When I changed her ethnicity to White, Amelia's score jumped from 32 to 48, to which she responded: *"It's just like you have more of the-- you have that much more percentage of having a successful vaginal birth after C-section. So it's more encouraging, it's like, 'Okay, I can do this.'"* The fact that Amelia didn't comment on the racial bias behind the score difference, when others did, was telling. With a 32% chance of VBAC success, she would have declined a VBAC. As a White woman at 48%, Amelia would have been confident to try, the higher scores boosting her confidence.

In fact, the score of 32% would have been so discouraging, Amelia suggested that providers should not share low scores with motivated VBAC candidates like herself. *"I think that if you have the goal [of a VBAC] that you shouldn't be given information that's going to deter you from that goal."* Amelia illustrates the tension between her own VBAC preference and a low score. A motivated VBAC candidate like Amelia may be more likely to achieve a VBAC, but

low scores introduced uncertainty, potentially whittling away at one's confidence, even though low scores themselves were troubled by limited precision. The concealed uncertainty of the calculator fostered a situation where providers withheld enthusiastic support for and sometimes discouraged women with low scores from attempting VBACs. Without the undue influence of the VBAC calculator and with the support of her partner, doula, and perinatologist, Amelia tried and succeeded.

Discussion

The purpose of this study was to bring VBAC candidates' diverse approaches to the uncertainty of planning a VBAC into dialogue with the science of VBAC prediction. I used critical and feminist ethnographic methods to highlight how one VBAC calculator neglected or silenced a range of less-invasive approaches, which included reframing failure and working to increase the probability for a successful VBAC. Many VBAC candidates did not see their chances for a successful VBAC as a preordained statistical fact and instead experienced pregnancy as an unfolding and embodied process that to some extent was open to modification (Niles, Vedam, Witkoski Stimpfel, & Squires, 2021). While many women justified less-invasive approaches through their valuing of the physiologic aspects of 'natural' childbirth, some women worked within a technological framework and used obstetric interventions, like inductions of labor and epidurals, to achieve a VBAC (A. C. Miller & Shriver, 2012).

The results of this research are consistent in many ways with prior feminist critiques of obstetrics. The VBAC calculator participates in a long history in which obstetricians, working in different time periods and under different disease paradigms, have defaulted to the most invasive treatment, in this case, the recommendation for a repeat cesarean as the best option for low calculator scores (Murphy-Lawless, 1998). By excluding a VBAC candidate's level of

commitment, the VBAC calculator devalued this subjective feeling as mere preference, a soft and unmeasurable impression lacking the solid scientific power of prediction (Duden, 1993). A problematic logic of non-modifiability informed the calculator; obstetric diagnostic categories have a well-documented tendency toward translating into fixed notions of the human pregnant body. These categories in turn reify differences of race and gender and turn women into the vehicles for justifying excessive surgical intervention (Cooper Owens, 2017; Murphy-Lawless, 1998).

Certain uses of the VBAC calculator vanished from the realm of statistical evidence those experiences that led many to prefer a VBAC (Wendland, 2007). However, the precise kind of vanishing that the VBAC calculator accomplished was surprising. Much recent feminist work has rightly focused on the ways in which fetal risks are being used to trump maternal autonomy (Paltrow & Flavin, 2013). Instead, the VBAC calculator proposed to engage women as autonomous decision makers by providing them reliable data to avoid a potentially complicated unscheduled cesarean performed after labor starts. The calculator marginalized by enrolling women into a well-circumscribed risk analysis that proposed surgical birth as the only solution for the probability of failure. The calculator did this under the banner of choice, turning VBAC-interested Black and Hispanic women's decision-making power into a tool that harmed them (Campbell, 2021).

Due to the multiple ways in which the calculator concealed uncertainty, the technology can be understood as an example of "information packaging" (Altman et al., 2019). Due to the dynamics through which relative risk turns acceptable risks into exceptional ones, the American VBAC situation was already rife with information packaging prior to the emergence of the VBAC calculator. Through selective sharing of information, the calculator drew from and

perpetuated the authoritative status of obstetrics, as the modern science supposedly best equipped to deal with risks in childbirth through invasive procedures. Midwives (and less commonly some family practitioners and obstetricians) assert that physiologic pregnancy and birth are increasingly subjected to a presumption of abnormality through regimes of risk management (Healy et al., 2016), a process facilitated by information packaging. Thus, it's relevant that a midwife-led research team conducted the most thorough assessment of the calculator's misuses, finding that providers used the calculator more to counsel women into repeat cesareans than into VBACs (Thornton et al., 2020). As a result, certain uses of the calculator expanded, rather than shrank, the terrain for surgical intervention, perpetuating obstetric dominance.

In order to address the discriminatory impact of the race-adjusted VBAC calculator on Black and Hispanic women, the MFMU researchers recently published a model that does not use race/ethnicity as a variable (Grobman et al., 2021). However, if the analysis in this paper is correct, *any* VBAC prediction tool that exclusively relies on individual risk factors, including the new VBAC calculator, will run counter to the diverse ways that pregnant individuals approach the uncertainty of planning a VBAC. Furthermore, patient insights could influence the science of VBAC prediction. It's clear to patients that providers and hospitals contribute to successful VBAC, and future iterations of a VBAC calculator should include provider and hospital variables. For instance, a Swedish group found that the VBAC calculator's accuracy increased by adding the labor unit's cesarean rate (Fagerberg et al., 2015). Others have found women with identical individual risk factors have a 78% greater chance for a VBAC if they give birth at a hospital with a high VBAC rate (Triebwasser et al., 2019). Another research group investigated the extent to which the prenatal probability for a successful VBAC changed over the course of pregnancy, finding that the probability increased for 56% of women by the end of

pregnancy (Ha et al., 2020).

In addition to more accurately reflecting the multiple factors which influence the probability for a successful VBAC, statistical analyses like these also challenge the VBAC calculator's problematic logic of non-modifiability and multiply the models available to counsel patients. The dominance of one VBAC prediction model narrowed the terrain of mode-of-birth options counseling. A patient-centered approach to discussing the probability for a successful VBAC recognizes that prediction is not a relevant frame for many, and therefore, should not play an outsized role in counseling these women. For those VBAC candidates who desire a numeric estimate of their probability for a successful VBAC, providers should delve into a robust conversation about the multiple hospital, provider, and individual factors that influence successful VBAC. So too, providers should discuss what can be done to potentially increase the probability for success. Women who have low probabilities for success should be afforded a range of birth options, not just cesarean section. Finally, due to the limitations of VBAC prediction models that use only individual factors, including their limited precision in the lower scores ranges, no VBAC-interested person should be denied a VBAC based on what providers perceive to be a low score.

Because the purpose of this analysis was to highlight the limits of VBAC prediction, less space was dedicated to the experiences of women who found the calculator useful. The data collected from the two institutions which required use of the calculator was limited to 6 interviews, which mainly concerned controversial cases (e.g. women who had low scores but still pursued a VBAC). As a result, this study cannot comment on the experiences of VBAC-interested women who had perceived low scores but for reasons related to institutional policies

scheduled a repeat cesarean. We don't know how such women struggled with, adjusted to, or possibly embraced, cesareans that they did not originally desire.

In a recent systematic review of the 94 studies that now make up the burgeoning international field of VBAC prediction, Wu and colleagues boasted that “*the probability of successful vaginal birth is one of the most crucial factors in the decision-making process during the prenatal counseling*” of women with a prior cesarean (Wu, Kataria, Wang, Ming, & Ellervik, 2019). Contrary to this assertion, I've shown in this paper how the probability for a successful VBAC is important to some, a negligible influence to others, and oppressive to the most committed. VBAC prediction is an *obstetric* project that works for those who value surgical control over the uncertainty of planning a VBAC. In the world of VBAC prediction, cesarean surgery plays a starring role, swooping in before birth gets too risky. On the other hand, VBAC-interested women in this study preferred that cesarean surgery play a supporting role, a back-up option if and when the need should the need arise.

Chapter 2: Evidence-Based Discrimination: the VBAC Calculator and the implementation of a new racial algorithm in American obstetrics.

Introduction

After having a cesarean for her first birth, Destiny⁶ wanted to try for a vaginal birth after cesarean, or VBAC, in her second pregnancy. She worried that multiple cesareans would limit her plans to have four to five children and recovering from the cesarean had been very difficult. Early in prenatal care for her second pregnancy, Destiny consulted a midwife with the hopes of increasing her chances for a VBAC. *“I started off with a midwife and then she told me that she couldn’t be my provider because of my weight and because of me being African-American.”* Destiny didn’t realize that she was giving birth in a hospital system that used the Maternal Fetal Medicine Units (MFMU) Network VBAC Success calculator (Grobman et al., 2007).⁷ New institutional policies dictated that women who had low calculator scores were too high risk for midwifery care, thus potentially excluding Destiny from a model of care that could increase her chances for a VBAC (Bayrampour et al., 2021).

The midwife referred Destiny to an Ob/Gyn who input her risk factors into the calculator. The calculator combined Destiny’s age (mid-30s), elevated Body Mass Index (BMI), her race, and the indication for her prior cesarean, which had been done when she stopped dilating during an induction of labor. The calculator assessed her probability for a successful VBAC to be 12%.

⁶ All names have been changed to pseudonyms to protect participants’ privacy.

⁷The calculator combines the indication for the prior cesarean with a woman’s age, race/ethnicity, and Body Mass Index (BMI) to estimate the probability of successful VBAC. For example, increasing age and BMI decrease the probability. A prior cesarean for a labor arrest disorder also decreases the score.

When she received the score, initially Destiny felt discouraged, “*I felt like [having my baby vaginally] was impossible.*” While Destiny’s low score was exceptional as few scores fell into this range, at the same time Destiny’s story was not unusual. Prenatal care providers widely adopted the VBAC calculator over the last decade as a tool to assess the probability for a successful VBAC.⁸ Among other factors, the calculator used race/ethnicity to predict the probability, giving scores to Black and Hispanic women that were on average 5-15 points lower than White women. As I will discuss later in my results, the calculator played a role in determining Destiny’s care options as well as informing how she thought about her ability to give birth in ways that were significantly based on her racial identity.

One of several race-adjusted clinical algorithms to emerge in the past two decades, the invention and implementation of the VBAC calculator raises important questions about the promise and peril of using race to inform clinical decisions (Vyas, Eisenstein, & Jones, 2020). Some have argued that factoring race into clinical decision makes for more personalized treatment with the potential to address health disparities (Satel, 2002), while others have expressed concern that race-adjusted clinical algorithms may perpetuate racially-unequal health outcomes (Cerdeña, Plaisime, & Tsai, 2020; Roberts, 2011). Still, no study has analyzed whether and how the VBAC calculator might perpetuate inequities. In order to better understand the potentially negative downstream consequences of the VBAC calculator in U.S. maternity care, an exploratory and ethnographic study was designed. In the paper that follows, I present results that shows how scientists, clinicians and women reproduced implicit racism in the calculator. Finally, I discuss the calculator in light of growing attention to obstetric racism and to race-

⁸ This study concerns the race-based VBAC calculator. Because a new VBAC calculator that excludes race has been developed, I refer to the ways in which the VBAC calculator racially assessed Black and Hispanic women using the past tense. See Grobman 2021.

adjusted clinical algorithms. I conclude with some thoughts on the possibilities for a fairer and more just VBAC calculator that excludes race as a variable (Grobman et al., 2021).

Discriminatory by Design

Given the rise in both cesarean use and maternal morbidity in the U.S., in 2010 the NIH declared increasing the VBAC rate to be a public health priority. At that time the NIH also noted that several statistical models could accurately predict the probability for a successful VBAC using individual factors. In that same report, the NIH noted that race and ethnicity was the most significant “demographic” factor associated with unsuccessful VBAC (Cunningham et al., 2010).⁹ While other prediction models also found race/ethnicity to be salient, only the MFMU VBAC calculator rose to prominence. Because the calculator used race/ethnicity as a scoreable and predictive demographic factor, as opposed to a measure of racism, the calculator was discriminatory-by-design (Benjamin, 2019).

Several evidence-based stamps of approval obscured the calculator’s discriminatory design and facilitated its uptake into clinical practice. As an NIH-funded network, the centers that participated in creating the VBAC calculator (the MFMU) followed established policies around the inclusion of diverse racial/ethnic populations (Epstein, 2008). Derived from one of

⁹ I realize that phrases such as “race and ethnicity” or “race/ethnicity” collapse different assumptions about categorizing human difference. I use race/ethnicity as a joined term because the VBAC calculator collapsed African-American race and Hispanic ethnicity. However, it’s worth problematizing “ethnicity” as I have already done with race. Ethnicity, like race, is a historically-specific categorization. However, ethnicity is generally not constructed as a visible and measurable human phenotype, as with the biological fiction of race. Ethnicity refers to a heterogenous combination of geographic, national, linguistic, cultural, religious, legal, and cultural elements. The MFMU group did not define who belonged to the category “Hispanic” at the time they collected data in the late 1990s from a network of hospitals in the Northeastern and Southeastern U.S. and in Chicago. Hispanic participants in my study were quite aware of the shifting nature of the category “Hispanic” and they often requested more granular details about the Hispanic women who contributed data to the VBAC calculator. Despite their distinct constructions, epidemiology and genetics can biologize race and ethnicity. For a discussion on naturalizing ethno-racial difference see Montoya 2011. For a detailed assessment of ethnicity and VBAC see Edmonds 2016.

the largest prospective cohort studies to examine the question of VBAC prediction, the MFMU researchers found the VBAC calculator to be valid using their robust sample. The calculator earned an evidence level II, just under the gold-standard randomized controlled trial (Adams, 2013; Wendland, 2007). Confident in their study design, the MFMU researchers considered their discovery an objective statistical logic that could support clinicians and women in making more informed mode-of-birth decisions. Finally, the two most respected American Ob/Gyn scientific journals published the MFMU researchers' calculator analyses (Grobman et al., 2007, 2009).

The race/ethnicity and VBAC association also appeared to be significant in terms of its magnitude. After dividing White, Black, and Hispanic women into mutually exclusive groups, the MFMU researchers found that race/ethnicity decreased the chance for a successful VBAC by 50%.¹⁰ In fact, the contribution of race/ethnicity equaled that of the most significant clinical predictive factor, a diagnosis of having had a cesarean for a labor arrest disorder (Grobman et al., 2007). However, the magnitude of the race/ethnicity and VBAC association was accompanied by silence around potential etiologies, ranging from the sociological to the clinical. This silence was likely due to prior epidemiologic work that had already normalized race/ethnicity as a demographic factor, as opposed to racist clinical practices (Shim, 2002). So, it was likely assumed that the MFMU researchers did not have to further explicate the race/ethnicity-VBAC association.

Considering race/ethnicity as a demographic factor, the MFMU researchers presented clinicians with two unfortunate paths. They could ignore race/ethnicity and treat all women the

¹⁰ The details of how the MFMU researchers operationalized race as a variable wasn't available in the methods sections of their published papers. I obtained the original data abstraction forms from the statistical center at George Washington University, and these forms revealed that researchers categorized women into mutually exclusive categories according to their "predominant race/ethnicity."

same (in other words, trouncing upon their own results), or they could give Black and Hispanic women more personalized, yet inferior, scores (that is, presume that the calculator would work to these women's advantage). The prevailing bioethical, legal, and clinical standards recommended that VBAC candidates conduct a numeric assessment of their different birth options (Horey et al., 2013). The MFMU researchers decided that Black and Hispanic VBAC candidates could use the calculator's statistical evidence to make more informed decisions; therefore, in their first paper they suggested that the calculator would have universal applicability in a similar fashion to prenatal genetic diagnosis, another individual risk-benefit analysis that had become routine in American prenatal care (Grobman et al., 2007; Rapp, 2000).

Next, the MFMU group wanted to know if their calculator could actually be used to improve outcomes, so they analyzed whether surgical complications increased with decreasing calculator scores. They found that when calculator scores dropped below 60%, 3.1% of women who attempted a VBAC experienced maternal or neonatal morbidity compared to 1.5% of women who scheduled a repeat cesarean. The MFMU researchers found this relative risk of 2:1 to be statistically significant, and they proposed below a score of 60% repeat cesarean became the safer option (Grobman et al., 2009). Of note, Black women were the only racial/ethnic group to have worse outcomes in the MFMU data set, having a morbidity rate 1.8 times that of White women.¹¹ Because the MFMU group assumed that Black women's and their newborn's injuries

¹¹ In order to compare total morbidity rates across groups, the MFMU researchers combined minor maternal (puerperal fever, blood transfusion, wound infection), major maternal (hysterectomy, operative injury), and neonatal morbidity (Apgar <4 at 5 minutes, umbilical cord arterial pH <7.00, NICU admission, hypoxic-ischemic encephalopathy, death). Of note, the MFMU group did not stratify and then compare the prevalence of morbidity by race. Doing my own calculations, I found that 8.3% of White women, 10.2% of Hispanic women, and 14.6% of Black women experienced morbidity in the original VBAC calculator data set. See Grobman, 2009.

were a function of intrinsic racial factors, rather than sociological, they presumed these poor outcomes had been unavoidable. The MFMU researchers racialized this excess harm as “Black” morbidity (K. A. Scott, 2021).

While the MFMU group naturalized Black bodies as more prone to failure, disease, and early death, Hispanic women’s relationship to the calculator was construed as “paradoxical.” In American obstetrics, Hispanic women are racialized as simultaneously “obstetrically hardy” and yet they remain “at risk” for adverse pregnancy conditions, like gestational diabetes (McGlade, Saha, & Dahlstrom, 2004). Others have argued that Hispanic women do not have paradoxical biology; rather, what are paradoxical are the processes of racialization in which the bodies of people of color are presumed to be naturally vulnerable (either ‘hardy’ or ‘disease prone’) because of their biology (Gálvez, 2011). However, Hispanic women’s paradoxical status did not prompt the MFMU researchers to investigate potential causes for Hispanic women’s lower VBAC rates.

Although the MFMU was not the only scientific group to find an association between race/ethnicity and VBAC (Hollard, Wing, et al., 2006), it was the most important contributor to an evidence-base that influenced obstetric care in the U.S. The MFMU group pursued translational medicine strategies to facilitate uptake of their tool (Grobman et al., 2007). In the early 2010s, an NIH-funded website began to host the calculator, and a separate Spanish-language website promoted the calculator to a Hispanic audience. Due in part to its accessibility on the internet, the calculator entered widespread use. The calculator’s widespread use in turn pressured the ACOG to develop guidelines on how to use the tool; the 2010 VBAC guidelines were the first to include an extended discussion about the VBAC calculator (ACOG, 2010). One of the most influential sentences in the ACOG document concerned the 60% cutoff developed as

a result of the MFMU's analysis of morbidity: *“Although there is no universally agreed on discriminatory point, evidence suggests that women with at least a 60-70% chance of a VBAC have equal or less maternal morbidity when they undergo TOLAC¹² than women undergoing elective repeat cesarean delivery.”* Importantly, the guidelines did not similarly suggest that VBAC candidates with scores *above 70%* attempt a VBAC, thus preserving the option for women with high scores to pursue a repeat cesarean. The 60% threshold set a high bar for success for all women, but especially for Black and Hispanic women, and became a new barrier to planning a VBAC (Thornton et al., 2020).

Race-adjusted clinical algorithms proposed to ameliorate racial health disparities through individualized risk assessments (Roberts, 2011). The VBAC calculator leveraged statistical techniques thought to have the ability to overcome bias-prone human decisions (Benjamin, 2016; Suresh & Guttag, 2019). While these interventions may have been well intended, a 2020 review article, which assessed the numerous race-adjusted clinical algorithms currently in use, suggested that these algorithms might automate health disparities (Vyas et al., 2020). However, there is scarce research exploring the impact on patient outcomes and experiences of a race-based tool like the VBAC calculator. Hence, by designing an exploratory and critical ethnographic study on the experiences of using the calculator among patients and providers, my research seeks to reveal how the VBAC calculator automated racism in obstetrics.

¹² TOLAC refers to “Trial of Labor After Cesarean.” I agree with Hazel Keedle that the term “trial of labor” conveys a lack of faith in the birth process and connotes that women give birth in front of a judge and jury. The VBAC calculator also uses a vocabulary of failure, and I’ve chosen to refer to the “MFMU VBAC success calculator” simply as the VBAC calculator. However, many providers in my study used the term “TOLAC.” So, when not a direct quote from an informant, I replace TOLAC with “labor after a cesarean” or “planned VBAC.” See (Keedle, 2020)

Materials and Methods

Approach: I approached the VBAC calculator as a technology that produced downstream effects that exceeded any clinical function. The calculator used risk as a technology to secure the future population health of mothers and babies through prenatal intervention into individual bodies. The technological manipulation of population and individual perinatal health intersects with notions of race and racism (Weir, 2006). Race and racism themselves can be thought of as a kind of technology, a historical and social process that structures inequity across multiple institutions thus producing differences in opportunity, wealth, and health (Crear-Perry et al., 2020; Logan, McLemore, Julian, & Vedam, 2021). Over time, race and racism requires periodic upgrades, becoming coded into new technologies, like the VBAC calculator (Benjamin, 2019). As an obstetrician, I had no experience using the VBAC calculator, though I had extensive experience counseling VBAC candidates. None of the data were gathered from VBAC candidates who were under my care at the time. The study was approved by the University of California, San Francisco Committee on Human Research.

Sample: I identified three cohorts of people that could provide insight into the rationale and impacts of the VBAC calculator: a multi-disciplinary group of key informants sampled from the broader health system, clinicians who worked at four different institutions, and pregnant/postpartum women who all had undergone a prior cesarean. First, I purposively selected 22 key informants, both users and non-users of the calculator, based on their research publications or public statements. Many informants held prominent national positions working on issues related to VBAC. I included scientists, clinicians (perinatalologists, general obstetrician/gynecologists, Certified Nurse Midwives and community-based midwives), doulas, lawyers, hospital risk managers, and civil society actors who worked in birth advocacy

organizations or who worked on writing national VBAC guidelines. The racial/ethnic breakdown of my key informants was: 15 White; 5 Black; 2 Asian/South-Asian-American.

The second group of interviewees was clinicians. I distributed a short survey to identify providers who used the calculator and subsequently recruited more providers through networking and snowball sampling. In total, I interviewed 17 providers, including perinatalologists, general obstetrician-gynecologists, and certified nurse midwives (CNMs). Providers had this racial/ethnic breakdown: 11 White, 2 Black, 3 Latina/o, 1 Asian-American.

The third group of participants were pregnant and postpartum women. Study recruitment

staff approached pregnant women who spoke English or Spanish, who were over the age of 18, and who were willing to participate in at least one interview. I enrolled postpartum women through social media advertisements and through snowball sampling. I enrolled 31 women who had all undergone a prior cesarean, 27 of whom were currently pregnant and 4 who were

postpartum. I purposively sampled pregnant women to obtain a range of birth histories and calculator scores. Study staff calculated the probability for a successful VBAC using information gathered from the Electronic Health Record and then used this information to target specific women for enrollment. See Figure 2.1 to the right which captures the webpage that hosted the VBAC calculator until recently. Ultimately, as the pregnancy women made plans for their births, 13 had VBACs, 10 had unplanned cesareans for a variety of reasons, and 8 had

VAGINAL BIRTH AFTER CESAREAN	
Height & weight optional; enter them to automatically calculate BMI	
Maternal age	18 years
Height (range 54-80 in.)	in
Weight (range 80-310 lb.)	lb
Body mass index (BMI, range 15-75)	25 kg/m ²
African-American?	no
Hispanic?	no
Any previous vaginal delivery?	no
Any vaginal delivery since last cesarean?	no
Indication for prior cesarean of arrest of dilation or descent?	no
Calculate	

A new calculator without race and ethnicity is under development.

Figure 2. 1 Web-hosted VBAC calculator

scheduled repeat cesareans. The racial/ethnic identifications were as follows: 8 White (two foreign born); 2 Asian/South Asian (one foreign born); 1 Native American; 12 Hispanic (three foreign born); 4 African-American; and 4 who identified as mixed-African, mixed-Hispanic, or mixed-Asian ancestry. Three women spoke Spanish only and were interviewed by myself in Spanish. Calculator scores ranged from a low of 12% to a high of 95%.

Settings: Providers worked in four different institutions. At two institutions, a large academic hospital network in the Northeast and a community practice in the Southwest, practice policies required that providers use the VBAC calculator to counsel women with scores lower than 60% to have a repeat cesarean. At the two other institutions in Northern California, providers sporadically used the calculator without the knowledge of the 60% cutoff. The majority of the women hailed from the two sites in Northern California, with 27 of the 31 giving birth at these sites. Ultimately, 2 women switched from hospital-based care to planned VBACs with community midwives.

Data collection: After informed consent, I conducted a semi-structured interview with key informants and with providers during which I asked them to detail their involvement with the calculator, to explain how the calculator worked, and to share observations on what they saw as the calculator's main benefits or harms. For providers, the interview guide also generally addressed how they counseled women about their birth options and specifically asked about controversial cases in their practices. Settings for the interviews were in person, via the phone or internet.

After informed consent, pregnant women had the option of participating in multiple data collection events, including interviews, observations, and recordings of prenatal visits. Women participated in a range of 1-5 data collection events with the entire cohort of 31 women

participating in 81 data collection events. Interviews were via phone or internet video; prior to COVID restrictions, several observations were conducted in person. An initial interview guide was designed after a literature search. The first interview was broad and focused on understanding the context surrounding mode-of-birth decisions, including the circumstances that led to the first cesarean, experiences during the cesarean and immediate recovery, their emotional and physical recoveries, significant events between pregnancies, and influential family and social media resources. A total of 13 prenatal care visits were recorded. Prenatal visits were recorded only at 1 Northern California hospital and with 1 community midwife. The visits were digitally recorded by leaving the recorder in an unobtrusive place in the exam room; the visit was recorded in its entirety. Recordings were offered as an option only to the first 15 participants; video visits instituted in the wake of COVID-19 proved difficult to arrange additional recordings. Prior to COVID restrictions, several observations took place in person where I observed women doing internet research or we reviewed together how to use the calculator.

If women didn't encounter the calculator during prenatal care, I introduced it during follow-up interviews. If the calculator had been introduced, I probed women's thoughts and reactions to the calculator. During follow-up interviews, I entered different arrangements of risk factors into the calculator in order to make explicit to women how age, race/ethnicity, and BMI contributed to the final score (See Figure 2.1 above). Varying the combinations of factors often elicited rich discussions about risk, probability, and VBAC. As the study progressed interview guides were altered to hone in on emergent findings.

Analysis: The interviews and prenatal visits were transcribed verbatim and analyzed using Atlas.ti, qualitative analysis software. Observations were entered into field notes which were also managed using the above software. The analysis followed the method of grounded

theory (Charmaz, 2014). Analysis began from the very start of data collection and continued throughout. An open coding process was used in order to ascertain preliminary themes, and using the constant comparative method, preliminary themes were tested within and across interviews as more data was gathered. With ongoing data collection these preliminary themes were assembled into codes; these codes were then merged and clustered through additional re-readings of transcripts. I defined key processes that demonstrated the co-production of evidence and race and then chose ethnographic cases to demonstrate the range of variation within these processes (Fields, 2012). Data saturation was reached as no new information emerged with additional recruitment of participants. In reporting findings, all participants were given pseudonyms to protect their identity.

Findings

Finding 1: The statistical redlining of VBAC candidates

The VBAC calculator worked as a statistical redlining technology that produced racially-segregated outcomes in officially desegregated institutions. Providers used the calculator to sort VBAC candidates on the basis of race in the name of evidence, informed consent, and quality care. A perinatologist explained how sorting VBAC candidates was key to the functioning of a clinical algorithm like the calculator. *“If we counsel people in a way that more women who actually were going to succeed tried, and less women who weren't going to succeed didn't try, then we actually would probably be impacting outcomes.”* In this section, I reveal how the calculator's benevolent sorting function belied the acts of coercion and processes of racialization that combined in order to risk stratify VBAC candidates.

The claimed predictive power of the VBAC calculator initiated a series of rehearsed behaviors for Ob/Gyn trainees and established providers alike. Ob/Gyn residents encountered the

calculator in their “chart prepping.” Because residents could gather the calculator’s factors from the Electronic Health Record (EHR) in advance, chart prepping helped to make prenatal visits more efficient. As one perinatologist remembered encountering the calculator during chart prepping, *“I feel like I was indoctrinated to the calculator...It’s like these are the tools that you’re supposed to use. These are the steps one through ten. It’s like this script that we’ve passed on but at no point were we really talking about, why are each of these steps so important.”* In most academic medical centers, residents provide prenatal care to publicly-insured pregnant women. Chart prepping helped to bring the calculator into public prenatal clinics, which depending on geographic location, were populated by majority Black and Hispanic women.

Established providers also strove to conduct evidence-based VBAC consultations. They adopted the calculator either because they knew the MFMU to be a reputable research network or because the ACOG guidelines discussed the calculator. In many practices, one provider was seen as the group’s evidence-based practitioner. If these evidence-based practitioners introduced the calculator, others followed their lead. Providers who were expert users of both the calculator and the EHR developed “smart phrases”¹³ that captured their standard language used during VBAC consultations. After creating a VBAC calculator smart phrase, a provider could borrow and insert the smart phrase into prenatal notes with just a few strokes of the keyboard. Thus, the EHR facilitated the calculator’s uptake.

By and large, providers gathered information about race/ethnicity from the EHR. If racial/ethnic identification wasn’t clear from the EHR, providers read race/ethnicity visually,

¹³ In order to make documentation in the EHR more efficient, providers save language that they repeatedly use as a “smart phrase.” The smart phrase is usually indexed under a shortened, easy-to-find name and then saved into a larger library of smart phrases, which providers can access any time they need to document a VBAC consultation, for example. The smart phrase is also accessible to all the other providers in the same practice who are networked into the same HER. With the a few strokes of the keyboard, a provider can import a smart phrase into a clinic note.

through phenotypic features, or culturally, as with a Spanish last name. Providers flattened differences between Black and Hispanic women of diverse nationalities, immigration histories, and socio-economic circumstances. An Ob/Gyn in Destiny's hospital admitted to following a "one-drop" rule when it came to categorizing people of mixed-African descent, "*We probably say they're African-American if they're any part.*" Because the calculator required distinct racial groups, providers automated a policy of racial purity.

The automaticity of the calculator was so effective that it wasn't until the research interview that many providers contemplated the challenges and impact of sorting women into mutually exclusive racial groups. Providers' racial identities didn't necessarily have any bearing on whether and how they used the calculator. Even some Black and Hispanic providers who considered themselves advocates for their communities automatically adopted the calculator. In Destiny's hospital, a Black CNM who served a mostly African-American clientele presumed the calculator was a tool to support health care decision making. During our interview, she realized the calculator's racial underpinnings and became angry that her institution required providers to use a technology that engineered inequity. "*And then to know that every single system including systems that are supposed to be about me and my health and for me and my health, but every single system, education system, the justice system, the health system, they're all like fighting to systematically destroy, or systematically make things unfair for me.*" She had direct experience with the calculator's discriminatory impact and recalled several recent cases where Black women she had counseled went on to have repeat cesareans as a result of perceived low scores.

In Destiny's hospital, new quality improvement (QI) protocols required providers, like this CNM, to use the calculator. QI protocols led to the calculator's automaticity in care in the name of risk management and informed consent, even when it involved coercion. I interviewed

the Director of QI who oversaw quality and safety for the entire network of academic hospitals where there were 8,000 births annually. The QI director revised the hospital's VBAC consent form to be consistent with the ACOG's discussion of the 60% threshold. She explained, "*The whole point of doing this [quality improvement] is to (a) practice good medicine and (b) allow ourselves to defend our care if there's a poor outcome.*" Should a VBAC candidate with a score below 60% attempt a VBAC and then have a poor outcome, the consent form would protect against lawsuits. If providers in Destiny's hospital were to support a woman who had a score below 60%, the QI director worried that the hospital would be vulnerable to malpractice liability. The QI director herself remembered several times when she had been on call covering the labor and birth unit and counseled women with low scores out of attempting a VBAC.

In fact, as part of the hospital's QI initiatives, she altered the EHR in such a way that required providers to sort women into four quartiles according to their probability for successful VBAC. So, in order to complete their documentation on a patient, a provider would mark a VBAC candidate as belonging in the lower quartile less than 25%, or 25-50%, and so on. She hypothesized, "*If they [VBAC candidates] are evenly distributed, well then wouldn't that suggest that the calculator wasn't helping?*" With the ability to electronically identify VBAC candidates, the QI department could not only automate but refine the process of statistical redlining. The EHR could now be used to identify providers who weren't counseling sufficient numbers of women with low scores into repeat cesareans. Destiny's hospital was not alone in developing policies that required providers use the calculator to counsel more into repeat cesareans than into VBACs (Thornton et al., 2020). However, Destiny's hospital was unique in the extent to which the institution wove the calculator into the EHR. By separating women into quartiles, the QI

department used the EHR to surveil providers' counseling and women's reproductive decisions on the basis of race.

Finding 2: The statistical encouragement and discouragement of VBAC candidates

In many ways the process of statistical redlining hummed in the background, out of view from patients in the moments of chart prepping before clinic or in meetings with hospital risk managers. However, if providers planned to counsel about the probability for a successful VBAC, at some point they had to present the calculator to women. The intention behind the calculator had been to bring a numeric and standardized approach to communicating the probability for a successful VBAC. Instead, providers continued to contextualize the numeric probability with their own subjective interpretations, and providers' subjective interpretations served to encourage or discourage women from planning a VBAC. Sometimes, providers' subjective interpretations obscured both the existence of and inner workings of the calculator. When providers obfuscated the calculator, they enhanced the calculator's automaticity. In the face of such obfuscation, motivated Black, Hispanic, and multi-racial VBAC candidates had to perform extra work to expose the calculator and decode the contribution of race to their scores.

Sometimes, providers employed subjective terms that carried statistical weight in combination with an explicit discussion about the calculator. Justine, who intended to give birth in California, identified as White and had a prior cesarean for breech, two factors that increased her chance for a successful VBAC. At a prenatal visit, Justine's perinatologist presented her calculator score of 70% in a positive light. *"I kind of plugged you into the calculator,"* said the perinatologist, *"and it's predicting a success rate in the 70s...So pretty much your factors are in your favor."* Despite having risk factors that supported a successful VBAC, Justine still had the option to schedule a cesarean, which is what she did. Women with high scores had unrestricted

choice, and as a result, women like Justine didn't have to push her provider further to explain why her risk factors supported a successful VBAC.

Other times, providers gave statistical encouragement outside the context of a one-on-one counseling session with the calculator open. For example, Sally, who like Justine also identified as White, had a first cesarean for an arrest of labor. According to the calculator, a labor arrest cesarean decreased Sally's probability for a successful VBAC, but that decrease was mitigated by the point boost for White women. As Sally's first cesarean was wrapping up in Pennsylvania, she remembered her Ob/Gyn *"actually said literally like right after she finished sewing me up, 'If you want to have a VBAC next time you can, you're an ideal candidate.' She kind of put the idea into my head."* Sally's provider encouraged her not with a specific discussion of a calculator, but with a term that cast Sally as the norm, the *ideal*. Sally's early knowledge about VBAC helped her to eventually achieve one. The encouragement offered to White (and Asian) women radiated out from the calculator's intended use as a prenatal counseling tool, boosting confidence on the basis of race as soon as the first cesarean ended.

On the other hand, Black, Hispanic, and some mixed-ancestry women encountered statistical discouragement, sometimes through vague terms that obscured how the calculator worked. Chloe identified as a Black woman and, like Sally, she underwent a cesarean for a labor arrest. When Chloe started her prenatal care in Florida, she queried the Ob/Gyn about her birth options. *"This pregnancy is still new. I haven't decided anything. I'm wondering if VBAC is something I should be considering."* The obstetrician reacted decisively, neither consulting the calculator nor asking Chloe any questions about her own care preferences. *"She was like, 'Oh no. We'll schedule your C-section.' She didn't even ask me questions. So that was very frustrating. I asked her, 'Okay, tell me more about why—' It felt like I was pulling from her some*

of these factors.” While some providers disclosed the calculator and its inputs, Chloe’s Ob/Gyn had embedded the calculator into their clinical reasoning and performed a mental calculation that disqualified Chloe without further explanation. In order to decipher this discouraging news, Chloe had to push for more information. With this extra effort, her Ob/Gyn eventually explained that her risk factors were not “in her favor.”

Even with full knowledge of how race/ethnicity worked as a variable in the calculator, the calculator presented a series of difficult, and sometimes impossible, choices. For instance, because the calculator prevented people from identifying as multi-racial or Afro-Hispanic, these VBAC candidates had to suppress or render visible their identities in order to engage with the calculator. Some multi-racial women decided to split the point difference down the middle, crudely reasoning that their White heritage met their Black or Hispanic heritage halfway. Other multi-racial women, when given the choice, chose to racialize themselves fully into the Black and Hispanic categories. For instance, even though Mitzi identified more with the Filipino side of her mixed Afro-Filipino family, she still would identify as Black in the calculator. *“I mean, for me, I would probably still check the Black box, because that's how I physically, people will see me as. And it's going to be based on what you look like.”* Mitzi presumed that the “Black box” in the calculator referred to the unfair visual surveillance of Black women in health care spaces. Therefore, she believed the lower score would more accurately assess her chances for a successful VBAC, not because of any actual clinical risk, but due to unequal treatment stemming from how providers perceived her race.

Other times, the calculator’s requirement that women self-identify into mutually exclusive racial categories, forced women to share an otherwise hidden racial identity. When her providers introduced the calculator, Beatriz shared her multi-racial background. With a Hispanic

mother and White father, Beatriz often passed as White and filled out other official forms, for example in school, as White. Beatriz understood Hispanic women to be “at risk” for certain conditions like diabetes, and she didn’t want her providers to miss something important about her health. *“Well because they’re talking about my physiology and if there’s any kind of connection to my ethnicity and potential health issues I want them to have the full picture.”*

Beatriz reasoned that if a tool like a VBAC calculator required Hispanic ethnicity, there must be some clinical relationship between ethnicity and VBAC.

Beatriz planned to give birth at a hospital in Arizona that had recently developed a policy not to allow VBACs below a calculator score of 63%. After introducing the calculator, Beatriz’s Ob/Gyn pointed out that it was advantageous for her to identify as White. *“The doctor said, ‘Are you sure? Because you look White.’ I was like, ‘Yes, I’m sure.’ She’s like, ‘Okay, I’m just saying this because if I mark Hispanic, it’s going to knock you down a few points.’”* That the calculator could have such disparate results based on the perception of her ethnicity revealed to Beatriz the arbitrariness between looking White and being Hispanic. *“I was infuriated at that time...I was just thinking like, this just shows how arbitrary this entire process is. I’m like, if this calculator is based on science, then it shouldn’t be like that flexible.”*

Compared to Mitzi’s resignation in the face of the calculator, Beatriz exposed the power of the calculator’s medial racism. The calculator was powerful precisely because providers presented it as a scientific object designed to ensure a safe birth while at the same time accomplishing the scientifically impossible project of dividing humanity into mutually exclusive races. The calculator compelled Beatriz to make herself visible to her providers as a racialized subject in order to make a safe plan for her birth, but her Ob/Gyn denied any relevance to her health by encouraging her pass for White. Nonetheless, even when Beatriz racialized herself as

White in the calculator her score of 61% didn't reach above the practice's cutoff due to her having an elevated BMI. Beatriz entertained driving 2.5 hours away from home to give birth at a more VBAC-friendly hospital. After much searching for alternatives, she surprisingly found a supportive Ob/Gyn in the same practice. With this support, Beatriz eventually went into labor and had a successful VBAC.

In order to use the calculator, providers had to add their subjective interpretation, a word of encouragement or discouragement. As providers gained facility with the calculator, some performed mental calculations without pulling up the calculator. Both subjective interpretations and mental calculations served to obscure the existence and inner workings of the calculator. Mental calculations spread the calculator's statistical logic into other domains beyond its intended use. Most of the time, the process of subjectively encouraging or discouraging went smoothly, but with a mixed-heritage and motivated VBAC candidate like Beatriz the process broke down.

Finding 3: Conflating risk via a multi-factorial model to predict VBAC

Through a mysterious and ill-defined orchestration of multiple conditions, which were posited as individual risk factors for both poor outcomes and unsuccessful VBAC, the calculator's demographic inputs of age, race/ethnicity, and BMI together facilitated or hindered a successful VBAC (N. Krieger, 1994). The multi-factorial model of disease causation informed the development of predictive algorithms across multiple specialties, from nephrology to cardiac surgery, which were then implemented to support clinical decision making (Vyas et al., 2020). Specifically in the field of obstetrics, the co-occurrence of age, race/ethnicity and BMI as the "usual suspects" predictive of poor obstetric outcomes became so routine that their salience to statistical modeling in evidence-based obstetrics often requires no explanation (Shim, 2002).

Nonetheless, a plausible biological contribution of age and BMI to the probability for a successful VBAC, which I discuss below, made it possible for biology to creep into definitions of race/ethnicity. Providers and some women made use of the calculator's other variables, especially BMI, to produce Black and Hispanic women as being overweight and at-risk. As a result, some used BMI to rationalize the salience of race to the calculator.

Increasing age is consistently associated with undergoing first-time cesareans and with failed attempts at a VBAC (Wu et al., 2019), although even the majority of women over the age of 50 (74%) who attempt labor for the first time will have a vaginal birth (Osmundson, Gould, Butwick, Yeaton-Massey, & El-Sayed, 2015). In interviews, providers explained how an old uterus might decline in contractility over time, though there's no evidence to support this. In vitro studies do not show that uterine contractility declines with age (Crankshaw, O'Brien, Crosby, & Morrison, 2015). The association between BMI and VBAC has been less consistent though still common (Wu et al., 2019); multiple clinical studies, including in the context of VBAC, suggest that women who have elevated BMIs may have longer labors (Faucett, Allshouse, Donnelly, & Metz, 2016; Shenouda et al., 2019).¹⁴ Weaving together the potential contribution of age, race/ethnicity, and BMI to successful VBAC, some American researchers have gone so far as to argue that differences in pelvic bone architecture, connective tissue, and

¹⁴ A plus-size maternity care advocate I interviewed challenged the notion that fatness is the only explanation for the measured difference between BMI and labor progression. She proposed that anti-fat bias could explain the BMI association, and that the statistical association in turn propagates additional anti-fat bias. She explained how providers commonly discuss labor with plus-size women in terms of "soft tissue dystocia," a medical term she says refers to "the *'fat vagina theory'*." In addition to stigmatizing plus size women sexually, the fat vagina theory made it difficult "*for people of size to even think they have a chance at having a VBAC.*"

length of labor explain why White, Black, and Hispanic women have different rates of successful VBAC (Hollard, DA., et al., 2006).

Notwithstanding the scientific uncertainty around the relative contribution of the biological and the social to the categories of age, race/ethnicity, and BMI, providers did not have to maintain a belief in the biology of race in order to reproduce racial differences in VBAC care. As I detailed above, very often providers racially sorted VBAC candidates with little reflection. However, some providers who were uncomfortable with the calculator's use of race focused on BMI as the reason why Black and Hispanic women had lower VBAC rates (Strings, 2019).

For instance, Destiny's midwife explained that her elevated BMI was the primary contributor to the low score. This was a satisfactory explanation for Destiny. *"If the midwife had said because you're African-American [she can't take care of me], I would have felt like she was being racist. So it makes sense because of the weight and race together."* When considering race in isolation from BMI, Destiny was confused. After all, she had the same capacity to give birth as a White woman. Echoing the history of Black women being excluded from the category of "woman" (hooks, 2015), Destiny asserted, *"I am female. I have a uterus and the goal is to have children so I didn't think that me being a different color or a different race played a part in it. Because a lot of Black women have babies vaginally."* Body size on the other hand, *"That makes sense because we [Black people] don't eat right. [White women] were taught to eat better than we do. So, it makes sense."* By definition, race and BMI independently contributed to Destiny's calculator score, a double penalty, but Destiny counted them as one. Because the midwife focused solely on BMI, Destiny accepted the calculator's guidance and she understood that the calculator only penalized Black women for their weight.

Other women questioned whether the calculator's use of BMI was a relevant indicator for overall health and capacity to give birth. Beatriz worked as a Grand Canyon tour guide and was in solid shape. *"I'm very against BMI because there's "obese" on all my files through all my care. I'm five foot two I weigh like 160 pounds, you know, but I'm very muscular, curvy, but muscular."* Beatriz pointed out how the BMI did not capture the diversity of human forms, glossing over differences in fat distribution, muscle density, and overall fitness (Nuttall, 2015). Still other women proposed that the BMI, as a Eurocentric standard, pathologized Black, Hispanic, and Pacific Islander women's body sizes. Finally, some women whom the calculator categorized as having elevated BMI's argued that they could be fit and healthy at any size. In other words, VBAC candidates in this study argued that the relationship between weight, health, and one's ability to give birth was much more variable.

Even though Destiny thought her body size might disadvantage her, she committed to her goals of a healthier diet and preparing her body for labor and birth. Despite the calculator's framing of Destiny's race and BMI as non-modifiable risk factors that fixed her probability for a successful VBAC, Destiny creatively sought ways to influence the outcome of her birth, which included finding an Ob/Gyn who supported her goals for a VBAC. When Destiny arrived on the labor floor for an induction of labor, the on-call Ob/Gyn phoned to consult with Destiny's primary Ob/Gyn. *"The colleague contacted me that she was going to go along with the plan, however, she did not think that the patient had been appropriately counseled."* If a provider supported a woman like Destiny, who at 12% had an extremely low score, the provider's clinical judgment could be called into question. Still, Destiny's Ob/Gyn advocated for Destiny's agreed upon birth plan. Destiny's Ob/Gyn had extensively discussed with her the risks and benefits of

planning a VBAC, and she believed Destiny was well-informed about her birth options and said as much to her colleague, who was now attending Destiny's birth.

Unaware of the behind-the-scenes controversy surrounding her case, Destiny progressed through her induction of labor, reached full dilation, and began to push. Having never experienced a vaginal birth, Destiny started to doubt herself. *"I had been pushing for almost 40 minutes. I was exhausted. But something told me like push. I did it. I knew I could do it."* Like many VBAC candidates who chose to attempt a VBAC regardless of their low scores, Destiny turned toward her own fortitude for encouragement, as opposed to the calculator's risk assessment. Ultimately, Destiny succeeded in her VBAC, and the combination of a supportive provider with a motivated VBAC candidate together proved a potent challenge to the calculator's automaticity.

Discussion

The study of obstetrics and gynecology contributed to the foundations of scientific and medical racism in the United States (Cooper Owens, 2017). Over the course of the last decade, Black women led and forced a reckoning with the ways in which racism, not race, produces inferior outcomes for Black women and their newborns, including avoidable death (Bridges, 2020; Crear-Perry et al., 2020; Davis, 2018; K. A. Scott, 2021). Increased awareness around racism ran in parallel to the U.S. obstetric profession adopting a VBAC calculator that discriminated on the basis of race, speaking to the powerful role that technology plays in upgrading and automating racism (Benjamin, 2016).

While some have expressed concern that the VBAC calculator might systematically disadvantage Black and Hispanic women (Vyas et al., 2019), this is the first qualitative study to document how that disadvantage got operationalized. The routinized use of race in

epidemiological modeling informed an evidence-base that proved a powerful vehicle for providers to adopt a discriminatory tool into practice (Shim, 2002). The evidence-based nature of the calculator initiated a series of automatic behaviors, as providers who wanted to appear as if they were following current guidelines adopted the calculator. Furthermore, prior to the invention of the calculator, obstetricians already perceived VBAC care in the U.S. to be an area of significant malpractice liability (Cox, 2011). Thus, new evidence-based VBAC standards propagate rapidly, as those standards became norms against which to judge medical negligence (Kukura, 2010). The MFMU researchers' use of race as a risk factor informed a risk logic that crossed multiple domains, beginning with epidemiologic modeling, then extending into clinical decision making, and eventually becoming woven into discussions around legal liability and bioethical notions of informed consent (Weir, 2006).

Providers used the VBAC calculator to coerce women with perceived low scores into scheduling repeat cesareans, compounding a situation where many VBAC-interested people are already challenged to access care that supports their goals (Basile Ibrahim et al., 2021). A survey confirmed the calculator's coercive tendencies, with 1 in 5 CNMs reporting that the calculator was used to talk women into cesareans (Thornton et al., 2020). The pressure to undergo cesareans for a perceived low calculator score represents another example of racism in maternity care denying agency to women of color (Altman et al., 2019). In this specific instance, the racism of the calculator extended to all women who found themselves to have a score below 60%. However, the calculator's racism especially exposed Black women to the negative consequences of cesarean overuse (Campbell, 2021). Because the MFMU group folded Black women's avoidable morbidity into the development of the 60% cutoff score (Mehta et al., 2020),

it's possible the calculator could have worsened outcomes for Black women, an area for future investigation.

American guidelines encourage women to choose their mode of birth after a first cesarean (ACOG, 2019). However, the calculator complicated the notion of free choice. Even in the absence of coercion, the calculator structured differential choices through a proliferation of terms designed to encourage or discourage VBAC candidates on the basis of race. Furthermore, the calculator's medical racism operated through the notion of free choice. Again, in the absence of coercion, when some women interacted with the VBAC calculator they chose to racialize themselves into the Black or Hispanic categories. While subjective commitment predicts actually attempting a VBAC (Kaimal et al., 2019), subjective commitment is mediated by differential access to supportive resources, from the psychological to the financial, which help to sustain commitment. Through the selective sharing of information (Altman et al., 2019), the VBAC calculator chipped away at subjective commitment, especially for women with perceived low scores. In the future, researchers and clinicians could examine how exposure to a more robust discussion around the multiple patient, provider, and hospital factors that influence successful VBAC might alter the patient's level of subjective commitment.

A limitation of this study was that many Black pregnant participants were cautious to go on the record with a White male obstetrician during recorded interviews. Revealing discussions about racism tended to happen when I shut off the recorder, and it was in these interactions that I realized my own limitations in gathering qualitative data with Black women about anti-Black racism. The data collected from the two institutions which required use of the calculator was limited to 6 interviews which concerned controversial cases (e.g. a provider who supported a woman in pursuing a VBAC despite having a low score). Thus, the data lacks the perspectives

of Black and Hispanic women who wanted a VBAC but decided to have a repeat cesarean due to a perceived low chance of success. Finally, because this analysis focused on the automation of racism, less space was dedicated to the ways in which participants disrupted the calculator's automaticity.

Amidst calls for the abolition of race-based medicine (Chadha, Lim, Kane, & Rowland, 2020), the MFMU researchers developed a new calculator that excludes race/ethnicity (Grobman et al., 2021). While a partial step forward, the results from this research suggest that additional work may be necessary to address the ways in which VBAC calculators now factor into providers' clinical reasoning. Even in the presence of a new calculator, providers may continue to make racialized judgements in their sorting of VBAC candidates.

While removing race from the VBAC calculator may be a welcome first step, the complete de-implementation of the VBAC calculator, as well as the other race-adjusted clinical algorithms currently in use, will likely require coordinated efforts across medicine, public health and civil society. For example, the New York City Health Department recently formed the Coalition to End Racism in Clinical Algorithms, also called the CERCA (Lanza & Logan, 2021). The CERCA brings together hospital leaders, clinicians, and public health professionals with the purpose of evaluating the de-implementation of three race-adjusted algorithms used in nephrology (estimated Glomerular Filtration Rate, or eGFR), pulmonology (Pulmonary Function Tests, or PFTs), and obstetrics (the VBAC calculator).

While, removing race will help mitigate the old VBAC calculator's most negative consequences, racism might continue to operate implicitly in the calculator (Obermeyer, Powers, Vogeli, & Mullainathan, 2019). Racism may explain in part why Black and Hispanic women compared to White women undergo more unnecessary primary cesarean births (Edmonds,

Hawkins, & Cohen, 2014; Washington, Caughey, Cheng, & Bryant, 2012). Because the new VBAC calculator treats every prior cesarean as if it were clinically necessary, more Black and Hispanic women become implicitly eligible for entry into a VBAC prediction tool.

Furthermore, two of the new calculator's variables, BMI and treated chronic hypertension, are shaped by structural and interpersonal racism. For example, neighborhood lethal policing is associated with a greater risk of hypertension and obesity in women (Sewell et al., 2021). The incorporation of these two variables could mean that Black and Hispanic women are implicitly concentrated in the lower score ranges of the new calculator. Although BMI and hypertension may have a plausible clinical relationship to successful VBAC, the new calculator disconnects risk factors from structural forces and shifts responsibility for a successful VBAC onto the individual (Shim, 2002). The new calculator continues to unfairly presents a free choice while concealing factors that contribute to successful VBAC, many of which, like hospital culture and racism, may be beyond the control of any individual (Triebwasser et al., 2019). A fairer and more just VBAC calculator must pay attention to the explicit and implicit ways that racism structures the risk of a primary cesarean, the quality of postoperative care, and clinicians' willingness to respect a woman's care preferences. Without a critical analysis of the multiple ways in which the use of primary and repeat cesareans in the United States have become racialized, the possibility remains that *any* VBAC prediction could automate inequity (Obermeyer et al., 2019).

Chapter 3: Beyond numeric risk: an ethnographic study of the multiple influences into mode-of-birth decision making

Introduction

Cesarean section can be a life-saving intervention for birthing people as well as for their newborns. However, the U.S cesarean rate rose over the last 20 years to 1 in 3 births, and no population health benefit has been found when cesarean rates exceed 10-15% (A. P. Betran et al., 2015; CDC, 2019). New data has documented the short- and long-term risks to maternal and newborn health of cesarean section (Sandall et al., 2018). One reason the U.S. cesarean rate remains high is due to a decrease in number of vaginal births after cesarean (VBACs).

Attempting a VBAC is a safe and reasonable option, and many believe that increasing the VBAC rate could help reduce avoidable maternal morbidity (Cunningham et al., 2010; Leonard et al., 2019). After a first cesarean, 50% of birthing people in the United States are interested in a VBAC, but only 17% end up trying (Declercq et al., 2014). The majority will have an elective repeat cesarean delivery (ERCD) for their subsequent births (CDC, 2019).

Many birthing people who are interested in a VBAC live far from a hospital that offers VBAC; some 50% of counties may not have a VBAC-offering hospital (Leeman, Beagle, Espey, Ogburn, & Skipper, 2013). In the late 1990s and early 2000s, a significant number of hospitals stopped offering VBAC because they did not have the resources to comply with new standards that required hospitals to have a surgical team immediately available for the duration of an attempted VBAC in order to deal with the unlikely event of a uterine rupture (Barger et al., 2013). However, even in VBAC-offering hospitals, the number of women attempting a VBAC has declined, likely due to a combination of hospital, provider, and patient factors (Grobman et

al., 2011; NIH, 2010). Women report that providers deny requests for VBACs for medical reasons (45%), due to an unwillingness to provide the service (25%), or hospital protocols (15%) (Declercq et al., 2014). Another factor may be that birthing people receive inaccurate information about the risks and benefits of VBAC and ERCD, and as a result, do not seek VBAC. In 2010 a NIH consensus statement recommended that VBAC counseling should be “evidence-based, minimize bias, and incorporate a strong emphasis on values and preferences of pregnant women (NIH, 2010).” Researchers proposed that decision-support tools could increase the VBAC rate by giving women evidence-based and numeric information about the risks and benefits of ERCD and VBAC (Horey et al., 2013). However, to date decision-support interventions have not proven effective in moving more birthing people to attempt a VBAC (Kuppermann et al., 2020).

Decision-support interventions work from the perspective that the choice to plan a VBAC or schedule an ERCD starts with the accurate communication of numeric risk (Kaimal & Kuppermann, 2010). After the accurate communication of the numerically small, but distinct, maternal and fetal risks associated with VBAC and ERCD, provider and patient can deliberate from a shared foundation and rationally decide together which mode of birth best reduces maternal/fetal risk (Allison Shorten, Chamberlain, Shorten, & Kariminia, 2004). For example, the risk of uterine rupture, which occurs in 0.7% of planned VBACs, is an essential component of mode-of-birth counseling, as 1 in 12 ruptures can result in permanent neurologic injury or death to the fetus (Landon & Grobman, 2016). Given this risk to the fetus, the choice for or

against VBAC or ERCD depends, in large part, on whether an individual prefers to avoid or assume the risk of uterine rupture.¹⁵

While women do use numeric information about maternal/fetal risk to make mode-of-birth decisions (Kaimal et al., 2019), the exclusive focus on reducing maternal/fetal risk has been criticized on multiple levels. First, the focus on so-called objective outcomes like maternal/fetal morbidity “vanishes” other outcomes that women value and go unmeasured, especially those pertaining to maternal subjectivity, the interconnectedness of the mother-baby dyad, and long-term and psycho-social outcomes (Wendland, 2007). Second, decision-making in pregnancy is far more expansive and dynamic than a single numeric risk/benefit analysis aimed to reduce morbidity (Downe, Finlayson, Oladapo, Bonet, & Gülmezoglu, 2018). Women often align with a particular birth philosophy, consult their personal and familial histories, involve emotions and the body, and invoke notions of good/bad parenthood (Yuill, McCourt, Cheyne, & Leister, 2020). Women value *how* birth is conducted, including issues related to control, agency, respectful care, racism, and physical safety (Davis, 2018; Lyerly, 2013). This is not to say that women’s choices and responses to numeric risk are limitless; women in the United States approach decisions in pregnancy with a defined set of dispositions that inform how to apply “technology” and “nature” in their efforts to reduce risk and ensure safety (A. C. Miller & Shriver, 2012).

¹⁵ It’s important to point out that the focus on the fetal risk of uterine rupture has been much criticized for its fetal bias which eclipses the short and long-term risks of cesarean section to the mother and to the newborn. These risks are well-documented and include short-term respiratory complications for the newborn, altered microbial colonization of the newborn’s intestinal flora, and rare injury to the fetus during cesarean. For the mother, cesarean carries increased risk of infection, organ injury, hemorrhage, anesthesia complications, future problems with abnormally adherent placenta, long-term increased risk of hysterectomy, and the escalating risk of multiple cesareans leading to increased risk of mortality. See Wendland 2007 for additional discussion on fetal bias in evidence-based obstetrics and see Sandall 2018 for a thorough review of cesarean section’s impact on short- and long-term health.

Much prior mode-of-birth research presumed numeric risk information to be the most important decision input. As a result, scarce data exists as to whether and how women actually use numeric information about risk in mode-of-birth decisions. So too, research is lacking as to how non-numeric elements influence mode-of-birth decisions. In order to examine the influence of non-numeric inputs and their relationship to numeric inputs, an exploratory and ethnographic study was designed. We explored how prior birth experiences informed a preference for a VBAC or repeat cesarean, as well as how that preference, once formed, influenced the ways in which women interpreted and acted upon numeric risks. Finally, we explored aspects of the birth experience that went beyond a strict numeric risk-benefit analysis.

Preferences and decisions related to mode of birth

Research into decision-making in childbirth has demonstrated the diverse ways in which birthing people across time and cultures assign different meanings to the role of technology in birth, to the role of the care provider, and to place of birth (Basile Ibrahim et al., 2021; S. Vedam et al., 2019; Yuill et al., 2020). Women in the U.S. approach decision-making in pregnancy with a defined set of preferences. Care preferences, which inform decision making, can be thought of as a limited set of “tool kits” that women dip into when they encounter new information. Preferences do not fully determine decisions; for example, in the face of limited options, women can decide to go against their preferences (A. C. Miller & Shriver, 2012).

After a first cesarean, the favorability of cesarean as a mode-of-birth increases (Dweik, Girasek, Toreki, Meszaros, & Pal, 2014). The preference for a mode of birth appears to take shape in the months post-cesarean and endures into the next pregnancy. Attanasio and colleagues surveyed women in the 12 months after a first cesarean and found that on average 45% were interested in a VBAC (Attanasio et al., 2017). Kuppermann and colleagues found that in the first

and second trimester of the pregnancy that followed a first cesarean 47.6% of pregnant people expressed interest in a VBAC, and mode-of-birth preference appeared to be stable over the course of the pregnancy with a similar percentage (44.8%) ending up attempting a VBAC (Kuppermann et al., 2020). Thus, the preference for a VBAC or an ERCD appears to be well-formed and stable by the middle of the next pregnancy.

On average, preferences appear to be well-formed and stable, but important differences can be found between and across groups. For example, Attanasio and colleagues also found that 74% of Black women and 53% of Hispanic women preferred a VBAC compared to 42% of White women. Having a difficult post-operative recovery, wanting the experience of a vaginal birth, and desiring a larger family informed a preference for VBAC (Attanasio et al., 2017). Thus, varying and potentially inequitable experiences with the first cesarean and different reproductive intentions can produce different levels of interest in a VBAC (Johnson et al., 2019). A preference for VBAC is also tied to wanting less medical intervention, while women who wanted an ERCD had more concerns over long-term sexual function. Finally, women who wanted a VBAC tended to value the opinions of other people like family and friends about the mode of birth (Kaimal et al., 2019).

In addition to the numeric risk of uterine rupture, another standard numeric component of VBAC counseling is the probability for a successful VBAC (Wu et al., 2019), as a failed Trial of Labor After Cesarean (TOLAC) can be associated with higher complication rates (Grobman et al., 2009). One “VBAC calculator” designed by the Maternal Fetal Medicine Units (MFMU) Network entered widespread use in the United States over the last decade (Thornton et al., 2020). The VBAC calculator used six factors, including maternal age, race/ethnicity, and BMI to predict the probability for a successful VBAC (Grobman et al., 2007). The MFMU researchers designed

the VBAC calculator so that clinicians and women could make more informed decisions about the risks and benefits of different modes of birth. However, the latest decision-support trial, the first to include a VBAC calculator, did not increase the number of women attempting a VBAC (Kuppermann et al., 2020). Given that the preference for a mode-of-birth is already well-formed and that numeric risk information does not appear to influence birth preference in the next pregnancy, we undertook this exploratory ethnographic study to examine the factors that influence birth preference formation. We also sought to understand how birth preference influences the ways in which women interpreted and responded to the standard numeric risks commonly discussed in VBAC counseling in the United States.

Materials and Methods

This study was a secondary analysis of interviews and prenatal visit recordings generated as part of a larger ethnographic inquiry that assessed the impact of a VBAC calculator on the decision-making processes of a diverse group of 31 pregnant and postpartum women. In the parent study, all of the participants had undergone a prior cesarean, were over the age of 18, spoke English or Spanish, and gave birth across four different institutions.

Sample: This analysis concerned the experiences of 25 pregnant women who enrolled at one institution in Northern California. We limited the analysis to this one site because it was at this site that women consented to and accepted our invitation to have their prenatal visits recorded, which allowed for a deeper analysis of how women responded to prenatal discussions of numeric risk. The 25 women were followed over the course of their pregnancies; women had to complete at least one interview to participate. Of these 25 women, 5 had prior vaginal births, and 1 woman had a prior failed TOLAC. Ultimately, 8 women scheduled an ERCD; 8 desired a

TOLAC and then had an unscheduled cesarean delivery; 9 women desired a TOLAC and had a successful VBAC (7 planned hospital; 2 planned home birth with one hospital transfer).

Data collection. Data collection began in September 2019 and concluded in December 2020. Women participated in 1-5 data collection events with a total of 74 data collection events (interviews, observations, prenatal visit recordings). 13 prenatal care visits were digitally recorded in their entirety by leaving the recorder in an unobtrusive place in the exam room. The recordings were offered only to the first 15 participants; video visits instituted in the wake of COVID-19 restrictions made it difficult to arrange additional recordings.

Semi-structured interviews with women occurred over the phone, in person, or via Zoom. Interviews focused on the circumstances that led to the first cesarean, their experiences during the cesarean, their emotional and physical recoveries, significant events between pregnancies, as well as influential family members and social media resources. The interviews gave participants space to debrief interactions with prenatal care providers, review hopes and fears for their upcoming births, and share significant events that occurred during their ultimate cesarean or VBAC through a final postpartum interview. Because the parent study followed women through the course of their pregnancy and postpartum journeys, extensive data were collected about women's decision processes around mode of birth. The interview guide became more focused over the course of the study in order to confirm or refute emergent themes. Near the end of the study, theoretical sampling helped to refine the findings and to reach data saturation. The interviews and prenatal visits were transcribed verbatim and analyzed using Atlas.ti, qualitative analysis software. In reporting the findings, all participants were given pseudonyms to protect their identities.

Analysis: The analysis followed the method of grounded theory (Charmaz, 2014). Analysis began from the very start of data collection and continued throughout. An open coding process was used in order to ascertain preliminary themes, and using the constant comparative method, preliminary themes were tested within and across interviews as more data was gathered. With ongoing data collection these preliminary themes were assembled into codes; these codes were then merged and clustered through additional re-readings of transcripts. Following a grounded theory approach, we did not see our themes as “emergent,” as the coding process relied on previous work that defined the different approaches that U.S. women take when dealing with issues of risk and safety in childbirth (A. C. Miller & Shriver, 2012), as well as prior work on what matters to women in childbirth (Lyerly, 2013; Yuill et al., 2020). Building on this prior work, in our coding process we examined issues related to uncertainty, the body, and temporality. We examined the processes which informed the construction of a preference for a given mode-of-birth. We then examined how this initial preference intersected with numeric and non-numeric elements that women incorporated into their decisions as the pregnancy unfolded over time. Results are presented in the form of representative ethnographic cases using pseudonyms to protect participants’ privacy.

Findings

Table 3. 1 Participant demographic and other information

Participant feature	Statistics
Age	Mean 35 (28-41)
Race/ethnicity	White: 7 Hispanic: 9 Asian: 2 Black: 3 Native American: 1 Multiracial: 3
Prior cesarean indication	Breech/Twins: 5 Fetal: 10 Labor arrest:10
Intended and actual mode of birth	Preferred cesarean, then ERCD: 8 Preferred VBAC, then unplanned CS: 8 Preferred VBAC, then successful VBAC: 9
Health Insurance Status	22 Private / 3 Public

Finding 1: The importance of prior birth experiences in shaping mode-of-birth preferences

The first cesarean, as the only prior birth experience for most women in this study, anchored the eventual preference for VBAC or repeat cesarean. In particular, physical experiences during, before, and after the first cesarean significantly shaped the mode-of-birth preference. By physical experiences, I refer to several elements: the extent to which women experienced labor contractions, if at all, prior to the first cesarean; the quality of anesthesia during and after the surgery; and, the presence or absence of maternal or newborn complications. The prior birth experience encompassed the ways in which women explained the cause for the cesarean to themselves. In the months, weeks, and even years afterwards women reflected upon the level of vulnerability they experienced during and after the first cesarean, and many acquired new methods of coping with the potential for a future cesarean. An overall assessment of the physical experiences, vulnerability, and coping mechanisms significantly shaped an initial, and often strong, preference for a mode-of-birth.

The different circumstances around, indications for, and anesthetic approaches to the first cesarean produced a variety of physical experiences. For some women who had their first cesareans scheduled before labor started, as for a breech-presenting fetus, lack of experience with the sensations of labor produced a preference for ERCD. For others, that same lack of experience resulted in a longing for the sensation of contractions and a preference for VBAC. Women who had cesareans for a labor arrest diagnosis often recalled the exhaustion of their protracted labor course, which impacted their initial newborn bonding experiences. While for some a desire to feel less exhausted at the moment of birth could sway toward a cesarean, for others a VBAC represented the possibility of a more alert state.

Other elements related to the first cesarean also shaped mode-of-birth preferences. If the first cesarean had been scheduled, these cesareans tended to have higher quality anesthesia, imparting a sense of control. In contrast, some women who had unscheduled cesareans during labor reported more unnerving physical experiences during the surgery itself, including nausea/vomiting, uncontrollable body shaking, and poorly controlled pain. While negative physical experiences with pain control pushed some women to plan a VBAC, other women still sought a cesarean. Some women experienced general anesthesia and remembered waking up suddenly in the recovery room with a baby in their arms, feeling as if they had missed an important transition into motherhood. In such instances, a desire to be awake and present in the next birth could inform either a preference for VBAC or ERCD.

Most of the women personalized the cause for the first cesarean as a result of their own physical failures (e.g. “I have a small pelvis” or “I was too tired to push.”). The ways in which women personalized the cause for the first cesarean sometimes led to fixed notions about one’s ability to give birth in the future, thus favoring an ERCD (e.g. “Maybe I just make breech

babies.”). Other women personalized the cesarean in less fixed ways, demonstrating a more malleable approach to their future ability to give birth, which kept the option for a VBAC open. Only two women, both of whom preferred VBAC, refused to personalize the cesarean as due to their own physical failures. Instead, these two women placed blame for the cesarean on faulty obstetric technologies or poor quality care.

In the weeks, months, and even years after a woman’s first cesarean, an ultimate assessment of that experience, in combination with any other prior birth experiences, influenced the preference for a mode-of-birth in subsequent births. For many, the cesarean was their first brush with the vulnerability of bodies, and the temporary incapacity from the cesarean frustrated their desire to feel capable as new mothers. Several women experienced trauma, depression, and anxiety due to poorly controlled pain or lack of postpartum social support. Mental health issues prolonged the time it took to process the cesarean, leading several women to delay their next pregnancies for years. Many of the women talked about discovering new coping mechanisms as a result of their first cesarean; they emerged knowing more about how to better cope with health issues and how to recover from surgery while caring for a newborn. By the time women entered their next pregnancies, their physical experiences with the first cesarean and recovery, combined with an assessment of vulnerability and coping mechanisms all informed a mode-of-birth preference.

The impact of the first cesarean loomed large especially for those women who had never experienced a vaginal birth. The five women who experienced both vaginal birth and cesarean were better equipped to compare and contrast both options, and thus, were more secure in their preference for a VBAC. All five of the women who had prior experience with vaginal birth planned a VBAC, though two of the five eventually had unplanned cesareans due to new

obstetric complications. One woman in the study had a prior failed TOLAC and highly desired an ERCD. Other than these 6 women who were in their third pregnancies over the course of the study, the other 19 women had one prior birth and one prior cesarean. Because these 19 women had only ever undergone a cesarean as their prior mode of birth, the physical experience of that cesarean served as the benchmark, default option. Even if that previous cesarean had been a negative experience, the physical fact of never having had a vaginal birth was highly influential in the face of risk and uncertainty.

To illustrate these points, I contrast how different experiences with the first cesarean informed divergent preferences for Layla and for Justine. Layla identified as African-American, had a complicated first cesarean and recovery, ultimately expressing a strong preference for a VBAC. During her first cesarean Layla lost a large volume of blood, and the surgical team almost did a hysterectomy to control her bleeding. Layla was discharged from the hospital only to be readmitted days later with a splitting headache and severely elevated blood pressures. While readmitted she was separated from her newborn, and the separation combined with all these complications provoked significant anxiety. Thankfully, Layla's parents cared for her newborn son, which was critical for her physical and emotional recovery. The first six months after her son's birth had been such a *"roller coaster"* that Layla told her doctors early in her next pregnancy, *"that the only reason why I don't want another C-section because my recovery was awful."* At end of her second pregnancy, Layla was admitted for high blood pressures and she opted for an ERCD rather than face the prospect of an induction of labor, remembering that her first labor had been prolonged and ultimately led to a cesarean.

In contrast, Justine, who identified as White and had a prior cesarean for breech, described her surgery and uncomplicated recovery as *"fantastic."* Justine began her second

pregnancy with a preference for repeat cesarean. Justine’s providers actually tried to encourage her to attempt a VBAC because they saw her as someone with a high probability for a successful vaginal birth. The numeric probability factored little for Justine. Because her cesarean had been performed before labor started, the thought of experiencing uterine contractions was foreign, even scary. *“I just feel like there's so much that's unknown to me when I already know how terrifying it is to have another child that for me a C-section feels safe.”* As a known scar, the cesarean represented certainty. On the other hand, Justine also wondered whether the new physical experience of spontaneous labor would shift her preference toward VBAC. *“I think that if I were to go into labor, I probably would just continue that route.”*

Layla and Justine demonstrate how prior experiences with pain, labor, and the anticipation of pain and labor, contributed to a strong, pre-existing mode-of-birth preference. Neither woman’s preference was altered by non-experiential data about numeric risk. Layla and Justine both show how new physical experiences, or the heightened anticipation of certain physical experiences, can shift these preferences, even in the final weeks of pregnancy.

Finding 2: Women interpreted numeric data through their preference toward VBAC or ERCD.

In their next pregnancies, women interpreted numeric data through their often strong and pre-formed mode-of-birth preference. Providers introduced numeric data when they discussed the standard risks of VBAC compared to ERCD; numeric data also resulted from a series of ultrasounds and prenatal screening and diagnostic tests. Those most committed to their mode of birth were unphased by most numeric data. However, sometimes numeric data challenged a participant’s mode-of-birth preference, especially when numeric data referred to the risk of a complication that one had never experienced. Unless she had direct experience with a specific complication, processing the risk of a complication usually meant conjecturing outside of

her prior physical experiences. In such instances, many women sought additional information, which included stories from friends, family, and social media forums about physical experiences, in order to translate numeric data into physical experience, even if those experiences were not one's own.

Traditionally, a 0.7% chance of a uterine rupture is one of the standard risks discussed in VBAC counseling (ACOG, 2019). Whether and how women should consider the *fetal* risk of uterine rupture in their mode-of-birth decisions has been one of the most controversial issues in VBAC care in the United States (Kukura, 2010). The controversy centers on whether the foreknowledge of a VBAC's risk to the fetus should translate into the "responsible" choice to have a repeat cesarean (Phelan, 1998).

Given how well formed many women's preferences were for a particular mode of birth, few changed their preference based on the risk of uterine rupture. For example, the risk of uterine rupture did not factor for someone like Valentina, who highly desired the "*empowering*" experience of a VBAC. In one prenatal visit, Valentina's provider discussed uterine rupture in detail, including the dramatic scenario of the fetus being fully extruded into the mother's abdomen. Valentina responded to that discussion saying that she wasn't the type of person to dwell on the "*what ifs.*" Lingering over the rare risk of uterine rupture would have distracted Valentina from the extensive preparations she was taking for her VBAC.

If a woman already preferred an ERCD, the discussion of uterine rupture reinforced this preference. For example, in a recorded visit Justine's provider discussed the risk of neurologic damage and death for the fetus during a uterine rupture. Justine had a platelet disorder that could impair her clotting ability, and in a follow-up interview Justine worried that uterine rupture posed a *maternal* risk for excessive bleeding. Therefore, she continued to prefer an ERCD due to

the procedure's perceived safety and control, but she personalized the risk of uterine rupture different from the dominant approach that specifies rupture as a fetal risk.

Nicole was the only person in the study who experienced a tension between her preference for a VBAC and the *fetal* risk of uterine rupture. Nicole's approach underscores again the importance of prior experiences. Because Nicole experienced contractions before her first scheduled cesarean for breech, she had confidence in her physical abilities to give birth. *"I feel like my odds of a successful VBAC are a little bit higher because I know that I dilated. I know that my body kind of knows what to do."* As a White woman, the VBAC calculator also predicted that Nicole would have a higher probability for a successful VBAC. While Nicole leaned toward a VBAC, she felt that as a trained scientist she needed comparative data on ERCD. Despite her confidence around VBAC, her lack of experience with vaginal birth made her more susceptible to pro-cesarean data sources. *"I feel like I'm easily influenced just because I don't have a lot of personal experience. I'm not a doctor, I'm not a nurse, and I've only had one kid. So it can be hard to interpret all the data out there."*

In particular, Nicole sought out forums where women discussed their experiences with repeat cesarean and VBAC, surprising even herself with her desire for stories as someone who worked professionally with data. She found two social media groups, a pro-VBAC group that tended to de-emphasize the fetal risk of uterine rupture, and a pro-cesarean group that tended to emphasize the fetal risk. The pro-cesarean group advocated for responsible maternal conduct, the overall message Nicole described as, *"If you really love your baby, why don't you just have a repeat cesarean?"* Nicole worried she might be putting her baby at risk by attempting a VBAC, and discussions with providers didn't alleviate this concern. Nicole recalled how her providers parroted their standard spiel about uterine rupture, *"Oh, it's very rare. This doesn't usually*

happen, but it's good to be aware of 1%, blah, blah, blah." Still searching for more experiential data in the form of stories, Nicole turned back to the pro-cesarean social media forum, which numbered approximately 26,000 members, where several women shared personal experiences with uterine rupture.

Instead of exacerbating her fear, these actual experiences helped Nicole to contextualize and personalize the low risk of uterine rupture, and ultimately, to feel more at peace with planning a VBAC. *"From what I've gathered from the discussions, it sounds like, even in the case of a rupture, the outcome is still likely going to be a good one if you are in a hospital setting when it happens."* In addition to assuaging her fears, these stories helped Nicole to conceive a plan to arrive at the hospital early in the labor process so that her providers could monitor her for signs of a uterine rupture. As soon as she got to the hospital and the nurses placed her on the fetal monitor, she relaxed about the risk of rupture and progressed to a successful VBAC.

While Nicole was the only person who struggled with uterine rupture as a factor in her decision, her approach shows how many women in this study personalized numeric risk. Most of the time a strong preference toward VBAC or ERCD meant that few struggled to interpret and integrate numeric risks. Though Nicole had prior experience with both labor and a cesarean, the risk of uterine rupture posed a challenge because it was beyond her own physical experience. Like many in this study, Nicole found that other women's stories helped to incorporate numeric data.

Validation of numeric data with personal stories was essential for many in this study. Because of this two-step process, the introduction of numeric data tended to complicate women's deliberations instead of facilitating a cohesive birth plan. An ultrasound-derived estimation of fetal weight, results from diabetes tests, elevations in blood pressure—all could influence mode-

of-birth considerations. A positive diabetes test might shift one's preference toward an ERCD, as a diagnosis of diabetes might translate into a larger baby and a more difficult labor. As before, women interpreted new numeric data through prior experiences and their preferred mode of birth. Due to a battery of prenatal tests, numeric data came in at a regular pace, and for some, prolonged the final mode-of-birth decision until later in pregnancy.

For example, Chloe spent the first two-thirds of her pregnancy gathering numeric information about risks and benefits. The first provider she saw counseled her to have an ERCD, because of a low VBAC calculator score. Chloe identified as African-American and had a first cesarean for a failed induction of labor, two factors that according to the calculator's scoring system decreased her chances for a successful VBAC. Chloe rejected the race-based VBAC calculator, and she sought other research that did not use race to calculate the probability for a successful VBAC. Looking through this research, Chloe came to understand that her probability for a successful VBAC was around 50%, a sufficiently high number for her to plan a VBAC. However, she still felt that her numeric research did not yield the certainty she desired. *"Yeah. I mean, reading the research helps. I feel I got saturated, and just no paper told me, "You, yourself have X percent," or, "You, should do VBAC or not."* Because numeric data could not guarantee absolute certainty, numeric data without experiential data tended to complicate more than simplify mode-of-birth decisions.

Around 32 weeks of pregnancy, after making the final decision to plan a VBAC, Chloe realized that she'd possibly spent too much time scouring the research literature. *"I consumed a lot of information and cut myself off at a certain point."* The process of weighing numeric risks and benefits had possibly delayed Chloe from important emotional and physical preparations. *"Even though I have made the decision to try for a VBAC, I'm still really nervous...I'm flooded*

with the same anxieties and fear that I had preparing the first time around. So what will my body do?...Will it hurt? Where will I be when my labor starts? Do I feel prepared? Will I have enough support?" In order to address these anxieties, Chloe found a birth preparation course that gave her, *"an opportunity to think about what a successful [vaginal] birth will look like, and for me, just to feel grounded and like, 'Yeah, I can do this.'"* Several weeks later, Chloe developed high blood pressures, and her providers recommended an induction of labor. An induction of labor influenced Chloe to choose an ERCD, as her first cesarean resulted from a long and unsuccessful induction process.

Once again, when faced with significant changes to the anticipated physical experience of labor, Chloe switched her preference from a VBAC to an ERCD. After not finding a clear answer in the numbers, Chloe had to face all the unknowns of a vaginal birth, similar to her first birth. Even though ERCD also had a set of unknowns, like whether the recovery would be similarly painful compared to the first, ERCD did not have the same unknowns as VBAC. In fact, ERCD filled in the unknowns that a VBAC could not.

Finding 3: Conviction and support in VBAC journeys

Over and over, women with no prior history of vaginal birth checked in with their ability to face the unknown. As a result, choosing a VBAC was less a single numeric analysis of risks and benefits at one point in time. Instead, the decision to plan a VBAC was an ongoing encounter with uncertainty. In particular, one's conviction and supportive networks counteracted uncertainty during crucial moments. Women with the conviction, and importantly, often the resources, worked to increase their chances for a successful VBAC by changing hospitals, establishing care with providers whom they saw as more VBAC-friendly, committing to a program of diet and exercise, hiring doulas, switching care to a community midwife, and

resolving to avoid an induction of labor (if possible). Some women, less strong in their conviction, simply maintained hope that the second birth would be different than the first. Finally, many women built a network of supporters, and when faced with uncertainty, supporters reminded women of why they preferred a VBAC and encouraged them to keep trying.

As one of the few women who refused to personalize the reason for her first cesarean, Valentina strongly preferred a VBAC. As a result of having what she saw as an unnecessary cesarean, Valentina switched to a new hospital for her second pregnancy, hired a doula, and enriched her knowledge about different birth scenarios by listening to birth-related podcasts. During prenatal care, a provider introduced Valentina to the VBAC calculator. As a Mexican-American woman in her mid-30s the calculator predicted a probability for a successful VBAC of 54%. This 50-50 chance didn't match her level of commitment. "*I'm 100% into having a VBAC.*" The calculator introduced uncertainty, and Valentina responded with conviction. However, it's important to point out that not all women responded to the calculator with conviction like Valentina. It took effort and resources to sustain one's commitment to a VBAC, and the calculator whittled away at some women's confidence in their ability to have a vaginal birth.

With the COVID restrictions on hospital visitors coming into effect, In the final weeks of her pregnancy Valentina switched from a hospital to a home birth. She wanted her partner and son as a supportive presence during the birth, and she wanted to labor undisturbed by hospital routines, which again, had become complicated by COVID. While only two women planned a home birth in this study, Valentina's story nonetheless demonstrates how women who desired a VBAC used their skills and knowledge, as well as financial resources, to navigate uncertain and

dynamic circumstances. Not everyone was as bold in their conviction as Valentina, and in such situations when one's conviction wobbled, women fell back on supportive resources.

At the end of her pregnancy, because her Type 2 diabetes was proving difficult to control, Amelia was suddenly facing the prospect of an earlier induction of labor at 37 weeks, as compared to the original date of 39 weeks. Her perinatalogists supported Amelia's plan for a VBAC; in other institutions, some providers would have discoursed or even prohibited Amelia from attempting a VBAC due to a perceived low VBAC calculator result. As a Mexican-American woman in her late 30s with an elevated BMI, the VBAC calculator gave Amelia a 32% probability for a successful VBAC. Through the suggestion of her perinatologist, Amelia found a doula through a local non-profit, and together with her doula and her partner, Amelia crafted a birth plan. Despite a strong preference for a VBAC, when the induction of labor moved two weeks closer, Amelia started to get cold feet. So, she turned to her network of supporters. *"And I was like, "Maybe we'll just do the C-section and get it over with." And my partner helped me stay strong and remind me what I really wanted."* Amelia did go through with the induction and had a successful VBAC.

For Amelia, the decision-support came late in pregnancy as the prospect of labor became more real. Sticking to her decision in the face of uncertainty required reaching out for help. In that moment of hesitation, Amelia did not reach out for numbers. In fact, in an interview where I introduced the VBAC calculator Amelia said the result of 32% would have been discouraging. (Of note, Amelia's perinatologist did not introduce the calculator during prenatal care, possibly so as not to discourage Amelia). Thus, the "decision support" Amelia needed to move forward came not from numbers but from the people who knew her well and cared about her goals.

Finding 4: Beyond the decision: seeking a good birth

Especially for people who had negative experiences with their prior births, even after the official decision to attempt a VBAC or schedule an ERCD, additional work needed to be done to ensure that the upcoming birth would be better than the previous. Pursuing a good birth in the pregnancies that followed a first cesarean involved numerous considerations that were of equal importance to reducing clinical risk. A good birth could mean feeling connected with partners, families, and providers. Women also discussed the importance to a good birth of long-term health and psycho-social outcomes. Finally, whether in a VBAC or an ERCD, women valued control, agency, and physical safety.

For instance, Jennifer, a Chinese-American nurse used her knowledge of the health care system to create a feeling of safety around her repeat cesarean in an effort to counteract the trauma she experienced in her first birth. When Jennifer was in labor for the first time, a midwife abruptly came into the hospital room and recommended that Jennifer start Pitocin, without discussing the risks and benefits of the medication. *“I was very upset by that provider [the midwife] because I thought that she was taking away my autonomy, as a patient, to make decisions on my own.”* Even as a nurse herself who understood that providers were not always at their best, Jennifer couldn’t shake the feeling of having lost her autonomy. Eventually, Jennifer’s labor stopped progressing, and she transitioned into a cesarean. At one point during the surgery, Jennifer’s pain suddenly increased. *“I went from not feeling anything to feeling everything...and I just screamed.”*

As a result of the negative interaction with the midwife and the traumatizing surgery Jennifer valued continuity of care in her second pregnancy. *“I think the continuity of care would be very helpful because it's a provider that knows you... And I don't have to worry about having*

emotional or traumatizing conversations with another midwife.” Jennifer arranged for the same Ob/Gyn who did her first cesarean to do her repeat cesarean. In seeking a good birth, many women, like Jennifer, sought to influence *how* the birth was conducted and *who* was present in the room, goals that were not reducible to a numeric-risk benefit analysis.

In another example, Paula crafted a plan for a good birth that valued long-term functional outcomes. Paula had already had a successful VBAC, however, after her VBAC, Paula suffered from symptomatic pelvic organ prolapse. She approached her second VBAC with plans to protect her pelvic floor, recognizing that her providers were more concerned with reducing risk. *“Midwives and Obs and nurses, what is a successful delivery for them is a healthy baby out. That’s the main priority. Your pelvic floor is not their priority.”* Paula quizzed several providers about whether a scheduled cesarean could protect her pelvic floor, and the consensus was that the risk to her pelvic floor in another VBAC was “low,” and as a result, a repeat cesarean was not recommend.

Paula wanted more specifics than “low risk,” so she turned to social media forums where women discussed pelvic floor issues. She watched online videos that addressed optimal pushing positions, and during the pushing phase of labor, Paula used her new skills and knowledge to request that she be allowed to “breathe her baby out.” Paula hoped that this slower and less forceful approach to pushing would protect her pelvic floor. In our postpartum interview, Paula reported that her pelvic floor issues had not worsened and in fact were better compared to her first VBAC.

Of course, it’s difficult to prove the clinical effectiveness of Paula’s approach to protecting her pelvic floor with this one story. The point of Paula’s story is that even births that are low risk for complications raise important questions about what counts as a good birth. The

main metric for safety and success in VBAC is minimizing surgical risk. In contrast, for women like Jennifer and Paula, the goals of a good birth was to maximize their psychological and physical well-being.

Discussion

To understand how prior birth experiences and numeric data informed preferences and decisions around mode of birth, we conducted an analysis of qualitative data from interviews and recordings of patient-provider interactions. We found that experiences with the prior cesarean significantly influenced the preference for VBAC and ERCD. During the next pregnancy, women's preference for a mode of birth helped them to incorporate numeric data. When numeric data posed a challenge, many women sought stories to personalize the numbers. The decision to attempt a VBAC or schedule an ERCD was far more expansive and included multiple inputs, and was more prolonged, sometimes extending into the final weeks of pregnancy. Finally, after the formal decision to plan a VBAC or an ERCD, women pursued goals that kept their bodies safe and healthy in an environment that balanced issues of control and agency.

While this study confirms prior research that mode-of-birth preferences were well-formed by the middle of the next pregnancy (Kuppermann et al., 2020), this research does point out opportunities to potentially influence mode-of-birth preference. For instance, sub-optimal pain control significantly influenced mode-of-birth preferences. All women should have high-quality anesthesia during after their cesareans (Johnson et al., 2019); with more optimal pain control, women may approach their repeat cesareans with less fear. Also, women differed in the ways that they personalized the indication for the cesarean. Women who had more flexible interpretations of the first cesarean went on to attempt a VBAC; thus, working with women to develop a narrative around their first cesarean which leaves open the possibility that their bodies

might be capable of a different outcome could foster a more flexible mode-of-birth preference (Murphy-Lawless, 1998). The optimal time for mode-of-birth decision support has not been established (A. Shorten & Shorten, 2014), but this research suggests that decision support should and can begin as soon as the early postoperative period of the first cesarean.

This study also confirms previous research that mode-of-birth preference was stable for most women over the course of the pregnancy that followed the first cesarean (Kuppermann et al., 2020). While subjective commitment predicts actually attempting a VBAC (Kaimal et al., 2019), that subjective commitment does not exist in a vacuum. Subjective commitment is mediated by differential access to supportive resources, from the psychological to the financial, which help to sustain commitment (Chapter 2). This research did identify women who started off with a preference for VBAC and who then changed their decision to an ERCD later in pregnancy. The dynamic and embodied aspects of pregnancy have been underexplored in the informed-decision making literature (Yuill et al., 2020). Thus, the support for mode-of-birth decisions may need to be extended beyond a single risk-benefit analysis to include the uncertain terrain of later pregnancy. Continuity care models, especially midwifery led care, could prove useful in supporting VBAC candidates in navigating the uncertain terrain of later pregnancy, as a known provider more often understands the patient's goals and preferences and can help to integrate new clinical data (Sandall, Hatem, Devane, Soltani, & Gates, 2009).

This research suggests that helping women to identify and then pursue a good birth could shift preferences. A recent small RCT focused on producing a positive birth experience for women with a prior cesarean. The intervention included explicit communication of values and preferences, encouragement to thoroughly review birth options, and assistance in identifying what mattered most in their births. While this RCT was small, the authors found that focusing on

a positive experience helped more undecided women to plan a VBAC (Wise, Sadler, Shorten, van der Westhuizen, & Shorten, 2019).

Finally, this research found that stories helped to personalize risk and could influence mode-of-birth preference. In prior decision-support research women have requested to combine numeric and narrative data, but to date, no VBAC decision-support intervention has attempted to incorporate stories (Frost, Shaw, Montgomery, & Murphy, 2009). Also, more women who attempted a VBAC reported that the opinion of an “important other,” who was not a medical provider, influenced them in their decision (Kaimal et al., 2019). A systematic review of 13 trials which tested decision aids that combined testimonials, scripted narratives, documentaries, or enacted conversations found that people integrate factual information and stories to make health care decisions. However, it was unclear from the trials reviewed how this interplay could be maximized to ensure optimal health care decisions (Bekker et al., 2013), and the role of narratives in decision-aids remains an area of investigation (Shaffer, Focella, Hathaway, Scherer, & Zikmund-Fisher, 2018).

A strength of this study was its prospective design, which allowed us to follow the arc of mode-of-birth decisions and to examine multiple decision inputs as they arose in real time. Recordings of prenatal visits helped to confirm exactly how risks were discussed and to engage women more deeply in their responses to these discussions. However, this study reflected the experiences of a well-resourced and English-speaking group of participants giving birth at an institution that supported informed choice around VBAC and ERCD. Thus, the analysis may not reflect the experiences of women who are less-resourced and/or give birth in institutions that do not support a range of choices in pregnancies to follow a first cesarean. At the same time, this study fills an important gap as much of the previous literature on VBAC has

focused on the experiences of women who encounter barriers to accessing supportive providers (Basile Ibrahim et al., 2021).

The findings from this paper suggest several new avenues for a more person-centered approach to decision support that includes physical experiences and acknowledges (at least for some women) the dynamic nature of mode-of-birth preferences. In the postoperative period following the first cesarean, care providers could debrief with women the factors that contributed to the first cesarean, including provider, hospital, and individual factors. A thorough debrief could help to counteract some women's tendency to personalize the indication for the first cesarean into fixed notions around their ability to birth in a future pregnancy. In between pregnancies, providers should continue the conversation as women's thinking about the first cesarean evolves, with a focus on discussing how the experience of the first cesarean is influencing an early preference for a VBAC or ERCD. In between pregnancies, providers should also work to identify women who may be suffering from trauma, depression, or anxiety as a result of the first cesarean, as these women may need additional services and support.

Early in the next pregnancy, instead of assuming that all patients interpret the risks and benefits of VBAC and ERCD similarly, providers should work with women to understand what kinds of risks and benefits matter to them as individuals who have a specific physical experience with the prior cesarean. Providers can work with women to identify what a positive birth experience would mean to them given the experience of the prior cesarean. Rather than approaching the mode-of-birth decision as single risk-benefit analysis at one point in time, providers could continue to revisit how new information may or may not be shifting care preferences. Especially for women considering a VBAC, providers should emphasize building a supportive care team by involving partners, family members, or doulas. The continuous

midwifery care model, which emphasizes health-promotion and an individualized approach, could be uniquely suited to address the dynamic nature of mode-of-birth decisions and could serve as a model for future decision-support efforts (Niles, Vedam, et al., 2021).

To date, VBAC decision support tools, consisting of standardized information about the numeric risk of surgical complications, have not influenced women to attempt more VBACs (Horey et al., 2013; Kuppermann et al., 2020). The exclusive focus on surgical morbidity in VBAC decision support has been criticized as an *obstetric* preoccupation that obscures the complex and dynamic inputs that go into mode-of-birth decisions (Wendland, 2007).

Furthermore, under the guise of decision support providers have set the terms and the limits of mode-of-birth decisions (Rubashkin, Chapter 1), and they have reproduced racism through the selection of good VBAC candidates (Rubashkin, Chapter 2). It's time to shift away from a provider-centered approach focused on reducing surgical risk to an approach that encompasses the diverse and dynamic inputs that go into mode-of-birth decisions.

Conclusion

This dissertation aimed to critically analyze the invention and implementation of an obstetric technology, the MFMU VBAC Success Calculator. I used an ethnographic design informed by feminist and anti-racist methodologies to demonstrate the partial perspective and contested terrain of the VBAC calculator. Far from being an objective tool with universal appeal and applicability, in my first chapter, I revealed the VBAC calculator to be a distinctly *obstetric* technology to the uncertainty of planning a VBAC. I brought the calculator into dialogue with a range of ways that women experienced uncertainty while planning their VBACs. I argued that the VBAC calculator marginalized less invasive approaches to this uncertainty through, for example, the calculator's problematic logic of non-modifiability.

In my second chapter, I argued that the VBAC calculator automated racism by systematically giving lower scores to Black and Hispanic VBAC candidates. Providers propagated the calculator, rapidly bringing the tool into the clinic by integrating it into the EHR, writing it into hospital consent forms, and factoring the calculator into their clinical reasoning. The calculator resulted in the proliferation of new statistical terms used to encourage White and Asian women as ideal VBAC candidates, while Black, Hispanic, and some multi-racial women were discouraged as bad candidates for attempting a VBAC. The multi-factorial model of disease worked to rationalize the use of race in the calculator, while users of the calculator, both providers and women, postulated that the calculator's other factors explained the salience of race to the statistical model.

Finally, in my third chapter, I critiqued the standard approach to mode-of-birth decision making in which providers and women deliberate together about numeric risks and benefits of VBAC and ERCD. I explored the subjective, physical, and temporal elements that women

mobilized to make decisions about whether to attempt a VBAC or schedule an ERCD. I provided a more robust account of how the decision to attempt a VBAC continues to unfold over the course of pregnancy, as opposed to a single rational risk/benefit analysis at one point in time. I propose that the decision to plan a VBAC can be better conceptualized as an ongoing encounter between uncertainty and determination. As a result, the decision support that women need to successfully navigate uncertain terrain may need to begin with debriefing the first cesarean early in the recovery process and be extended into the final weeks of the next pregnancy.

Implications for Global Health: cesarean reduction efforts

The global overuse of cesarean section has exploded in parallel with the rise of evidence-based obstetrics in the Global North and the movement toward universal facility-based childbirth in the Global South (Boerma et al., 2018). In the Global Health context, the circulation of evidence across borders now happens rapidly. One of the crown jewels of evidence-based obstetrics, the multi-country RCT the Term-Breech Trial that Wendland critiqued in 2007, resulted in near universal cesareans for a breech presenting fetus (>85% high HDI countries; <75% medium HDI; <60% low HDI) (Vogel et al., 2015).

The VBAC calculator also quickly entered into global professional obstetric circles and set off a chain reaction in diverse national contexts, from Canada to Sweden, from Colombia to Iran. Research groups in diverse countries have validated the VBAC calculator, changing little the fundamental structure of the calculator in the process. The VBAC prediction models developed in other countries continue to exclude subjective level of commitment and to rely on individual factors (Wu et al., 2019). With the exception of one study in Sweden, all these validation studies exclude health system and provider elements that support or hinder successful VBAC (Fagerberg et al., 2015).

In this dissertation, I have argued that VBAC prediction models expand the indications for surgical birth. Under conditions of cesarean overuse, which is rapidly becoming most of the world, certain uncritical and inflexible applications of VBAC prediction models into clinical care potentially will turn more prior cesareans into recurring indications. That VBAC prediction models appear to be a globally ascendant approach to counseling should concern Global Health scholars who approach the problem of cesarean overuse from a multi-level perspective as a health service outcome, the provision of which is sensitive to the vagaries of supply and demand, the economics of convenience, and the whims of provider judgement (Betran et al., 2018).

Reducing avoidable cesareans in a safe manner will likely require such a multi-level approach. For example, a cesarean reduction intervention at one Shanghai, China hospital combined intervention components at the governmental (cesarean reimbursement), hospital (cesarean performance metrics), provider (provider incentives for lower cesarean rates), and patient (continuous intrapartum midwifery care) levels. The hospital reduced its cesarean rate from 51% to 36% without any increase in neonatal morbidity/mortality. The most comprehensive multi-level intervention to increase VBAC rates in low-VBAC rate countries, however, did not result in increased VBAC rates (M. Clarke et al., 2020). For future multi-level VBAC interventions, it's unclear whether and how to address the ways in which certain forms of evidence contribute to low VBAC rates. National care guidelines, which in the past have narrowly interpreted evidence, ultimately served to limit the pool of eligible VBAC candidates; on the other hand, liberalization of those same national guidelines did not produce the desired effect of raising the VBAC rate (Barger et al., 2013). Thus, changes to evidence-based guidelines may be a necessary but not sufficient component to increase the VBAC rate.

Implications for Global Health: the study of respectful maternity care

To date, the Global Health discussions around mistreatment of women in birth facilities has largely focused on measuring and describing experiences of mistreatment, violence, and abuse. Recently, many have called for a shift in focus toward the fundamental drivers that produce reported experiences of mistreatment (Sadler et al., 2016; Sen, Reddy, & Iyer, 2018). A recent United Nations report from the Special Rapporteur on violence against women was the first U.N. body to analyze the root causes of mistreatment and to recommend actions for nations to address mistreatment in birth facilities (Simonovic, 2019). The Special Rapporteur discusses one driver of mistreatment to stem from harmful stereotypes “in reproductive health context on women’s decision-making competence, women’s natural role in society and motherhood limit women’s autonomy and agency (Simonovic, 2019).” From the perspective of this U.N. Report, members states need to address the multiple ways in which women are excluded from making decisions about their bodies and their babies during childbirth.

While not discounting the extensive findings in the mistreatment literature in which women report a global problem with violations of autonomy (Bohren et al., 2015), this dissertation argues that mistreatment and abuse do not disappear as women transition into the decision-making role. How evidence about risk is produced (Wendland, 2007) and how risk gets associated with invasive treatments (Charles & Wolf, 2018) determine which options providers make available to women. The automation of racism and of obstetric power operate through packaged information, and packaged information determines the terrain on which decisions are made (Altman et al., 2019).

Different from the ways in which Global Health researchers measure and describe overt forms of mistreatment in birth facilities, social scientists have worked to reveal ‘quieter’ and

more ‘quotidian’ forms of violence, which they claim underlie more overt violence. For example, Rochelle Chadwick argues that the ways in which obstetric practices silence women’s haptic and embodied knowledge constitutes a form of violence (Chadwick, 2019; Duden, 1993). Chadwick encourages an analysis of obstetric violence not only as a top-down repressive force. Instead, she argues that obstetric violence works through “epistemic silencing,” a concept she borrows from Black feminist philosopher Kristie Dotson. Epistemic silencing occurs when the dominant group “fails to identify a speaker as a knower” due to the speaker’s social location (Dotson, 2011). Acts of epistemic silencing, between providers and women, or even in instances when women silence themselves, comprise these less visible forms of violence. Chadwick concludes that quiet forms of violence enable overt violence as a response to birthing people who transgress the often unspoken norms of conduct in birth facilities.

The VBAC calculator contributed to the epistemic silencing of haptic knowledge in childbirth, especially for those VBAC-interested women who had perceived low scores, and nonetheless, wanted to experience the physical sensations of labor and birth. In some institutions, when women pursued a VBAC despite a low probability for success, providers pressured and sometimes coerced these women into repeat cesarean, an overt form of violence. My own work, along with that of Chadwick and anthropologist Dana-Ain Davis, suggests that in order to address overt forms of obstetric violence and obstetric racism we must also account for these small and significant epistemic injustices (Davis, 2018).

Implications for the critical study of evidence-based obstetrics

New obstetric technologies that manage risk through invasive procedures, like the VBAC calculator, are often presumed beneficial and can obviate the protocols of evidence-based medicine. Like electronic fetal monitoring, the VBAC calculator did not need to be subjected to

the gold-standard of clinical effectiveness, a RCT, before becoming widely used (Sartwelle et al., 2017). A recent RCT, which incorporated the VBAC calculator as part of a decision-support intervention, found that the calculator did not influence more women to attempt a VBAC (Kuppermann et al., 2020). Perhaps the good news of this trial is that the calculator did not appear to harm women in a randomized setting, but survey data from real-world settings shows that the calculator is being used more to counsel women into repeat cesareans (Thornton et al., 2020).

After the VBAC calculator passed a series of statistical tests, the ACOG included a discussion of the calculator in its latest guidelines, possibly because the MFMU is a reputable American research network. For comparison, the British Royal College of Obstetricians and Gynaecologists, which presumably assesses the same VBAC research literature as the ACOG, was more measured in their assessment of VBAC prediction models. The RCOG cautions that, “Although [VBAC] prediction models ought to be intuitively beneficial, such models have not been routinely applied in the decision-making process and their precise role is yet to be established...the use of specific population-based models to predict VBAC success needs further data, although initial results are promising (RCOG, 2015b).” While we await the updated RCOG VBAC guidelines, this dissertation argues that “further prospective research” should include not just cohort studies and RCTs, but also critical, trans-disciplinary qualitative analyses.

In her 2007 article “The Vanishing Mother: Cesarean section and ‘Evidence-Based Obstetrics’,” obstetrician and anthropologist Claire Wendland argued that evidence in obstetrics is produced through a series of epistemic choices that elevate certain ways of thinking about childbirth, gender, and the body. She carefully analyzed the hidden assumptions embedded in RCTs and cohort studies in the field of obstetrics, arguing that these assumptions contribute to

the normalization of cesarean overuse. Statistical models that compare cesarean section to vaginal birth elevate cesarean surgery to the status of an “unmarked” procedure: “Meanwhile, vaginal delivery becomes marked as unpredictable, uncontrolled, and therefore dangerous, appropriate for only a select few (Wendland, 2007).”

My ethnography provides empirical evidence for Wendland’s theoretical intervention.. The VBAC calculator’s statistical model used a binary outcome variable that assumed cesarean surgery and vaginal birth to be comparable outcomes. The VBAC calculator produced vaginal birth as an uncertain and risky event, the occurrence of which could be made more certain through the application of a statistical technology. While some women subscribed to a statistical logic and defaulted to cesarean section as their preferred mode of treatment, the women who attempted a VBAC considered cesarean section a back-up option. They pursued a range of less-interventionist approaches and valued the process of labor and birth. VBAC-interested women had a greater tolerance for uncertainty that ran counter to the VBAC calculator’s statistical logic to control risk in advance with a scheduled cesarean. In Wendland’s wording, the VBAC calculator “vanished” the subjective desire to experience labor and birth, which informed these diverse, less-invasive approaches to the risk and uncertainty of attempting a VBAC. By vanishing these elements, the VBAC calculator foreclosed less-invasive alternatives, expanded the terrain for surgical intervention, and perpetuated the supremacy of obstetrics.

On the other hand, as an empirical study of evidence-based obstetrics, my work fills in some gaps in Wendland’s theoretical intervention. The VBAC calculator did not completely vanish women; instead, the MFMU researchers designed the calculator with women as decision makers in mind. As historians Lorna Weir and William Arney noted over the course of the 20th century, evidence-based obstetrics combined with a certain strain of choice-based feminism to

construct mothers, usually White and economically advantaged, as competent managers of risk. Arney observed that choice in obstetrics unfolds against a well-circumscribed and often invisible “background of obstetric safety (Arney, 1982).” Women who transgress obstetrically-defined safety boundaries find themselves subjected to denials of care, and in some cases, even court-ordered interventions and imprisonment (Diaz-Tello, 2016; Niles, Stoll, et al., 2021; Weir, 2006).

While Wendland carefully attends to the construction of risk within evidence-based obstetrics, Lorna Weir traces how constructions of risk originate in the epidemiologic and clinical domains and then mutate when they travel into the domains of the law, insurance, and the state. Across all these domains, risk works as a technology of security, guarding against future danger through interventions in the present, be they clinical or legal. When perinatal risk traveled into the legal domain, courts in Canada upheld a woman’s right to bodily autonomy, but in the domain of child welfare, concerns over perinatal risk invited state invention into the pregnancies of Indigenous Canadian women (Weir, 2006).

Weir’s analysis of the perinatal mortality rate explains how the fetal risk of uterine rupture in an attempted VBAC originated in evidence-based obstetrics and then traveled into the courtroom (Kukura, 2010). Thus, Weir’s account of perinatal risk is broader than Wendland’s, in that she delineates the mutually-reinforcing effects of risk across disparate domains. Clinician researchers have tended to focus more narrowly on how obstetricians and midwives approach epidemiologic and clinical risk differently (Healy et al., 2017). While this narrower focus may be appropriate for certain risks that stay confined to the clinical realm, the risks of VBAC have crossed multiple domains, making them more complex to analyze and address.

The fetal risk of uterine rupture has been one of the most contentious aspect of mode-of-birth decisions. On the one side, some advocate that responsible mothers should opt for an ERCD (Phelan, 1998), while critics of this approach argue that the fetal risk of uterine rupture is treated as an exceptional risk set apart from other kinds of fetal emergencies (Charles & Wolf, 2018). As an exceptional risk, uterine rupture is used to police women's reproductive decisions in the context of VBAC (Kukura, 2010). This research provides some reassurance for those, including Weir, concerned about the impact of fetal bias on pregnancy and birth care. Because women in this study were allowed to form a range of interpretations and responses to the risk of uterine rupture, few struggled with uterine rupture as a specifically fetal risk, and the risk of uterine rupture dissuaded few from their chosen mode of birth. Similarly, a recent quantitative analysis found that all women want to avoid a uterine rupture, but the desire for a vaginal birth likely overrode the desire to avoid uterine rupture (Kaimal et al., 2019).

Weir's analysis has some limitations in that she assigns risk logics to particular professionals: clinicians work on clinical risk, lawyers work on legal risk, and social workers work on risks to the state (Weir, 2006). The situation of VBAC, however, demonstrates the possibility for obstetricians to invoke legal risk without themselves having any formal legal training nor having to defend their legal arguments in a court of law. In my study, some obstetricians justified repeat cesareans for women with low probabilities for successful VBAC due to concerns that they would be subjected to a civil malpractice suit should the woman attempt a VBAC, fail, and suffer an injury. In such instances, obstetricians assume the position of a plaintiff lawyer who argues that any foreseeable harm to the fetus, or to the mother in the case of the VBAC calculator, justifies a scheduled repeat cesarean (Phelan, 1991). While during

the course of this research I did not discover any instances of court-ordered cesareans done in the name of VBAC prediction, that possibility remains.

Implications for bioethical and human rights approaches to VBAC

In 2007, the same year in which the MFMU group published their first calculator analysis, bioethicist and obstetrician Anne Lyerly and colleagues criticized some general approaches to risk in pregnancy, which also specifically applied to the situation of VBAC at that time. Lyerly and colleagues noted that certain approaches distorted risk by considering the probability of outcomes alone and in isolation from women's values and social contexts and by regarding any incremental risk to the fetus to trump other consideration (Lyerly et al., 2007). In a later paper, Lyerly and Little developed bioethical criteria to counteract guidelines that restrict access to VBAC. They argued that because the numerically small absolute risks of VBAC and ERCD are broadly considered to be "safe and reasonable" and because mode-of-birth decisions are highly contextual, the individual woman is best position to decide between the two options (Lyerly & Little, 2010).

Lyerly concept of risk distortion aligns with how I have argued relative risk has been used to turn the absolute risks of attempting a VBAC from acceptable to exceptional. Despite bioethical critiques like Lyerly's that were contemporaneous to the development of the VBAC calculator, the MFMU researchers' use of relative risk informed restrictive national care guidelines and coercive clinical practices on the ground (ACOG, 2010; Thornton et al., 2020). Despite trenchant bioethical critiques of risk distortions in the context of VBAC, the proposed solution, an appeal to the principle of patient autonomy, did not sufficiently restrict the production of new restrictive VBAC guidelines. The exceptionalization of risk circumscribes patient autonomy by narrowing the available options as between a risky VBAC or the relative

safety of a scheduled cesarean. While several ethical alternatives have been proposed to counteract the “annulment” of autonomy in maternity care (De Vries, 2017; Newnham & Kirkham, 2019; Premkumar & Gates, 2016), these alternatives do little to change the structures of obstetric science that continue to (unethically) vanish specific aspects of care that matter to birthing individuals.

Bioethicist Michael Rost has recently proposed an empirical bioethical agenda that aims to clarify the moral harms of mistreatment during childbirth and to connect these harms to outcomes (personal communication). Such an empirical approach to the bioethics of VBAC could encourage scientists to measure moral injury alongside and in relation to typical obstetric outcomes. In addition, care preferences and goals, as well as experiences of mistreatment, abuse, and racism can all be quantified and added as variables to VBAC statistical models (S. Vedam et al., 2019). For example, obstetrician Karen Scott has developed a patient-driven measure of obstetric racism, and Scott plans to assemble an obstetric racism data dashboard to visualize these patient experiences, representing a key intervention into the denial of obstetric racism (K. Scott & Davis, 2021). In another example of a unique and preference-sensitive approach to VBAC, Fobelets and colleagues analyzed how a mismatch between preferred and actual mode of birth affected outcomes. They found that women who desired a VBAC but who ultimately had a scheduled ERCD had worse health related quality of life at 3 months after birth (Fobelets et al., 2019), a finding that challenges the disregard for women’s care preferences in the context of VBAC. Different from prior bioethical critiques, the work of Rost, Scott, and Fobelets elevate issues of emotion and embodiment with the goal of *visceralizing* the available data sources (D’Ignazio & Klein, 2020). By adding flesh and feeling to the data, future research into VBAC could counteract the absences and omissions of current approaches in evidence-based obstetrics.

The efforts detailed above are welcome interventions into the obstetric scientific process. However, in order to safely reduce cesarean globally, multiple strategies will likely be necessary. Concerns over avoidable morbidity and mortality, especially with the potential for placenta accreta in future pregnancies, has propelled the issue of cesarean overuse to the top of some health care agendas. On the other hand, some civil society groups have argued to move beyond such narrow clinical framing of the problem of cesarean overuse, instead framed cesarean overuse as a violation of fundamental human rights. In 2013, in their periodic report to the U.N. Committee on the Elimination of All Forms of Violence Against Women (CEDAW), Greek civil society groups were the first globally to frame cesarean overuse as a human rights violation. In accepting their report, the CEDAW committee, which can produce binding agreements with the all governments who signed onto the U.N. convention, obligated Greece to reduce their rate of cesarean section “performed without medical necessity” and to train or re-train “medical personnel on natural birth and to introduce strict control of medical indications for cesarean sections in order to reach the WHO recognized rates (CEDAW, 2013).” It’s unclear what impact the CEDAW reporting has had on the Greek situation, but CEDAW mechanisms have in the past pressured governments to correct gender injustices (Hunt & Gruszczynski, 2019).

For unclear reasons, the U.N Special Rapporteur did not include in their landmark report on obstetric violence the Greek effort to reduce cesareans through UN accountability mechanisms. The Special Rapporteur did highlight cesarean overuse as a violation of the women’s fundamental human rights under the doctrine of informed consent. While in this dissertation I’ve highlighted how professional power, sexism, and racism are reproduced through information packaging, international human rights frameworks would identify information packaging as a failure to provide “full information about recommended treatments so that

[women] can make informed and well-considered decisions (Simonovic, 2019).” As a remedy, the Special Rapporteur recommended that governments adopt health laws and policies to guarantee full and free informed consent for cesarean section and to publish data on health facilities’ cesarean rates. While I welcome the Special Rapporteur’s effort, I’m still dubious that informed consent is the only protection needed to shield women from cesarean overuse. The only other current strategy in the international human rights literature, that of Greece, is potentially more impactful in that it recommends changes to professional training and proposes performance targets. The application of human rights law to the problem of cesarean overuse is an active area, and based on prior successes in other areas of gender discrimination, represents a potentially fruitful avenue for positive change.

What does mode-of-birth counseling look like after this dissertation?

In their 2010 consensus statement, the NIH recommended that mode-of-birth counseling be “evidence-based, minimize bias, and incorporate a strong emphasis on patient preferences (Cunningham et al., 2010).” This dissertation has shown how complicated these terms—evidence, bias, preference—are, intersecting as they do with issues of obstetric authority, gender and power, and racism. Nonetheless, using the theory and the data from this dissertation I have several recommendations for improving provider education and for improving the counseling of pregnant people who have undergone a prior cesarean.

The current data sources, which inform the evidence base used in mode-of-birth counseling, are woefully inadequate. Evidence-based guidelines like the ACOG’s and the RCOG’s could be expanded to include qualitative and critical sources that discuss how processes of mistreatment and racism negatively impact outcomes in pregnancies that follow a first cesarean. So too, evidence-based guidelines could counteract the strong tendency to package

evidence-based numeric risks in mode-of-birth counseling. Those who write national care guidelines could de-emphasize relative risk and emphasize the low absolute risks of VBAC and ERCD in their documents. The RCOG VBAC guidance already does this in their discussion around uterine rupture. When discussing the low absolute risk of uterine rupture, the British guidelines recommend that providers also inform women “that the absolute risk of birth-related perinatal death associated with VBAC is extremely low and comparable to the risk for nulliparous women in labour (RCOG, 2015a).” By paying attention to the ways in which evidence is packaged in the current approach to mode-of-birth counseling, new and more robust national VBAC guidelines could counteract bias in counseling that historically has favored ERCD.

Professional bodies could change from a model where the obstetrician selects good candidates based on a set of risk factors to one where the obstetrician promotes preference-concordant and goal-oriented care. On the one hand, the current ACOG guidelines do state that mode-of-birth decisions are preference-sensitive, but on the other hand, the ACOG also discusses that obstetricians should risk stratify VBAC candidates (ACOG, 2019). After reading this dissertation, it should be clear that minimizing risk is a distinctly obstetric approach, and that risk carry varied meanings to women depending on their prior birth experiences, experiences of racism, and future reproductive plans. So, instead of minimizing risk, obstetricians could discuss the meaning of risk and the meaning of a good birth for specific patients. Obstetricians could be educated about how selecting good VBAC candidates has narrowed birth options and reproduced racism. The ACOG might make explicit that even so-called bad VBAC candidates deserve the supportive care that will help them to achieve a birth that suits their preferences and goals.

As I discussed at the end of Chapter 1 in points that bear repeating, a patient-centered approach to discussing the probability for a successful VBAC recognizes that prediction is not a relevant frame for many VBAC candidates. Therefore, VBAC calculators should not play an outsized role in counseling these women. For those VBAC candidates who desire a numeric estimate of their probability for a successful VBAC, providers might delve into a robust conversation about the multiple hospital, provider, and individual factors that influence successful VBAC. So too, providers could discuss how to potentially increase the probability for success. Women who have low probabilities for success should be afforded a range of birth options, not just cesarean section. Finally, due to the limitations of VBAC prediction models that use only individual factors, including their limited precision in the lower score ranges, no VBAC-interested person should be denied a VBAC based on what providers perceive to be a low probability for success.

Some obstetricians reading this document will surely have a story of a bad candidate who attempted a VBAC, failed, and then had a complicated surgery. During the course of this research, I coincidentally had some of the toughest attempted VBAC cases of my career. Specifically, I cared for two women who attempted a VBAC and both attempts resulted in a cesarean performed after labor started. However, the two women had different outcomes because I improved my surgical technique between the two births.

The first woman transferred into the hospital from community-based midwifery care so that she could attempt a VBAC in a hospital setting. Several factors in this woman's history made me concerned about a complicated surgery if her attempted VBAC didn't work; still, I supported the woman in her preferences to attempt a VBAC. She progressed in labor all the way into the pushing phase, but despite supportive care from her doula, midwife, and medical team,

pushing her baby out proved difficult. I discussed options, and she elected to try forceps. Unfortunately, the forceps didn't work and we transitioned into a complicated cesarean due to significant difficulty in delivering her baby, whose head had become impacted in her pelvis. Due to the force required to dis-impact her baby, the woman sustained injuries to her uterus and cervix such that I nearly had to perform a hysterectomy. It took six hours to repair her uterus and safely complete the surgery.

After that surgery, I consulted with a senior obstetrician who recommended that I should have delivered the baby feet first instead of expending such effort to dislodge the head. Such a "reverse breech" maneuver could have prevented the lacerations to the woman's uterus and cervix that complicated the surgery. For the second woman then, who attempted a VBAC and also had an arrest of labor in the pushing phase, a colleague walked me through the reverse breech maneuvers. This time, the second mother sustained no injury to her uterus or cervix and her baby too was unharmed.

I share these two different outcomes to reinforce again how the provider disappears from national guidelines and from mode-of-birth counseling. The biomedical model of cesarean surgery reduces all complications to de novo pathology (Duden, 1993), rather than a result of iatrogenic harm or an obstetrician's skill. No doubt, attempted VBACs that end in cesarean can be challenging surgeries, but given the low number of attempted VBACs in many hospitals, it's possible that some obstetricians might not feel confident in their surgical skills to manage complicated attempted VBACs. If an obstetrician doesn't have the skills to support even so-called bad VBAC candidates in attempting a VBAC, they could refer to another obstetrician or a midwife who can help the patient to achieve their goals.

Obstetricians could be educated in a socio-ecological model of disease risk to counteract the reductive biomedical model of cesarean section, including how racism influences the risk for primary and repeat cesareans (N Krieger, 2011). Using a socio-ecological model in their mode-of-birth counseling, obstetricians could help women come to a richer understanding of the experience of the first cesarean. As thinking about the first cesarean evolves over time, obstetricians could be available to discuss that evolution and identify women who have persistent symptoms of trauma that may impact their ideal timing for their next pregnancy. Finally, because mode-of-birth preferences appear to solidify early in the post-operative period, a series of visits with a continuity provider could help women to identify their values, preferences, and future reproductive goals. During the immediate post-operative period, obstetricians could expose women to a range of ideas, birth philosophies, and provider practice types (e.g. midwifery care) that might help women to make sense of their cesarean experiences. Exposing women to a range of ideas and birth philosophies could help to counteract the tendency to personalize the reason for the first cesarean. Obstetricians could encourage women to take a more malleable approach to one's future ability to give birth vaginally, leaving open the possibility that the next birth could be different from the first.

Limitations

I would be remiss if I didn't point out several limitations of this dissertation. Due to limitations on time, resources, and IRB logistics, I could have gathered additional data at institutions where the VBAC calculator became a matter of official policy. While I did gain partial access to two institutions, the interviews I conducted in these institutions were mainly with providers who objected to use of the VBAC calculator as official policy. I could have included more perspectives from providers who found the VBAC calculator to be a useful

adjunct to clinical care in these institutions. Also, I tended to be referred controversial cases in which women successfully challenged the VBAC calculator. Thus, I included no stories from Black and Hispanic women who found the calculator to be useful, or even, embraced the calculator. Surely, some Black and Hispanic women do desire repeat cesareans and the calculator may speak to their goals and values around cesarean section. Generally, I have highlighted the ways in which providers and some women reproduced race through the calculator. Due to space limitations, I was not able to address the multiple ways in which scientists, providers, and women disrupted the calculator's automaticity.

As a U.S. based study, the meanings that providers and women associated with risk and safety may not be translatable to other settings. Due to the limitations that COVID-19 had on data collection, I was not able to engage with ethnography fully as a method, especially in terms of meeting people within their homes and other extra-clinical contexts. I think that this especially limited by interactions with people who opted into the study who were lower-income. My recruitment of women through clinical spaces had its limitations in terms of the participants who were willing to talk to me generally had a level of comfort sharing their stories with a White male physician. Due to lack of time, funding, and COVID limitations, I was unable to connect with participants who had challenges accessing care.

Over the course of this study, I developed as qualitative researcher. While my insider status as a physician at my own institution helped me to get access to participants, I also had to push myself outside my clinical role and to fully inhabit the role of critical ethnographer. This meant that early on in the study I tended to focus more on the clinical aspects of VBAC and ERCD. Because of my own limitations as an early-career, clinician-ethnographer, I did not gather sufficient amounts of contextual information about how aspects of obstetric violence and

racism described in this dissertation were connected to other intersecting forms of violence and inequity in women's lives.

Conclusion: What are the political possibilities for a critical ethnography of obstetric thinking?

In this conclusion, I have continued to circle back to the point that obstetric thinking, including the thinking that informed the VBAC calculator, forecloses the possibility for less-invasive approaches to risk and danger in childbirth. In foreclosing these possibilities, obstetric approaches can silence some women's haptic knowledge while also turning some women into vehicles for justifying excessive intervention. Obstetric justifications of excessive intervention have, and because of the calculator, continue to be connected to ideologies of racism.

As I laid out in the introduction, I understood my task as a critical ethnographer to have an activist edge, in that the purpose of my research was to intervene into the hegemonic practices of obstetric thinking to expose the effects of such practices on marginalized social locations (Madison, 2020). By detailing the effects of obstetric thinking on marginalized social locations, this dissertation is an intervention that counteracts processes of epistemic silencing within obstetrics.

On a micro level, I witnessed the power of ethnography as a political intervention when during the research interview providers slowed down for the first time to reflect on the deeper meanings that informed their actions. These moments of awakening were surprising to me, as I had not anticipated the transformative potential of the research design itself. The perpetuation of hegemonic practices related to obstetric thinking, in part, rely on the uncritical adoption of new technologies. At the same time, the impact of the ethnographic interview was limited to those

providers who were willing to reflect. For example, when I began interviewing members of the MFMU in the Spring of 2019, the research network had no immediate plans for revising the calculator. Thus, it's more likely that the social movements that powerfully reframed racism as the risk factor, influenced the MFMU network to remove race as a predictive factor from the calculator.

Furthermore, because my approach to intervening into hegemonic practices was through one-on-one interviews with women, such an atomistic design meant that those who participated in my study were isolated from each other. It was not possible for participants to speak with each other and develop their own collective recommendations on how to make the obstetric scientific process more transparent and accountable to their experiences (Franck et al., 2018). While the NIH VBAC consensus document from 2010 did involve community representatives (Cunningham et al., 2010), non-clinical factors, like hospital policy and provider willingness (Korst, Gregory, Fridman, & Phelan, 2011), have largely gone unaddressed over the last decade. In interviews, women readily identified these non-clinical factors as significantly impacting their ability to attempt and succeed at a VBAC (Basile Ibrahim et al., 2021). In the future, participatory research methods could and should inform research agenda setting to enhance equitable access to VBAC care.

Moving further out from one-on-one interactions, I consider the political possibilities at the group or institutional level. Given that my goal is to intervene into obstetric thinking, I plan to reach obstetricians by publishing my findings in obstetric journals and through grand rounds presentations in obstetric departments. The findings I plan to highlight in publications and presentations, like those in this dissertation, represent perspectives that we obstetricians often don't (or are unable to) solicit during the limited scope of a prenatal visit. I hope that in sharing

alternative approaches to the risk and uncertainty of planning a VBAC, obstetricians will bring to their science and their clinical practice a more robust picture of the diverse care preferences that women bring to their pregnancies which follow a first cesarean. Through these group-level knowledge translation activities, some practices and hospitals may be moved to discontinue use of the VBAC calculator.

However, like the individual impacts I listed above, I also recognize that without a broader connection to social movements, changing practices in individual hospitals will rely on goodwill. Social movements produce new norms, cross-link issues, and build coalitions to achieve equity, justice, and freedom. For example, in the wake of social movements that named racism as a public health crisis, the New York City Health Department recently formed the Coalition to End Racism in Clinical Algorithms, also called the CERCA (Lanza & Logan, 2021). The coalition brings together hospital leaders, clinicians, and public health professionals with the purpose of de-implementing three race-adjusted algorithms used in nephrology (estimated Glomerular Filtration Rate, or eGFR), pulmonology (Pulmonary Function Tests, or PFTs), and obstetrics (the VBAC calculator). The strategy of addressing all three of these algorithms represents an example of cross-linking with the potential for broader impact beyond any single critical ethnography.

Finally, I consider the potential impacts of my ethnography at a national and global level. Earlier in the conclusion, I recommended that the ACOG broaden the kinds of data, especially social science, bioethical, and legal sources, included in national VBAC care guidelines. Until these different viewpoints are integrated and given their own weight, the ACOG's national VBAC guidelines will perpetuate an approach that exceptionalizes the risks of attempting a VBAC, and

I've argued in this dissertation that processes of exceptionalization have been a key driver of inequitable access to VBAC care.

My involvement in birth justice organizing in the United States could help to foster coalitions for change at the national level. Again, demonstrating the mobilizing power of social movements on multiple levels, the federal agency the AHRQ recently solicited public input that will shape a review the agency is conducting on race-adjusted clinical algorithms (AHRQ, 2021). On a federal regulatory level, given the discriminatory impact of the VBAC calculator, the use of race in clinical algorithms could also fall under the jurisdiction of the Office of Civil Rights. A coalition of birth justice organizers are currently preparing a legal brief that, in part, will make the argument that the OCR does have jurisdiction over the development of such technologies like the VBAC calculator, while the legal brief will also make a broader argument that obstetric violence and racism should be recognized as forms of discrimination that under U.S. federal law.

The VBAC calculator globalized American race categories during a time when Global Health has called for decolonial methods that critically examine how inequity is reproduced in research (Daffé, Guillaume, & Ivers, 2021). Quite separate from these discussions within Global Health, which might have disrupted international processes of racism, the VBAC calculator made it possible for American obstetrics to continue its role as an exporter of medical racism, a legacy of global influence that dates to the origins of the profession in the times of slavery (Cooper Owens, 2017).

Research groups from Sweden to Colombia took up the project of validating the MFMU's statistical model in their own domestic populations. Because the VBAC calculator factored race into its equation, international validation efforts involved adapting American racial categories (Fagerberg et al., 2015; Fonseca, Rodriguez, & Maya Salazar, 2019). For example,

Swedish researchers translated the category “African-American” into “Sub-Saharan immigrants” and cobbled together a “Hispanic” category by combining people of Spanish, Portuguese, and South American descent. Colombian researchers investigated whether Black (“Negra”) or Indigenous (“Indigena”) women had lower VBAC rates. Both the Swedish and the Colombian groups found no association between race/ethnicity and successful VBAC rates. In interviews, some key informants who worked as scientists on these or similar validation studies hoped their so-called negative studies would challenge the use of race in VBAC prediction models.

Now, with multiple published international validations of the VBAC calculator, a recent systematic review assessed the constant statistical effect of race/ethnicity on successful VBAC at a global level (Wu et al., 2019). Systematic reviews are considered the pinnacle of evidence-based medicine as they allow researchers to assemble smaller studies into a more comprehensive statistical picture. Wu and colleagues combined all the studies that used race as a factor, whether the association with VBAC was significant or not. By subsuming negative studies under the same umbrella with positive studies, the systematic review’s design effectively neutralized negative studies as mere statistical noise. The grand narrative of evidence-based medicine situated negative studies within the larger global project of reproducing race through statistical means, again demonstrating that statistical criteria alone will not disrupt persistent processes of racialization that happen within and through obstetric thinking.

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