

CHAPTER I

INTRODUCTION

The promotion of planned pregnancies has long been a goal of women's reproductive health researchers and advocates within the United States. Concerns about unintended pregnancies are based on the impact on pregnant women, including the decision to terminate a pregnancy, the children born as the result of unintended pregnancies, and to society (Barrett and Wellings, 2002). The potential effects are far-reaching, as approximately one-quarter to one-third of all children born in the U.S. are the result of an unintended pregnancy (NSFG, 2002). In 2002, the direct medical costs of unintended pregnancy were estimated to be \$5 billion (Trussell, 2007). The three empirical papers that make up this dissertation all revolve around the issue of pregnancy intention. The dissertation's overall goal is to increase understanding of intentionality, from expanding upon established antecedents of pregnancy intention to examining the effect of pregnancy intention on the utilization and evaluation of reproductive health services.

This introduction will review a number of the statistics associated with unintended pregnancy in the United States. Trends associated with age, race, marital status, and income are emphasized, as these factors are aligned with the variables used in the forthcoming analyses. A brief history of the measurement of pregnancy intention is also included in this chapter. Chapter 1 concludes with an overview the dissertation's structure, including brief introductions to each of the empirical papers.

Every year in the U.S. approximately 5% of women of reproductive age experience an unintended pregnancy. Almost half (49%) of all pregnancies in the U.S. are unintended; of those pregnancies 48% end in elective abortion (Finer and Henshaw, 2006). In 2001, 65% of live births were intended at conception, with 15% reported as mistimed and 14% unwanted. Between 1994 and 2001, unwanted pregnancies increased from 9% to 14% of all pregnancies (2002 NSFG).

Women who are young, unmarried (particularly cohabitating), low-income, minority, and without a high school diploma are more likely to report an unintended pregnancy (Finer and Henshaw, 2006). Although the majority of unintended pregnancies in this country are to women who are neither economically disadvantaged or at either end of the reproductive age span (Brown and Eisenberg, 1995), increases in unintended pregnancies were markedly higher among poor women, whose rates rose 29% between 1994 and 2001. A poor woman in 2001 was four times as likely to report an unintended pregnancy, five times as likely to have an unintended birth, and more than three times as likely to have an elective abortion compared to higher-income women. These socioeconomic disparities were further exacerbated due to the 20% decrease in rates of unintended pregnancies for women with incomes at least twice the federal poverty level (Finer and Henshaw, 2006).

As a woman ages, pregnancies become increasingly intended. Reports based on the 2002 National Survey of Family Growth (NSFG) found that 21.6% of births to women under age twenty were intended, compared to 55.8% in women ages 20-24, 73.0% in women 25-29, and 78.2% in women 30-44. African-American and Hispanic women ages 30-44 were more likely (29.8% and 30.2%, respectively) to have an

unintended birth compared to non-Hispanic white women (19.4%). While the overall percentage of unintended pregnancies decreases with age, unintended births are increasingly attributed to unwanted pregnancies as women age. For example, 58.3% of unintended births to women ages 30 and over were the result of an unwanted pregnancy, compared to 39.0% in women ages 20-24. African-American (74.9%) and Hispanic women (61.9%) ages 30-44 also reported a higher proportion of births attributed to unwanted pregnancies compared to non-Hispanic white women (53.4%) (NSFG, 2002).

Women with an unintended pregnancy are less likely to use or initiate timely prenatal care services. According to reports from the 2002 NSFG, 93.4% of women with an intended pregnancy received prenatal care in the first trimester compared to 85.5% of women with unintended pregnancies. Women with private insurance were also more likely to have a intended pregnancy at birth (39.8%) compared to women covered by Medicaid (26.0%) or those using their own income to fund or supplement their delivery costs (29.5%) (NSFG, 2002).

History of Measurement

Interest in unwanted pregnancies began in the early 20th century around the time of the birth control movement, as activists such as Margaret Sanger observed the relationship between high rates of unwanted pregnancy among the poor and lack of access to contraception (Campbell and Mosher, 2000). At this time, births were defined as wanted based on marital status, with unwanted births defined as those occurring to unmarried women (Klerman, 2000).

The first large-scale studies of fertility began prior to World War II. In 1941, the study of Social and Psychological Factors Affecting Fertility, or the Indianapolis Study,

surveyed predominantly married white Protestant couples. The researchers focused on this population in response to concerns over declining growth of the middle class. If either the husband or wife had not wanted another child at the time the last pregnancy began, the couple was classified as having “excess fertility” (Campbell and Mosher, 2000).

The rapid increase in fertility following World War II replaced fears of declining growth. In 1955, the first Growth of American Families study was conducted, finding that excess fertility among married couples was 13%. By 1965, the National Fertility Study found that only 26% of married couples reported that their family planning efforts were completely successful (Campbell and Mosher, 2000).

The first study to include questions about pregnancy intention was the 1973 NSFG (Klerman, 2000). This survey was also the first to include unmarried women (Campbell and Mosher, 2000). The construct of intendedness in the 1973 NSFG, which continues to be widely used today, was based on both wantedness and timing. A pregnancy is classified as *mistimed* if the woman responds that she became pregnant sooner than she wanted. An *unwanted* pregnancy, updated from the prior concept of excess fertility, is defined as not wanting to have a(nother) baby now or at any time in the future. *Unintended* pregnancies are the sum of mistimed and unwanted pregnancies (Klerman, 2000).

Dissertation Structure

This dissertation is organized into six chapters, with the empirical research and results presented in a three-paper format in Chapters 3 through 5. This chapter provides background on the topic of pregnancy intention and outlines the empirical papers’ central

hypotheses. The literature review in Chapter 2 summarizes the impact of unintended pregnancy and provides an overview of the theoretical underpinnings of both patient satisfaction and life course theory. The papers presented in Chapters 3 through 5 include section on research questions and hypotheses, measurement and methods, results, and discussion (including limitations). The conclusion in Chapter 6 will synthesize the research findings, as well as discuss contributions to the pregnancy intention literature, implications for reproductive health policy, and directions for future research.

The first paper presented in Chapter 3 explores the relatively unexamined relationship between pregnancy intention and satisfaction with both prenatal and labor and delivery services among a sample of Medicaid-eligible women from the Flint, MI metropolitan area. As poor women with an unintended pregnancy are arguably in great need of high quality pregnancy related services, it is important to understand how such care can be modified to best meet their needs. Chapter 3 hypothesizes that women with unintended pregnancies will have a more negative perception of their pregnancy related services compared to women with intended pregnancies. The research further proposes that the strongest associations between intent and satisfaction will be found among the interpersonal measures of satisfaction associated with health care providers.

Chapter 4 presents the first of two papers examining issues of pregnancy intention with data from the 2006-2008 NSFG (Cycle 7). The overarching goal of this paper is to examine the potential for factors related to pregnancy history as antecedents of pregnancy intention. A secondary focus of this chapter is the attention to age differences in the hypothesized associations between pregnancy history and pregnancy intention. Women over the age of 30 have been largely ignored in the pregnancy intention literature in favor

of concerns regarding adolescent pregnancy. The research in Chapter 4 addresses this gap by hypothesizing that the cumulative experiences related to pregnancy history will become increasingly significant predictors of pregnancy intention as a woman ages.

The research in the third paper presented in Chapter 5 builds upon the findings of the two preceding chapters to examine the influence of pregnancy intention, pregnancy history, and age at conception on subsequent utilization of pregnancy prevention services. Specifically, these analyses focus on two dependent variables: the use of contraception during the interval between pregnancies and the election of post-pregnancy tubal sterilization. It is hypothesized that women with unintended pregnancies will not use contraception as frequently within the pregnancy interval, but will be more likely to choose tubal sterilization. As in the preceding chapter, the research questions in Chapter 5 continue to focus on differences in the predictive value of a woman's pregnancy history as she ages. Therefore, the hypothesized relationships between pregnancy intention and the post-pregnancy utilization of pregnancy prevention services are expected to be strongest for women ages 30 and over.

CHAPTER II

LITERATURE REVIEW

The three sections of this chapter provide critical contextual and theoretical background for the research presented in the remainder of the dissertation. The first section on pregnancy intention summarizes the research concerning the impact of unintended pregnancy and acknowledges common measurement concerns with the construct. In making the case for the substantial effects of unintended pregnancy, this section forms the foundation that motivates the research questions and hypotheses presented in Chapters 3 through 5. Chapter 3, for example, examines how pregnancy intention impacts the evaluation of prenatal and labor and delivery care. Ultimately, this research is concerned with improving upon these services to potentially ameliorate some of the negative outcomes outlined below. Similarly, Chapter 5 includes analyses of how intentionality, pregnancy history, and age at conception may influence the utilization of pregnancy prevention services. A better understanding of these factors could lead to higher contraceptive efficacy and the subsequent prevention of future unintended pregnancies.

The second section summarizes the primary theory of patient satisfaction, motivation for conducting patient satisfaction research, and research on patient satisfaction with prenatal care. This section is almost exclusively relevant to Chapter 3. The hypotheses in Chapter 3 are implicitly guided by discrepancy theory, which is reviewed in this section. As the data for Chapter 3 are exclusive to a Medicaid-eligible

population, socioeconomic predictors of patient satisfaction in general, as well as with prenatal care specifically, are highlighted.

The final section provides an overview of life course theory, discusses the role of pregnancy in the life course, and presents a modified life course framework for research on pregnancy. Chapter Four's focus on expanding the predictors of pregnancy intention to better reflect the experiences of women as they move into the latter half of their reproductive life course is influenced by general life course theory, as well as Misra and colleagues' (2003) integrated perinatal health framework. Similarly, Chapter 5 relies on life course theory in testing how age, pregnancy intention, and a woman's pregnancy history may predict her decision to utilize pregnancy prevention services.

Pregnancy Intention

Impact of Unintended Pregnancy

In a review of the effects of unintended pregnancy on the health of infants, children, and parents, Gipson, Koenig, and Hindin (2008) provide a schematic framework which outlines the antecedents as well as five potential pathways between pregnancy intention and health outcomes. Outcomes include: maternal behavior during pregnancy; birth outcomes; maternal postpartum behavior; infant and child health; and parental and sibling health and well-being. Research findings on a number of these pathways are discussed in this section. A replication of this model modified to highlight factors corresponding to the research questions in this dissertation is found in Figure 2.1. Chapter 3 considers the categories of *antenatal* and *delivery care*, under the pathway of maternal behavior during pregnancy. Chapter 4 explores both *individual* and *family* antecedents of unintended pregnancy, while the post-pregnancy utilization of

contraception and tubal sterilization examined in Chapter 5 corresponds to the category of *preventive care* under the pathway of maternal postpartum behavior.

Women with unintended pregnancies are more likely to engage in a range of potentially harmful behaviors during pregnancy. Consequences of unintended pregnancy include a greater likelihood of delayed entry into prenatal care and subsequent receipt of an inadequate number of visits (Brown and Eisenberg, 1995; Klerman, 2000). Women with unintended pregnancies are significantly more likely to smoke while pregnant (Brown and Eisenberg, 1995), gain less than the recommended amount of weight (Williams et al., 2006), and engage in binge drinking (Naimi et al., 2003). Delayed entry into prenatal care may also result in missed opportunities to diagnose pregnancy-induced hypertension, gestational diabetes, or sexually transmitted infections. Women with an intended pregnancy were almost four times as likely to take folic acid in the month prior to becoming pregnant (Rosenberg et al., 2003), putting children born as the result of an unintended pregnancy at greater risk for having a neural tube defect.

Women themselves may also be directly impacted by an unintended pregnancy. Women with an unintended pregnancy are at greater risk for depression during pregnancy, for postpartum depression, and for poor mental health in the years following the child's birth (Barber et al., 1999; Williams et al., 2006). Women who had a mistimed or unwanted pregnancy also reported 2.5 times the amount of physical abuse at any time during pregnancy or in the 12 months prior to conception compared to women with an intended pregnancy (Goodwin et al., 2000).

In examining the utilization of contraception in the interval between pregnancies and the election of tubal sterilization, Chapter 5 considers the impact of pregnancy

intention on post-pregnancy behavior. While this area of inquiry remains relatively unexamined, Borrero et al (2010) found that women with a history of unintended pregnancy were significantly more likely to report a tubal sterilization (29%) than women who had never experienced an unintended pregnancy (7%). The inclusion of pregnancy intention was further found to mediate the racial disparity in rates of tubal sterilization between African American and non-Hispanic white women. The authors conclude that racial disparities in unintended pregnancy, and the subsequent perceived loss of control that follows, may explain racial disparities in the choice of tubal sterilization over reversible contraceptive alternatives.

The research literature also suggests that the children born to women as the result of an unintended pregnancy may be negatively affected. These children, particularly if the pregnancy is unwanted, are consistently found to be at a greater risk for low birth weight (Brown and Eisenberg, 1995; Keeley et al., 2004). Children born to women as the result of an unintended pregnancy are also more likely to be premature and small for gestational age (Brown and Eisenberg, 1995), more likely as infants to have lower cognitive, behavioral, and emotional development, and are at greater risk of child abuse and neglect (Williams et al., 2006). Mothers are also less likely to breastfeed their child if the pregnancy was unintended (Kost et al., 1998; David, 2006). These children are more likely to receive reports of less than excellent overall health, exhibit either low levels of physical activity or extreme activity (suggesting potential behavioral problems), and score below the median on assessments of childhood development (Hummer et al., 2004; Crissey, 2005).

Negative consequences for children born as the result of an unintended pregnancy may reach far beyond infancy and early childhood. Longitudinal studies conducted by Barber and colleagues (1999; 2009) found a negative family-level effect on the relationship between mothers, the children born as a result of an unintended pregnancy, and the siblings of these children. Both children born as the result of an unintended pregnancy and their older siblings received fewer emotional resources from their parents (Barber and East, 2009). Mothers were more likely to use physical discipline and spend less leisure time with their children. Without the foundation of a strong mother-child relationship, the children were less likely to receive emotional and social support from their mothers as they aged into adolescence and early adulthood (Barber et al, 1999).

Additional studies support the findings that children born as a result of an unintended pregnancy are at greater risk for poor mental and emotional health as adults. Axinn et al. (1998) found that twenty-three years later, children born as the result of an unintended pregnancy had lower self-esteem, especially where the pregnancy was unwanted. The Prague Study, a 35-year project which periodically interviewed children born to women who were twice denied abortion, found a greater likelihood of depression, as well as out- and in-patient psychiatric treatment compared to pair-matched controls of children born as the result of an intended pregnancy. As adults, those persons born as the result of an unwanted pregnancy were also less likely to be satisfied with their jobs and relationships (David, 2006).

The Prague Study also raises the possibility for intergenerational effects on future parent-child relationships. Both women and men born as the result of an unwanted pregnancy were more likely to be divorced. When these women became pregnant

themselves, they felt less prepared for pregnancy and reported less support from their own mothers. Men reported less involvement as fathers and were more likely to have a strained relationship with the mother of their children (David, 2006).

Measurement

The research in this dissertation mirrors the majority of the literature in its use of the term “unintended pregnancy”. An unintended pregnancy is widely understood to be the sum of both mistimed and unwanted pregnancies. A pregnancy is *mistimed* if conception occurs sooner than the woman wanted. A pregnancy is *unwanted* when the woman did not ever want to have any children, or additional children, at the time she became pregnant. *Intended* pregnancies, often referred to as *planned* pregnancies, occur when the woman wanted to become pregnant at the time of conception or sooner (Brown and Eisenberg, 1995; Barber et al., 1999). Current cycles of the NSFG continue to use identical classifications. In addition, the NSFG also assesses the extent of mistiming, as well of levels of happiness and ambivalence towards the pregnancy. However, these constructs are rarely used in the pregnancy intention literature.

One of the most common critiques of the measurement of pregnancy intention is the over reliance on retrospective measures. Joyce and colleagues (2000) argue that retrospective measurement of pregnancy intention may be a more accurate measure of the attitude towards the pregnancy at the time of birth than at conception. A woman may feel a certain degree of ambivalence towards the pregnancy, but as she interacts with her partner, health care providers, and feels the pressure of social norms related to motherhood, her feelings may evolve towards wantedness (or the reverse) by the time she gives birth. However, in a later paper (Joyce et al., 2002), the authors found that by

correcting for selective pregnancy recognition (the tendency to recognize a pregnancy earlier if it was intended), the effect of timing on accurately assessing intent is significantly diminished.

Additional research has examined the trajectory of pregnancy intention from conception to postpartum. A study by Poole and colleagues (2000) on the instability of pregnancy intention found that about an equal percentage of their sample changed their intention status in either direction (12.5% in a positive direction and 10% in a negative direction). The findings of this study suggest that pregnancy intention may be more useful for studies at the population level, where the percentage of unintended pregnancy is more important than the intention trajectory of individuals.

Criticism has also focused on the saliency of the concept of pregnancy intention for many women. Klerman (2000) argues that researchers' concept of pregnancy intention assumes that, "becoming pregnant is a very rational activity based on planning and forethought" (p.161). Instead women may assume that they will become pregnant a number of times without much concern for timing. There is a great deal of ambivalence surrounding intention, reflecting the co-existence of both positive and negative feelings (Thompson and Brandreth, 1995). Luker (1999) argues that as the focus of measurement shifted from excess pregnancy to the beginning of childbearing, it became easier for women to label their pregnancies as "accidents," in order to avoid feelings of ambivalence towards the role of motherhood.

Accurately measuring pregnancy intention can also be hampered by a disconnect in the meaning of terms between researchers and respondents. Stanford et al. (2000) found that some women considered "planning" to be steps taken to prepare for the baby

after conception had occurred. A qualitative study by Barrett and Wellings (2002) found a great deal of variation in women's understanding of the terms "planned," "unplanned," "intended," and "unintended." Women rarely used these terms spontaneously, in particular the terms intended and unintended. The women who discussed their pregnancies in terms of planning tended to be older and more highly educated. However, for those women who did use these terms, understanding of a planned pregnancy extended beyond intent and the discontinuation of birth control to also include partner agreement and reaching an appropriate life stage for parenthood.

It is important to note that many women, regardless of intent, do not have the ability to plan a pregnancy. Many women lack access to affordable and acceptable methods of contraception. In relationships where there is an imbalance of power, a woman's partner may refuse to allow the use of contraception (Sable and Libbus, 2000). Women who become pregnant as the result of sexual assault also clearly lack control over planning a pregnancy.

Patient Satisfaction

Patient satisfaction has long been recognized as an important measure of the quality of care (Donabedian, 1988). From the perspective of health care providers, improving satisfaction is thought to result in more compliant and involved patients (Aharony and Strasser, 1993), in turn leading to better outcomes. However, much of the work on patient satisfaction is based on a consumerist perspective; emphasizing the patient's right to be satisfied with the quality of the health care services they receive (Williams, 1994). Patient satisfaction with care encompasses multiple components of quality, including the evaluation of a provider's technical abilities, as well as

interpersonal aspects of care and amenities (Donabedian, 1988). This section will review the dominant theory of patient satisfaction and major research findings, particularly as they apply to satisfaction with prenatal care.

The majority of patient satisfaction studies, including the research presented in Chapter 3, are either implicitly or explicitly guided by discrepancy theories of satisfaction. Discrepancy theory posits that satisfaction is derived from the difference between what the patient expects from their health care experience and what is actually received (Williams, 1994; Hodnett, 2002). Ware and colleagues (1983) found that while a large proportion of a patient's satisfaction rating is directly reflective of differences in the care received, that variation in satisfaction can also be attributed to an individual's preferences and expectations. Therefore, satisfaction measures both the quality of care received while providing valuable information about the patient. In the case of Chapter 3, results of this analysis can potentially expand our understanding of women with unintended pregnancies.

As attention shifted to the influence of patient characteristics on satisfaction, researchers began to include socio-demographic variables in their analyses. Older and lower income patients tend to have higher global satisfaction (Hall, 1990), which may be attributed to lower expectations for health care. Thomas and Panchansky's (1984) study on the dimensions of access found a great deal of variation among different socio-demographic groups in their preferences for care. For example, younger women valued the affordability of care compared to women in general, who emphasize the importance of the delivery environment. Therefore, in order to examine the relationship between satisfaction with access and utilization, the authors believe that a more homogenous

sample, as is provided by including only Medicaid-eligible women in Chapter 3, will provide the strongest results.

Patient satisfaction ratings tend to be higher for global satisfaction compared to specific aspects of care (Hodnett, 2002). Interpersonal aspects of care, such as provider communication, are stronger predictors of satisfaction than technical evaluation of care (Cleary and McNeil, 1988; Brody et al, 1989). As interpersonal aspects of care are highly valued by patients, a sustained patient-provider relationship leads to higher satisfaction, particularly over the long-term (Cleary and McNeil, 1988; Zastowny et al., 1989). Both global and specific facets of satisfaction will be explored in Chapter 3.

Satisfaction with Prenatal care

The literature on satisfaction with prenatal care mainly focuses on predictors of satisfaction, with an emphasis on socioeconomic disparities. This research is primarily motivated by the goal to increase the number of women, particularly low-income women, to initiate early prenatal care and to receive an adequate, or “optimal,” amount of care throughout their pregnancies. Many satisfaction studies are also conducted in order to increase satisfaction as a means of improving the quality of care provided.

Lower income women, women covered by Medicaid, as well as African-American and Hispanic women are consistently found to have lower expectations for prenatal care (Roter et al., 1999; Handler et al., 1998). According to discrepancy theory, having lower expectations for prenatal care would lead to higher satisfaction scores and the research generally supports this (Handler et al., 2003; Omar et al., 2001).

Findings on the relationship between satisfaction and use of prenatal care services are both limited and mixed. Studies by Moore and Hepworth (1994) and Higgins et al

(1994) found that low satisfaction with prenatal care was associated with lower utilization of services. However, Handler and colleagues' (2003) study of African-American women covered by managed care found that satisfaction had no significant impact on the adequacy of prenatal care utilization. At a minimum, the research appears to support that women with higher satisfaction with the health care system will be more likely to initiate prenatal care in the first trimester (*ibid.*). Once in the system, the immediate need for care during the pregnancy may supersede concerns regarding satisfaction in terms of continuing a schedule of prenatal visits.

While the relationship between pregnancy intention and patient satisfaction is relatively unexamined, a study by Humbert et al (2010) found that women who never wanted to be pregnant at the time of conception were less likely to be satisfied with both their prenatal care and primary prenatal care provider. Women with unwanted pregnancies were also more likely to perceive the level of concern shown from their prenatal care providers as insufficient. Humbert and colleagues' study is particularly relevant to this dissertation in that the data was derived from the same instrument used in the first empirical paper. A more comprehensive comparison of each study's methods and findings is found in Chapter 3.

Life Course Perspective

Although definitions of the life course perspective vary across disciplines, there are a number of common components relevant to the research questions and hypotheses in Chapters 4 and 5. Upon the surface, a life course perspective may seem indistinguishable from other multiple determinant frameworks, in that it recognizes the intersection of biological, psychosocial, and environmental contributors to health.

However, central to life course models is the inclusion of a temporal perspective, which acknowledges the impact of exposures across the life of the individual, and potentially across generations, as making a contribution to their health in early, mid, and later life (Ben-Shlomo and Kuh, 2002). As the life course perspective does not limit itself to risk factors which occur concurrently with outcomes of disease or health, proponents of the life course perspective often advocate for early intervention, including interventions with pregnant women, as a means for promoting health for persons of all ages (Halfon and Hochstein, 2002).

One of the principal models included under the umbrella of life course theory is the critical period model (WHO, 2000). Critical period models are based on Barker's (1998) fetal origins hypothesis, which proposes that intrauterine exposures and conditions may lead to poor health in later life. Critical period models also emphasize the influence of the environment on important developmental stages in infancy, childhood and adolescence (including childbirth), which in turn, greatly impact health in adulthood. Sensitive periods, which are often viewed as analogous to critical periods in that an exposure occurring at a particular stage of life has an effect on later development, are differentiated by a greater malleability to modify their impact following the exposure (Ben-Shlomo and Kuh, 2002).

Pregnancy and the Life Course

Pregnancy is viewed as a "critical period" in the life course for both mother and child. Known antenatal risks, such as exposure to cigarette smoking, are well established as to the negative impact on the child's physical and cognitive development. The events that take place during pregnancy may also play an important role in determining a

woman's future health. Gestational diabetes during pregnancy, for example, is a predictor of having diabetes at a later age. As Rich-Edwards (2002) argues, "the correlation between a woman's pregnancy outcomes and her mortality is plausible evidence that early life exposures of girls and young women set the course for lifelong health." Thus, a woman's pregnancy outcome is a measure of her own early health, as well as a potential determinant of her future health and the health of her child.

A life course perspective is also important to consider in terms of the impact of the unintended pregnancy on the mental health of the mother, child and family. An unintended pregnancy may be viewed as a stressful life event, which in turn, can negatively impact the mental and physical health of the mother while pregnant and following the birth of the child. As reviewed earlier, children born as the result of an unintended pregnancy, as well as their siblings are more likely to live in a home with inadequate social and emotional support (Axinn et al., 1998; Barber et al, 1999).

According to a life course perspective, these negative prenatal and early life experiences can lead to poorer health outcomes for these children as adults, and even impact future generations of children.

While it is rare, if not impossible, to find longitudinal data that examine women's lives from birth through the present, a lack of such information does not mean that a life course perspective must be entirely abandoned. In Chapters 4 and 5, a series of variables including the intentions and outcomes of prior pregnancies will be included in the analyses. Although these factors only measure relatively recent events, consideration of the cumulative influence over the reproductive life course is analogous to the goals of life course theory.

The life course perspective also influences the research hypotheses by challenging the assumptions that both women and health care providers may have regarding unintended pregnancy. The lack of research on women in the latter half of their reproductive life course reflects a perception that only adolescents and women in their early twenties are at risk for unintended pregnancy. Many women in their late thirties and early forties, for example, may falsely believe that they are no longer able to become pregnant. Providers may also concentrate their family planning counseling efforts on younger women, assuming that patients over age 30 are able to adequately prevent a pregnancy.

One model for a modified life course perspective guiding Chapters 4 and 5 is Misra, Guyer, and Allston's (2003) integrated perinatal health framework. The model incorporates both a life span approach with a multiple determinants model, which recognizes the contributions of "social, psychological, behavioral, environmental, and biological forces which shape pregnancy," (p.66) while incorporating the perspective that the outcome of a pregnancy is greatly influenced by factors occurring prior to conception. Although the intent of the framework was to focus on contributors to perinatal outcomes, the authors' proposal to integrate multiple determinants of reproductive health that acknowledges the life course is instructive for this research.

The integrated perinatal health framework divides women's reproductive life course into three periods: periconceptual, pregnancy, and menopause. Women who become and remain pregnant experience a prenatal, intrapartum, postpartum, and interconceptual periods (if they have additional children). Four paths of childbearing are recognized for women: those who begin childbearing in early adulthood, those with a

longer periconceptual period who delay childbearing, women who engage in late childbearing (late thirties to early forties), and the non-childbearing.

The motivation for this framework is well-aligned with the goals of this research. The authors' rationale begins within the presumption that factors associated with pregnancy outcomes are largely determined prior to conception. The authors further reference the high percentage of unintended pregnancies as a reason to promote behaviors during the periconceptual and interconceptual periods that support a healthy pregnancy regardless of intent.

The rationale for the integrated perinatal health framework also includes the shifting demography of childbearing. Misra and colleagues (2003) suggest that women who have delayed childbearing are faced with distinct biological and psychosocial issues that have often been ignored in the women's reproductive health literature. This point is central to Chapters 4 and 5, which proposes that as a woman ages, the cumulative influence of her experiences with pregnancy will influence her reproductive intention and choices.

The next chapter will presents the first of three empirical papers. The research questions and hypotheses in Chapter 3 are motivated by the Friendly AccessSM Program's intent to assess and improve upon pregnancy-related health services. As approximately two-thirds of the sample reported that their pregnancies were unintended, an interest emerged to examine if pregnancy intention influenced the sample's evaluation of satisfaction with prenatal and labor and delivery care. Analyses in Chapter 3 will examine the potential relationship between pregnancy intention and patient satisfaction

for both global and specific aspects of prenatal and hospital-based labor and delivery care.

Figure 2.1. Potential Effects of Unintended Pregnancy on Infant, Child, and Parental Health Outcomes

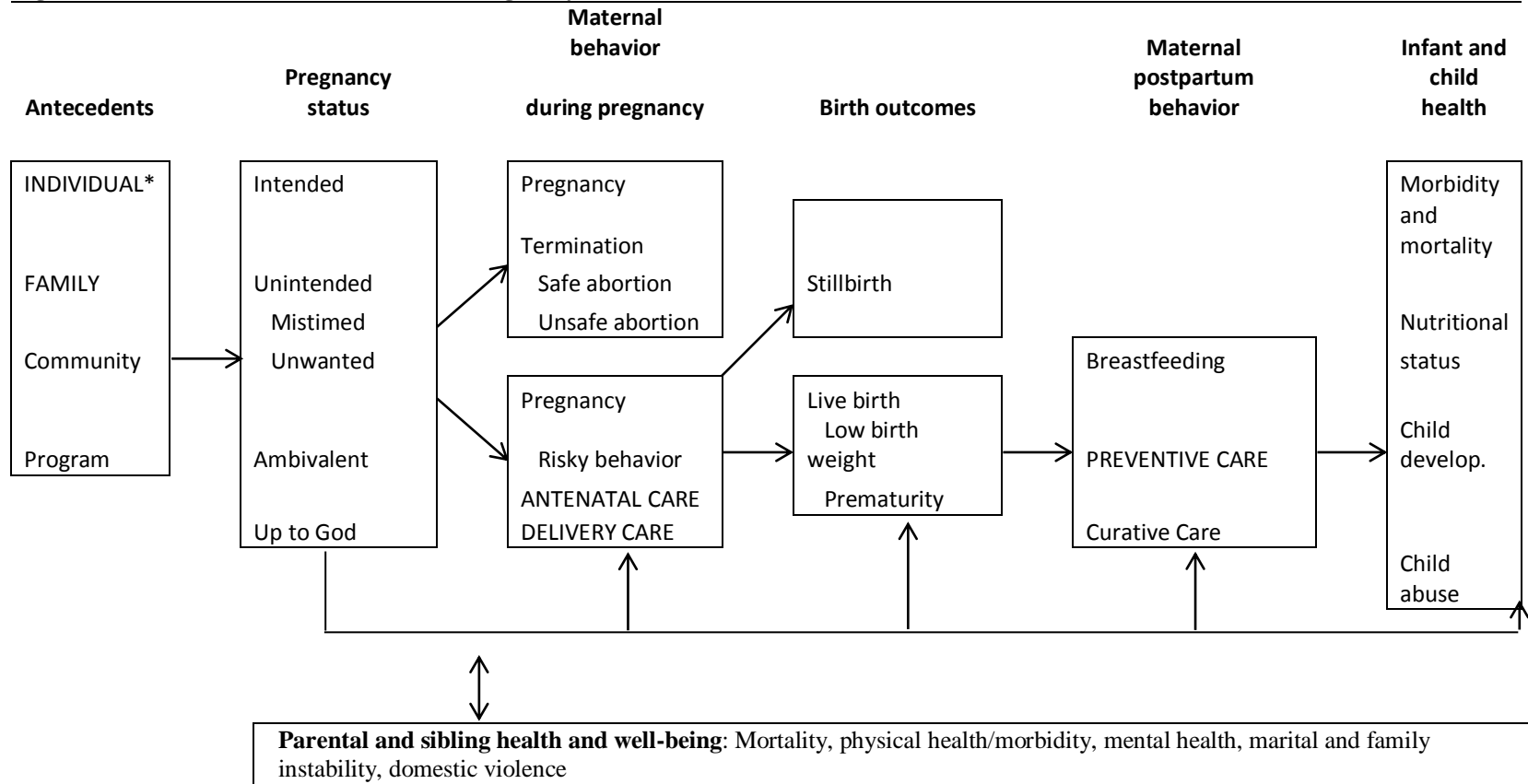


Figure adapted from Gipson JD, Koenig MA, Hindin MJ. 2008. The effects of unintended pregnancy on infant, child, and parental health: a review of the literature. *Studies in Family Planning* 39(1):18-38.

* Antecedents and effects in capital letters correspond to the research hypotheses in this dissertation: antenatal and delivery care in Chapter 3, individual and family antecedents of intent in Chapter 4, and preventive care in Chapter 5.

CHAPTER III

PAPER ONE

Satisfaction with Prenatal and Labor and Delivery Care: Does Pregnancy Intention Matter among Medicaid-eligible Women?

While objectives for pregnancy-related care generally speak to adherence to the recommended number of prenatal visits (Healthy People 2020), the quality of the clinical encounter remains an important consideration. Satisfaction with prenatal care and with labor and delivery services is a reflection of both patients' investment in and the quality of care they receive.

One commonly cited predictor of delayed entry into prenatal care is having an unintended pregnancy (Kost et al., 1998; Korenman et al., 2002). Late entry into prenatal care has the potential to result in negative health consequences for both the pregnant woman and the fetus. While intentionality may impact the timing of entry into prenatal care, the literature has rarely examined if pregnancy intention influences satisfaction once women are engaged in these services. Similarly, little is understood regarding the potential association between pregnancy intention and women's evaluation of their labor and delivery care in a hospital setting. This chapter attempts to address these gaps by testing the hypotheses that intentionality will influence women's satisfaction with both prenatal care and labor and delivery services.

One exception to this research gap is a recent study by Humbert et al (2010), which also utilized the Friendly AccessSM Survey to assess the relationship between

pregnancy intent and satisfaction among Medicaid-eligible women in Indianapolis, Indiana. The researchers found that women with an unwanted pregnancy were less likely to report high satisfaction with their prenatal care and prenatal care provider. Women with unwanted pregnancies were also more likely to assess the concern shown for them by providers as “poor” or “fair”. The research questions in this paper build upon these findings.

As poor women with an unintended pregnancy are arguably in great need of high quality services, it is important to understand how reproductive health services can be modified to best meet their needs. Evaluating the satisfaction of prenatal care services, especially for women from underserved populations, may provide valuable information to improve upon potential deficits. Using a sample of Medicaid-eligible women from the Flint, Michigan metropolitan area, it is hypothesized that women with unintended pregnancies are more likely to have a negative perception of their pregnancy related services compared to women with intended pregnancies, particularly if their pregnancies were unwanted. In terms of specific aspects of satisfaction, the research also expects to find the greatest differentiation in satisfaction with interpersonal aspects of both prenatal and labor and delivery care.

RESEARCH QUESTIONS AND HYPOTHESES

Research Question 1: Does pregnancy intention influence how women evaluate their prenatal care and their prenatal care provider?

Hypothesis 1a: Women with either mistimed or unwanted pregnancies will be less satisfied with their prenatal care than women with intended pregnancies. Women with unwanted pregnancies are expected to be the least satisfied with their prenatal care.

Hypothesis 1b: Women with either mistimed or unwanted pregnancies will be less satisfied with their prenatal care provider than women with intended pregnancies. Women with unwanted pregnancies are expected to be the least satisfied with their prenatal care provider.

Research Question 2: Does pregnancy intention influence how women evaluate specific aspects of prenatal care?

Hypothesis 2a: Women with unintended pregnancies will be less satisfied with their providers and staff at their place of care than women with intended pregnancies.

Hypothesis 2b: Women with unintended pregnancies will be less satisfied with their prenatal care provider's communication skills.

Hypothesis 2c: Pregnancy intention will not significantly influence satisfaction with the amenities at the place of prenatal care.

Research Question 3: Does pregnancy intention influence how women evaluate their labor and delivery care?

Hypothesis 3: Women with unintended pregnancies will be less satisfied with their labor and delivery care than women with intended pregnancies. Women with unwanted pregnancies will be the least satisfied with their labor and delivery care.

Research Question 4: Does pregnancy intention influence how women evaluate specific aspects of their labor and delivery care?

Hypothesis 4a: Women with unintended pregnancies will be less satisfied with the amount of perceived personal control during labor and delivery than women with intended pregnancies. Women with unwanted pregnancies will be the least satisfied with their amount of perceived personal control.

Hypothesis 4b: Pregnancy intention will not significantly influence satisfaction with hospital amenities.

This set of research hypotheses evaluates whether the experience of maintaining a pregnancy that was unintended will impact women's evaluation of health services related to their pregnancy. Women who have planned a pregnancy may be more enthusiastic about receiving care in the antenatal period. Similarly, these women may view their providers in a more favorable light. Although a positive attitude towards pregnancy may raise expectations for prenatal care that are unfulfilled, the negative

associations with an unintended pregnancy are expected to supersede any potential discrepancies between expectation and satisfaction. This logic extends to the expectations for stronger associations between unwanted pregnancies and the outcomes of interest compared to those that are mistimed.

Examining potential differences between women with intended and unintended pregnancies in the evaluation of specific aspects of prenatal care may offer information about the actual quality of care received and provide insight into this patient population through the lens of their expectations for care (Ware et al, 1983). In most satisfaction studies, ratings of global satisfaction tend to exceed ratings of satisfaction with specific aspects of care (Hodnett, 2002). Therefore, Hypotheses 2a and 2b expect to find the most marked variation in satisfaction scores between women with intended and unintended pregnancies for specific (versus global) measures of care. Although ratings of both amenities and interpersonal care have been associated with overall prenatal care satisfaction (Handler et al., 2003), the personal interactions with prenatal care providers and staff are hypothesized to be the most greatly influenced by pregnancy intention status.

Women's sense of personal control and involvement in decision making has consistently been associated with higher satisfaction with the birth experience (Goodman et al, 2004; Hodnett, 2002). Women with an unintended pregnancy, especially if that pregnancy is unwanted, may feel a weakened sense of control that carries over into the labor and delivery experience. Hypothesis 4a expects that measures of satisfaction with perceived personal control fostered by hospital-based providers will be more greatly influenced by pregnancy intention than satisfaction with hospital

amenities. Women's evaluation of personal control is similarly hypothesized to result in stronger associations with intent compared to global ratings of satisfaction with the hospital and general delivery care.

DATA AND MEASUREMENT

Survey Population

This study utilized data from the Friendly AccessSM Survey, a pilot study of maternal and child health services within the Flint, Michigan metropolitan area. The Flint area was one of four pilot communities included in a national community-based longitudinal study (Detman et al, 2008). Interviews were conducted with 358 Medicaid-eligible women following a live birth at one of three Genesee County, Michigan hospitals from July 2003 to January 2004. Hospital sub-samples from each facility were recruited proportionate to the percentage of births funded by Medicaid within that hospital. Patients were recruited by hospital staff and interviewed by trained lay members of the community, who in turn, were supervised by staff from the University of Michigan's Prevention Research Center.

The population interviewed in the survey closely mirrors the Medicaid-eligible population served in Genesee County at the time of data collection. Respondents' average age was 25.4 with an average parity of 2.4. African American (39.8%) and European American (54.5%) women were well represented; with a smaller proportion of Hispanic (7.3%) women interviewed. 41.6% of the sample had received an education beyond high school, while 34.6% had a high school diploma or GED, and 23.7% had not graduated from high school. In terms of pregnancy intention, the sample was almost evenly distributed among intended (33.6%), mistimed (34.2%), and unwanted (32.2%)

pregnancies. An overview of the sample's demographics according to women's pregnancy intention status is included in Table 3.1.

Measurement

Dependent Variables: Global Satisfaction Measures

A global measure of general satisfaction with prenatal care ("How would you rate your prenatal care?"), as well as the global measure of satisfaction with the prenatal care provider ("How would you rate your prenatal care provider?"), were based on responses to a 1 (least satisfied) to 10 (most satisfied) Likert scale. Since satisfaction scores tend to be skewed towards the upper end of the scale, the global measure for satisfaction with prenatal care was divided into three categories: low (0 to 6, 6.6%), medium (7-8, 21.5%), and high satisfaction (9-10, 71.9%). Global satisfaction with the prenatal care provider was similarly constructed, with 10.1% of the respondents reporting low, 20.3% medium, and 69.6% high satisfaction.

Three-category dependent variables were also created to capture global satisfaction with delivery care ("How would you rate your delivery care?") and with the hospital in which the respondent delivered her baby ("How would you rate the hospital?"). Responses were grouped into categories of low (0-6), medium (7-8), and high (9-10) satisfaction. 7.7% of women rated their satisfaction with their delivery care as low, with 18.8% of respondents rating their care as medium, and 73.5% as high. Women were also unlikely to report low satisfaction with the hospital (7.5%); with 19.7% rating their satisfaction as medium, and 72.8% as high.

Dependent Variables: Specific Measures of Satisfaction

Unlike global measures of patient satisfaction, which were based on a single question, scales of satisfaction with specific areas of prenatal care were derived using exploratory factor analysis to combine the responses of twenty-two survey questions into three common categories. The purpose of the factor analysis was to create a more parsimonious model of satisfaction with stronger measures, due to the cancelling of random error when variables are combined (Pett et al, 2003). According to Gorsuch (1983), survey data met the criteria for factor analysis, as the sample size was well over 200 and there were 4-5 variables per factor. This process varies from analyses by Humbert et al (2010), which chose to analyze selected survey questions individually to capture specific measures of satisfaction.

Factor analysis identified three factors that can be defined as distinct aspects of satisfaction with prenatal care. Categories included satisfaction with providers and staff at the place of care, satisfaction with primary provider communication, and satisfaction with the location of care's amenities. These three factors explained 66.31% of the total variance with initial eigenvalues over 1.0. Results of the factor analysis met two critical tests of significance; Bartlett's test of Sphericity had a Chi-Square of 5191.739, with 231 degrees of freedom and a significant p-value of 0.000, and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy equaled 0.945. The factor scores were further categorized into three ordinal variables: low, medium and high satisfaction. Appendix A presents a detailed description of the total variance explained and the structure matrix of the three factors, including the survey questions contained within each variable.

The first specific satisfaction measure, satisfaction with providers and staff at the location of care, encompasses the patient's level of comfort with the primary provider and support staff, thoroughness of explanations, respect and concern shown to the patient by office staff, and respondent's opinion as to the equitable treatment of patients. Satisfaction with primary provider communication incorporates an evaluation of sufficient time given to the patient, if the respondent felt comfortable with her provider, and how well questions presented to and explanations made by the woman's provider were mutually understood. Finally, satisfaction with the location of care's amenities captures the patient's assessment of waiting room appearance and atmosphere, location and cleanliness of the office, and quality of medical equipment.

Survey questions assessing specific aspects of satisfaction with hospital and delivery care were more limited and did not meet the criteria for factor analysis. Fewer questions were asked of respondents and questions alternated between dichotomous (yes/no) responses and Likert scales. In spite of these limitations, two distinct measures of satisfaction were created. Satisfaction with hospital amenities was based on the mean satisfaction score (a 1-4, low to high Likert scale) of questions related to: the cleanliness of the facilities; location; comfort; food; and parking. Scores were then redistributed into low, medium, and high satisfaction. A second measure assessed the amount of perceived personal control during labor and delivery. This measure was created by taking the cumulative number of affirmative responses to a series of yes/no questions including: how much control staff allowed the patient; if desired support people were permitted in the delivery room; if respondents were treated with respect; and if women received the desired amount of contact with the baby. The results were then further

divided into three categories of low, medium, and high perceived control. A listing of the survey questions used to construct satisfaction with personal control is found in Appendix B.

Pregnancy Intention

Pregnancy intention was based on response to the question, “Thinking back to just before you got pregnant, how did you feel about becoming pregnant?” Women who answered, “I wanted to be pregnant sooner,” or “I wanted to be pregnant then,” were classified as having an intended pregnancy. Women who responded, “I wanted to be pregnant later,” had their pregnancies labeled as mistimed, while women who chose, “I didn’t want to be pregnant then or any time in the future,” were placed into the category of unwanted pregnancies. Analyses using a dichotomous measure of pregnancy intention combined mistimed and unwanted pregnancies into a single category of unintended.

Socio-demographic Controls

A number of socio-demographic variables were included as controls in the analyses: age, race, education, marital status, parity and employment status. Both marital status and employment were recoded into yes/no variables. Race was recoded into three categories: European American, African American, and other race/ethnicity. Age was divided into five categories: 16 to 20, 21 to 22, 23 to 25, 26 to 29, and 30 to 42. Education was defined as less than high school, high school graduate or GED, or more than high school. Since all women were interviewed after the birth of a child, parity was defined as having one, two, three, or four or more children.

Quality of Care Measures

The American College of Obstetricians and Gynecologists, along with the American Academy of Pediatrics, recommends that prenatal care providers counsel their patients on a series of preventative and beneficial health behaviors during pregnancy (AAP, 2002). A series of fifteen yes/no questions largely adapted from the Centers for Disease Control and Prevention's Pregnancy Risk Assessment Monitoring System (PRAMS) survey (Colley et al, 1999) were used to ascertain provider thoroughness in the patient encounter. The full list of questions can be found in Appendix C. The number of positive responses was summed for each respondent and was then subdivided into three categories of high thoroughness (74.2%), medium thoroughness (22.0%), and low thoroughness (3.9%).

Access to providers was based on the number of affirmative responses to a series of questions focused on this issue, resulting in five categories from lowest access (2.1%) to highest (19.3%), with the most common group containing four positive responses (51.9%). Waiting times were also included as a measure of quality. Responses were divided into five categories based on average reported times: 0-15 minutes (67.2%), 16-30 minutes (15.2%), 31-45 minutes (7.2%), 46-60 minutes (8.4%), and over one hour (2.1%).

Due to the survey's focus on prenatal care, quality of care measures for labor and delivery care were unavailable. However, a variable concerning whether the birth was a vaginal (64.9%) or cesarean (35.1%) delivery was included in the analyses to account for the potential influence of a cesarean section on both global and specific measures of satisfaction.

ANALYSIS

Multinomial logistic regression was used for all analyses of the predictors of patient satisfaction, first for all global measures of satisfaction, secondly for specific elements of prenatal care, and separately for specific aspects of labor and delivery care. Logistic regression was first performed to examine potential relationships between a two-category definition of pregnancy intention (unintended v. intended) and satisfaction with both global and specific aspects of care. However, using a dichotomous measure of pregnancy intention consistently yielded weaker results compared to analyses where unwanted pregnancies were differentiated from those that were mistimed. This was consistent with the findings of Humbert and colleagues (2010) in their analyses of Friendly AccessSM data. Therefore, the results presented in this chapter will exclusively report on analyses using multinomial logistic regression to predict patient satisfaction. Women with the highest level of satisfaction were selected as the reference group. All analyses were performed using PASW[®] Statistics 17.0.

The potential influence of seven socio-demographic variables of interest (race, ethnicity, age, education, marital status, parity, and employment) was first examined. Socio-demographic variables that were significantly associated with either patient satisfaction and/or pregnancy intention were included as controls in their respective analyses. A similar process was also conducted for quality of care variables. Using multinomial logistic regression, associations between provider thoroughness, access to providers, and waiting times were tested for significance with pregnancy intention, as well as global and specific measures of prenatal care.

RESULTS

This section first presents the results for analyses of global satisfaction with prenatal care, followed by the three specific measures of satisfaction with prenatal care (with providers and staff at the place of care, with primary provider communication, and the location of care's amenities). Results will then be presented regarding satisfaction with labor and delivery care. These measures include global satisfaction with hospital and delivery care, as well as satisfaction with hospital amenities and perceived personal control during labor and delivery.

Global Satisfaction with Prenatal Care and the Prenatal Care Provider

Hypothesis testing for Research Question 1 revealed mixed results. There were no significant associations found between pregnancy intention and global satisfaction with prenatal care. However, pregnancy intention was significantly associated with overall satisfaction with the prenatal care provider. Women with an unwanted pregnancy were significantly more likely to have the lowest global satisfaction with their prenatal care providers (OR=3.82, p=.026).

Of the quality of care controls, both low (OR=19.57, p=.001) and medium (OR=4.12, p=.008) provider thoroughness were significantly associated with lowest satisfaction. Similarly, women who assessed their provider thoroughness as medium (OR=2.90, p=.002), were also more likely to report medium satisfaction their prenatal care provider. None of the socio-demographic controls (marital status, race, age and parity) were significantly associated with global satisfaction with the prenatal care provider. Details of the analysis are presented in Table 3.2.

Satisfaction with Specific Aspects of Prenatal Care

As proposed in Hypothesis 2b, pregnancy intention was found to be significantly associated with satisfaction with prenatal provider communication. Women with an unwanted pregnancy were significantly more likely to rate their satisfaction with provider communication as low (OR=3.61, p=.005). This finding is consistent with the hypothesis that women with unintended pregnancies are more likely to have an unfavorable view of their prenatal care provider, particularly if their pregnancy was unwanted. Detailed results of the analysis are presented in Table 3.3. Pregnancy intention status was not found to be significantly associated with either satisfaction with providers and staff at their place of care or the amenities of the clinical setting.

Of the control variables, ratings of low (OR=10.61, p=.035) and medium (OR=3.29, p=.005) provider thoroughness were significantly associated with lowest satisfaction with provider communication. Of the socio-demographic controls, African American respondents were significantly more likely to rate their satisfaction with provider communication as low (OR=4.52, p=.036) or medium (OR=5.46, p=.010).

Labor and Delivery Care

The proposed relationship between intent and satisfaction was examined on two levels: global satisfaction with hospital and delivery care, as well as satisfaction with hospital amenities and with the amount of perceived personal control during the delivery. Of these dependent variables, only personal control was found to be significantly associated with pregnancy intention status. Women with an unwanted pregnancy were more likely to rate their personal control in the low (OR=2.44, p=.034) or medium (OR=2.10, p=.032) categories. Women with a vaginal delivery were less

likely to rate their perceived personal control as low (OR=0.30, p=.000), or medium (OR=0.34, p=.000). Results of this analysis are presented in Table 3.4.

DISCUSSION

Significant findings support the research hypothesis that women with unintended pregnancies will have a more negative evaluation of their care. However, this was only the case for certain aspects of care: overall satisfaction with the prenatal care provider, satisfaction with the prenatal provider's communication, and the perceived sense of control during labor and delivery.

What does it mean that women with unwanted pregnancies had a less satisfactory evaluation of their prenatal care providers and their communication skills? According to discrepancy theory, women with an unwanted pregnancy should have higher satisfaction scores due to their tendency to have lower expectations for prenatal care (Omar et al, 2001). As this was not the case, one might look to differences in socio-demographic characteristics to explain this outcome. However, of the socio-demographic controls included in the analysis (race, education, marital status, age, and parity) only African American race was significantly (negatively) associated with provider communication. All of the women in the study were Medicaid-eligible, which also removes wide variation in socioeconomic status from the equation. Therefore, some unknown mechanism may be negatively influencing the prenatal care encounter between a pregnant woman and her provider. Perhaps there are conscious or unconscious biases against women who did not wish to become pregnant that emerge? One possibility is that providers may respond to women who are more enthusiastic about their pregnancy by spending more time answering questions. Conversely, women with unwanted

pregnancies may project their ambivalence towards the pregnancy into negative attitudes towards their providers.

Of the control measures that were included in the analysis, the strongest associations emerged between provider thoroughness and prenatal care satisfaction. Not surprisingly, provider thoroughness was strongly associated with satisfaction with the provider both globally and in terms of communication skills. Lower levels of satisfaction with provider communication were also reported by African American respondents. Since thoroughness was based on patient recall, at a minimum it appears that providers who spent time and communicated effectively had more satisfied patients. This not only illustrates that what happens in the clinical encounter influences how women evaluate their care, but suggests that if a pregnancy is known to be unwanted, that providers remain cognizant of how information is being received by the patient.

Women with unwanted pregnancies were also less likely to be satisfied with the amount of perceived control during labor and delivery. Even immediately following the birth of a healthy child, women with unwanted pregnancies openly reported that they did not intend to become pregnant at the time of that child's conception or at any time in the future. This finding suggests that the lack of control that women may have felt upon realizing that they were pregnant may carry over into the birthing process. Although it may prove difficult to identify women with unwanted pregnancies upon admission to the hospital, this finding underscores the need for providers to make every effort to help women understand their options and rights during the labor and delivery process.

Analyses that failed to yield significant associations between pregnancy intention and patient satisfaction also support the importance of the clinical encounter. For

example, pregnancy intention was not significantly associated with the amenities at either the hospital or the prenatal care site. Overall satisfaction with global prenatal and labor and delivery care was also not impacted by intent. This suggests that for women with unwanted pregnancies, the more superficial aspects of care are not as central to satisfaction compared to how they are treated on a more intimate basis by their primary care providers.

The results also reveal a number of considerations for future research on unintended pregnancy. First, analyses were uniformly stronger when unintended pregnancies were split into two categories; supporting the findings in the literature that a dichotomous model of pregnancy intention obscures the differences between mistimed and unwanted pregnancies (Humbert et al, 2010; Santelli et al, 2009; Gipson, 2008). In fact, mistimed pregnancies were not significantly associated with any of the global or specific satisfaction measures. With the exception of the significance between African American race and satisfaction with provider communication, none of the other socio-demographic control variables (e.g., age, education, marital status) were significantly associated with satisfaction. Therefore, future research should not assume that certain groups of women are more or less likely to be satisfied with their pregnancy related care.

The findings in this chapter both confirm and contradict those recently published by Humbert et al (2010). It is important to note that while analyses were based on the same survey, populations and methods of measuring satisfaction varied. Both this analysis as well as the former in Indianapolis found that women with unwanted pregnancies rated their prenatal care provider as low. The Indianapolis study also found that women with unwanted pregnancies were more likely to report that their provider

showed an inadequate amount of concern, which is analogous to the broader finding in this chapter regarding provider communication. In contrast to the findings presented here, Humbert and colleagues did find a significant negative relationship between global satisfaction with hospital care and unwanted pregnancy, yet did not report results for perceived personal control. As both of these studies were conducted in a single metropolitan area with small samples, additional research is needed to explore the relationship between pregnancy intention and satisfaction.

Limitations

The Friendly AccessSM Program was intended to evaluate access and quality of pregnancy related health care services for low-income women with no private health insurance. The small sample of Medicaid eligible women from one metropolitan area in Michigan was not intended to be representative of all women of reproductive age, so results should be interpreted with caution. The wide confidence intervals found in the results further illustrate the exploratory nature of this analysis. In terms of measurement, the breadth of questions assessing satisfaction with labor and delivery was considerably limited, making it impossible to control for quality of care.

Reporting on prenatal care immediately post-partum raises a number of concerns related to bias. Respondents were limited to those with healthy babies; therefore satisfaction scores may have been biased upward (Omar et al, 2001) in response to this positive outcome. The retrospective assessment of this survey also raises the possibility of recall bias in terms of both accurately remembering the intent of the pregnancy as well as the details of their prenatal care experience. As data was collected through in-person interviews, response bias may have also affected the data. Although

approximately two-thirds of the sample reported a pregnancy as either mistimed or unwanted, some women may have been hesitant to acknowledge that their pregnancy was unintended at conception. Similarly, respondents may have upgraded their evaluations of providers and care in response to concerns about offending the interviewer.

CONCLUSION

This research suggests that women with unwanted pregnancies may be more likely to have a negative evaluation of their prenatal care provider and their communication skills, as well as be less satisfied with their perceived sense of control during labor and delivery. At a minimum, these results show that women with unwanted pregnancies, regardless of their ambivalence towards the pregnancy, are not indifferent to the care they receive.

Both providers and patients may benefit from provider's attempts to ascertain the intentionality of a woman's pregnancy. Women with unintended pregnancies are more likely to engage in a range of harmful behaviors during pregnancy (Brown and Eisenberg, 1995; Williams et al, 2006). Gaining an awareness of a woman's feeling of ambivalence may improve provider communication in regards to these behaviors. Enhanced communication and trust with a provider may also help women increase their sense of control, which in turn, could improve the labor and deliver experience and possibly even the eventual transition to motherhood.

The next chapter turns away from intentionality as an independent variable to examine the antecedents of pregnancy intention. While the analyses are not directly

connected, expanding our understanding of the predictors of pregnancy intention may lead to improved quality and subsequent satisfaction with pregnancy related services.

Table 3.1. Demographic Characteristics of the Sample according to Pregnancy Intention Status of Most Recent Birth

	<i>Intended</i> n (%)	<i>Mistimed</i> n (%)	<i>Unwanted</i> n (%)	<i>Total</i>
Age				
16 to 20	14 (21.54%)	38 (58.46%)	13 (20.00%)	65
21 to 22	23 (32.39%)	26 (36.62%)	22 (30.99%)	71
23 to 25	24 (29.27%)	27 (32.93%)	31 (37.80%)	82
26 to 29	27 (38.57%)	18 (25.71%)	25 (35.71%)	70
30 to 42	29 (50.88%)	9 (15.79%)	19 (33.33%)	57
Race				
African American	39 (28.68%)	40 (29.41%)	57 (41.91%)	136
European American	66 (35.48%)	76 (40.86%)	44 (23.66%)	186
Other	8 (40.00%)	3 (15.00%)	9 (45.00%)	20
Education				
< High School	22 (26.51%)	29 (34.94%)	32 (38.55%)	83
High School/GED	37 (30.33%)	40 (32.79%)	45 (36.89%)	122
> High School	58 (40.56%)	50 (34.97%)	35 (24.48%)	143
Marital status				
Married	43 (50.59%)	29 (34.12%)	13 (15.29%)	85
Not Married	74 (28.14%)	90 (34.22%)	99 (37.64%)	263
Parity				
First Birth	35 (33.02%)	51 (48.11%)	20 (18.87%)	106
Second Birth	44 (37.61%)	44 (37.61%)	29 (24.79%)	117
Third Birth	19 (27.54%)	15 (21.74%)	35 (50.72%)	69
Fourth or Higher	19 (33.93%)	9 (16.07%)	28 (50.00%)	56
Currently employed (not counting maternity leave)				
Yes	39 (31.20%)	48 (38.40%)	38 (29.69%)	125
No	78 (34.98%)	71 (31.84%)	74 (33.19%)	223
Total	117 (33.62%)	119 (34.20%)	112 (31.84%)	348

Table 3.2. Odds Ratios from Multinomial Logit Regression Assessing the Association between Pregnancy Intention and Global Satisfaction with Prenatal Care Provider

	<i>Lowest Satisfaction (95% CI)</i>	<i>Medium Satisfaction (95% CI)</i>
<i>Pregnancy Intention</i> [†]		
Unwanted	3.81* (1.18-12.37)	1.30 (.56-3.01)
Mistimed	1.73 (.54-5.51)	1.94 (.94-3.99)
<i>Control Variables</i>		
Low Provider Thoroughness	19.57** (3.66-104.71)	1.93 (.32-11.76)
Medium Provider Thoroughness	4.12** (1.44-11.76)	2.90** (1.46-5.78)
Waiting Times		
0-15 minutes	0.42 (.04-4.55)	0.19 (.03-1.44)
15-30 minutes	0.67 (.05-8.53)	0.32 (.04-2.63)
31-45 minutes	4.72 (.33-68.61)	0.90 (.09-8.82)
46-60 minutes	0.96 (.06-14.88)	0.48 (.05-4.28)
Lowest Access	2.86 (.32-25.87)	0.78 (.06-9.60)
Moderately Low Access	2.54 (.61-10.62)	2.31 (.69-7.75)
Medium Access	0.69 (.17-2.81)	1.29 (.45-3.69)
Moderately High Access	0.36 (.11-1.20)	1.32 (.55-3.17)
Unmarried	1.82 (.51-6.53)	1.65 (.77-3.51)
European American	0.43 (.09-2.04)	1.79 (.35-9.15)
African American	0.40 (.09-1.87)	1.92 (.38-9.77)
Age 16 to 20	1.66 (.27-10.13)	1.41 (.39-5.09)
Age 21 to 22	1.17 (.21-6.76)	2.60 (.78-8.60)
Age 23 to 25	1.43 (.27-7.49)	2.41 (.75-7.77)
Age 26 to 29	2.18 (.43-10.96)	2.22 (.69-7.17)
First Birth	2.79 (.56-13.80)	1.99 (.66-6.01)
Second Birth	1.74 (.42-7.31)	1.52 (.53-4.33)
Third Birth	1.56 (.36-6.79)	1.00 (.32-3.14)

[†] References include: highest satisfaction; intended pregnancy; high provider thoroughness; more than 60 minute average waiting times; highest access; married; other race/ethnicity; age 30 and over; 4th or higher order birth.

*p<0.5; **p<.01

Table 3.3. Odds Ratios from Multinomial Logit Regression Assessing the Relationship between Pregnancy Intention and Satisfaction with Prenatal Care Provider Communication

	<i>Lowest Satisfaction (95% CI)</i>	<i>Medium Satisfaction (95% CI)</i>
<i>Pregnancy Intention</i> †		
Unwanted	3.61** (1.46-8.88)	1.87 (.82-4.26)
Mistimed	1.53 (.69-3.39)	0.94 (.46-1.91)
<i>Control Variables</i>		
Low Provider Thoroughness	10.61* (1.18-95.47)	1.31* (.11-15.47)
Medium Provider Thoroughness	3.29 ** (1.43-7.57)	1.32 (.57-3.01)
Unmarried	1.28 (.58-2.84)	1.29 (.63-2.66)
European American	1.78 (.45-7.12)	2.34 (.67-8.25)
African American	4.52* (1.10-18.57)	5.46* (1.50-19.92)
Age 16 to 20	2.82 (.80-9.56)	1.68 (.56-5.08)
Age 21 to 22	1.63 (.50-5.26)	1.24 (.46-3.36)
Age 23 to 25	1.84 (.59-5.73)	1.20 (.45-3.20)
Age 26 to 29	1.57 (.51-4.83)	0.65 (.24-1.73)
First Birth	0.61 (.19-1.96)	0.39 (.14-1.11)
Second Birth	0.74 (.25-2.20)	0.54 (.21-1.42)
Third Birth	0.94 (.30-2.97)	0.55 (.19-1.58)

† References include: highest satisfaction; intended pregnancy; high provider thoroughness; married; other race/ethnicity; age 30 or older; and 4th or higher order birth.

*p<.05; **p<.01

Table 3.4. Odds Ratios from Multinomial Logit Regression Assessing Associations between Pregnancy Intention and Satisfaction with Perceived Personal Control during Labor and Delivery

	<i>Lowest Satisfaction (95% CI)</i>	<i>Medium Satisfaction (95% CI)</i>
<i>Pregnancy Intention</i> [†]		
Unwanted	2.44* (1.07-5.56)	2.10* (1.07-4.11)
Mistimed	2.01 (0.91-4.46)	1.49 (0.78-2.84)
<i>Control Variables</i>		
Vaginal Delivery	0.30** (0.16-.057)	0.34** (0.20-0.59)
Unmarried	1.59 (0.71-3.56)	1.13 (0.60-2.14)
Age 16 to 20	2.32 (0.72-7.43)	1.37 (0.47-3.95)
Age 21 to 22	1.28 (0.43-3.76)	1.73 (0.69-4.37)
Age 23 to 25	1.33 (0.47-3.76)	1.68 (0.68-4.18)
Age 26 to 29	1.12 (0.38-3.30)	2.29 (0.93-5.63)
First Birth	0.47 (0.16-1.39)	0.93 (0.38-2.27)
Second Birth	0.50 (0.19-1.35)	0.65 (0.28-1.50)
Third Birth	0.68 (0.24-1.92)	0.70 (0.29-1.72)
Less than High School	0.81 (0.35-1.91)	1.20 (0.99-4.03)
High School Graduate/GED	0.66 (0.32-1.35)	0.59 (0.45-1.57)

[†] References include: highest satisfaction; intended pregnancy; high provider thoroughness; married; other race/ethnicity; age 30 or older; and 4th or higher order birth.

*p<.05; **p<.01

Appendix A. Total Variance Explained and Structure Matrix for Specific Prenatal Care Satisfaction Factors

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	10.726	48.753	48.753	10.726	48.753	48.753	9.743
2	2.491	11.324	60.077	2.491	11.324	60.077	5.225
3	1.370	6.229	66.306	1.370	6.229	66.306	7.175

Structure Matrix

	Component		
	Place of Care: Providers and Staff	Provider Communication	Place of Care: Amenities
How often were the questions answered in ways that you understood?		.803*	
How often do you think your provider understood what you said or asked?		.579	
How often did you feel comfortable telling your provider about your worries or problems?		.741	
How often did you provider give your enough time to talk about your worries or problems?	.421	.835	
How often did you think the provider spent enough time with you?		.826	

How often did the provider go over the results of any lab tests done on you?		.576	
How would you rate the place where you got prenatal care when thinking about the location of the office?			.776
How would you rate the place where you got prenatal care when thinking about the modernness of the medical equipment?	.596		.797
How would you rate the place where you got prenatal care when thinking about the cleanliness of the office or clinic?	.606		.770
How would you rate the place where you got prenatal care when thinking about the technical skills of your provider?	.819		.557
How would you rate the place where you got prenatal care when thinking about how comfortable the provider made you feel?	.862	.473	.488
How would you rate the place where you got prenatal care when thinking about how thorough your check ups were?	.862	.408	.494
How would you rate the place where you got prenatal care when thinking about the comfort of the waiting room?	.617		.842
How would you rate the place where you got prenatal care when thinking about the attractiveness of the office of your provider?	.592		.847
How would you rate the place where you got prenatal care when thinking about how comfortable the nurses or receptionists made you feel?	.793		.635
How would you rate the place where you got prenatal care when thinking about how well your provider explained procedures to you?	.874	.406	.468

How would you rate the place where you got prenatal care when thinking about how available people were to talk to about the food you ate during your pregnancy?	.707		.564
How would you rate the place where you got prenatal care when thinking about the respect your provider showed you?	.878	.426	.458
How would you rate the place where you got prenatal care when thinking about the concern your provider showed you?	.860	.451	.540
How would you rate the place where you got prenatal care when thinking about the atmosphere of the waiting room?	.589		.871
How would you rate the place where you got prenatal care when thinking about the helpfulness of the advice you received in how to keep yourself and your baby healthy during your pregnancy?	.856	.406	.567
How would you rate the place where you got prenatal care when thinking about whether the care provided was the same for all patients no matter how they pay for their medical care?	.845	.403	.617

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

* All of the questions in the component matrix were assigned to one of three specific prenatal care satisfaction categories. Categorical assignments are identified by the result in bold font.

Appendix B: Questions Used to Evaluate Personal Control during Labor and Delivery

1. Did you feel like you had some control over what was happening to you during your labor and delivery?
2. Did the labor and delivery staff ask you about what you wanted to happen during labor and delivery?
3. Did the labor and delivery staff allow you to decide when family members could be present during labor?
4. Did labor and delivery staff allow you to decide when other support people could be present?
5. Do you feel labor and delivery staff did things that respected your wishes for you labor and delivery?
6. Do you feel the person who delivered your baby did things that respected your wishes for your labor and delivery?
7. Did the person who delivered your baby treat you with courtesy and respect?
8. Was that person as helpful as you thought s/he should be?
9. Did the person who delivered your baby treat you in a friendly way?
10. Did you get to decide the amount of contact you had with your baby?

Appendix C: Assessment of Preventative Subjects Covered by the Prenatal Care Provider Used to Evaluate Provider Thoroughness

	<i>During any of your prenatal care visits did your provider talk with you about</i>
1.	What should you eat during your pregnancy
2.	How smoking during pregnancy could affect your baby
3.	Breast-feeding your baby
4.	How drinking alcohol during pregnancy could affect your baby
5.	Using a seat belt during pregnancy
6.	Birth control methods to use after your pregnancy
7.	The kinds of medicines that were safe to take during pregnancy
8.	How using illegal drugs could affect your baby
9.	How your baby grows and develops during your pregnancy
10.	What to do is your labor starts early
11.	Did your provider tell you about any classes where you could get more information about your pregnancy?
12.	How to keep from getting HIV (the virus that causes AIDS)
13.	Getting you blood tested for HIV (the virus that causes AIDS)
14.	Physical abuse to women by their husbands or partners
15.	Taking vitamin folic acid to prevent birth defects

CHAPTER IV

PAPER TWO

The Effect of Pregnancy History and Age of Conception on Pregnancy Intention: Predictors of Intentionality throughout the Reproductive Life Course

Every year in the United States, approximately 5% of all women of reproductive age experience an unintended pregnancy (Finer and Henshaw, 2006). While the percentage of unintended pregnancies decreases as women age, unintended pregnancy is not a phenomenon exclusive to younger women. In 2001, 23% of women ages 30-44 labeled their pregnancies as unintended, including 13% as unwanted (Chandra et al, 2005); yet the reproductive health literature on unintended pregnancy tends to focus almost exclusively on adolescents and women in their early twenties.

Patterns of unequal distribution of unintended pregnancy are well established in the research literature. In 2001, Hispanic (54%) and non-Hispanic black women (69%) were more likely than non-Hispanic white women (40%) to report a pregnancy as unintended (Finer and Henshaw, 2006). Of women ages 25-44, 61% of those with less than a high school education reported an unintended pregnancy compared to 18% with a bachelor's degree or higher (Chandra et al, 2005). Between 1994 and 2001, the rate of unintended pregnancy among low-income women increased by 29%, while simultaneously declining by 8% for women at or above 200% of poverty. Women who have never been married or are in cohabitating relationships were also more likely to report an unintended pregnancy (Finer and Henshaw, 2006). However, research

regarding the antecedents of unintended pregnancy rarely looks beyond these socio-demographic factors. This chapter attempts to address this gap, by hypothesizing that as a woman ages, factors related to her pregnancy history may become increasingly important predictors of pregnancy intention.

Understanding the antecedents of unintended pregnancy in non-adolescent women of childbearing age becomes more critical as women increasingly delay childbearing or remain voluntarily childless (Abma and Martinez, 2006). There are legitimate reasons for reproductive health professional and policy makers to focus on the prevention of unintended pregnancies in younger women. Children born to adolescent mothers are at greater risk for a range of both long- and short-term consequences (Jaffee et al, 2001) that may become further exacerbated for the entire family unit with a rapid repeat pregnancy (Boardman et al, 2006). However, prevention of unintended pregnancies in older reproductive-aged women, especially if those pregnancies are unwanted, is worthy of attention as well.

RESEARCH QUESTIONS AND HYPOTHESES

Research Question 1: Is pregnancy history significantly associated with pregnancy intention?

Hypothesis 1a: Women with a history of prior unintended pregnancy will be more likely to report a subsequent pregnancy as unintended.

Hypothesis 1b: Women with a younger age at first birth will be more likely to report their pregnancy as unintended.

Hypothesis 1c: Women with a history of pregnancy loss will be less likely to report the pregnancy as unintended.

Hypothesis 1d: The expected relationships in Hypotheses 1a-1c are expected to be stronger for women with unwanted as opposed to mistimed pregnancies.

Hypothesis 1e: The inclusion of pregnancy history factors will weaken the influence of socio-demographic controls.

Research Question 2: Does the relationship between pregnancy history and pregnancy intention change as women age?

Hypothesis 2: The predicted associations between pregnancy history and pregnancy intention will strengthen as women age, especially if the pregnancy is unwanted.

The hypotheses in this chapter propose that socio-demographic factors alone are insufficient predictors of pregnancy intention. Instead, Hypotheses 1a-1c will test how women's life experiences, in particular those factors related to pregnancy history, may impact the intentionality of subsequent pregnancies. Hypothesis 1a proposes that women with a history of unintended pregnancy will be more likely to experience a subsequent unintended pregnancy. Similarly, ideas about established patterns of non-planning influenced Hypothesis 1b, which expects that younger age of first pregnancy, when the pregnancy is more likely to be unintended, will be positively associated with a later unintended pregnancy. Klerman (2000) supports the conceptualization of non-planners when she argues that the academic concept of intentionality holds little relevance for the many women who simply assume that a number of pregnancies will occur at some point in their lives. Therefore, this group gives little thought to the planning of pregnancies. A continued lack of access to acceptable contraception, which can act as a significant barrier to planning a pregnancy, is also expected to contribute to these hypothesized relationships.

Conversely, women with at least one previous pregnancy loss are expected to report fewer later pregnancies as unintended (Hypothesis 1e). Considering that at least half of all pregnancies are reported as intended (Finer and Henshaw, 2006), women experiencing a pregnancy loss following an intended pregnancy are hypothesized to possess a strong desire to become pregnant again in the future.

Among unintended pregnancies, differences are expected in the strength and significance of the associations between independent variables and mistimed and unwanted pregnancies (Hypothesis 1d). Research treating pregnancy intention as a dichotomous construct (intended v. unintended) tends to overestimate the effects of mistimed pregnancies while underestimating the influence of unwanted pregnancies (Gipson, 2008). Therefore, the hypothesized relationships are generally expected to be stronger for unwanted pregnancies than mistimed.¹

The inclusion of pregnancy history factors as potential antecedents of pregnancy intention is also expected to attenuate the influence of socio-demographic controls (Hypothesis 1e). This proposed effect includes an expected diminished influence of a woman's age at conception on intentionality. Similarly, the inclusion of pregnancy history is expected to mediate the influence of race/ethnicity, marital status, mother's education, and parity.

As a woman ages, she is more likely to have experienced multiple pregnancies and pregnancy outcomes. Hypothesis 2 proposes that the cumulative effect of these experiences related to pregnancy history will exert the greatest influence on the intentionality of subsequent pregnancies for women ages 30-44. Women ages 30-44 are not only more likely to have been pregnant, but may also possess the emotional maturity for their pregnancy-related experiences to influence behaviors conducive to pregnancy prevention and planning.

According to the Expanded Health Belief Model (EHBM) (Rosenstock et al, 1988), there are a number of factors that predict preventive behavior. According to the

¹ There are a few notable exceptions to this hypothesis. A stronger association is expected between women with a history of at least one previous mistimed pregnancy and a subsequent mistimed pregnancy. Mistiming is also expected to be strongly associated with younger age.

EHBM, in order for a woman to engage in a health behavior, such as using contraception to prevent or space a pregnancy, she must first possess sufficient motivation to follow through with the behavior. Secondly, the woman must believe that she is susceptible to an unintended pregnancy, also referred to as a perceived threat. Third, a woman needs to believe that the outcome of a planned (or prevented) pregnancy will be sufficiently beneficial to outweigh the costs, or barriers, to engaging in the behavior. Finally, the woman must feel that she has the self-efficacy (Bandura, 1977), or perceived competence, to follow through with the prevention and planning behaviors.

The EHBM informs Hypothesis 2 in that as women mature, they are expected to be more likely to engage in the type of thoughtful calculus that the EHBM proposes. As women age and achieve desired parity, they are expected to perceive an unintended pregnancy as more undesirable, and therefore may be more highly motivated to take steps to prevent these pregnancies. Women in their thirties and forties may also find the costs of prevention and planning, such as the affordability of contraception or having employment with maternity benefits, to be less prohibitive. Finally, as women age they are also hypothesized to possess higher self-efficacy in the behaviors associated with the prevention of unintended pregnancies.

DATA AND MEASUREMENT

Analyses in this chapter are based on pregnancy and woman-level files from Cycle 7 of the National Survey of Family Growth (NSFG). The 2010 release of the NSFG contains the results of interviews from a nationally representative sample of 7,356 women, ages 15-44, from 33 Primary Sampling Units. Of the women interviewed, 4,524 women reported 12,221 pregnancies and 8,466 live births. All

completed pregnancies were included in the analyses regardless of the outcome. Interviews were conducted continuously 48 weeks of each year between June, 2006 and June, 2008. Women, teens, non-Hispanic blacks and Hispanics were oversampled. The response rate was 76%. A more detailed summary of the sampling and weighting methods is discussed elsewhere (Lepkowski et al, 2010).

Dependent Variable – Pregnancy Intention

Pregnancy intention was based on the response to the questions, “Right before you became pregnant, did you yourself want to have a(nother) baby at any time in the future?” and, “So would you say you became pregnant too soon, at about the right time, or later than you wanted?”. Women who became pregnant at the right time or later than desired were classified as having an intended pregnancy. Pregnancies to women who wanted to have a child in the future but became pregnant too soon were labeled as mistimed. An unwanted pregnancy was the result of the woman not wanting to become pregnant for the first time or again at any time in the future. Pregnancies where women answered “didn’t care” or “didn’t know” were excluded from the analysis (n=162). All analyses used intended pregnancies as the reference category.

Independent Variables – Socio-demographic Controls

Depending on the model, age at the time of conception was treated as either a continuous or categorical variable. Categorical age at conception was divided into four groups: adolescents (women under age 20), early twenties (ages 20-24), late twenties (ages 25-29), and women 30 and over (ages 30-44). The reference category for categorical age at conception, ages 20-24, was selected in order to best assess changes in predictors of pregnancy intention as women age. The selection of women in their early

twenties permits analyses of both younger and older women, while avoiding any potential skewing associated with pregnant adolescents as the reference group. As a group, women who became pregnant between ages 20-24 also most closely mirror the average distribution of pregnancy intention in this study's population.

For race/ethnicity, analysis was limited to Hispanic, non-Hispanic white, and non-Hispanic black women, with non-Hispanic white women as the reference group. The category of other race/ethnicity and/or multiple race was excluded from the analysis due to the small sample size (n=580) and inherent heterogeneity in this variable. Since data was unavailable for income level at the time of conception, the respondent's mother's highest level of educational attainment (mother's education) was used as a proxy for socio-economic status. Mother's education was separated into four categories of less than high school, high school graduate or GED, some college, and bachelor's degree or higher, which was used as the reference. Marital status was measured at the time of conception for each pregnancy, and was organized into four categories: married (reference); widowed, divorced or separated (one category); cohabitating; and never married and not cohabitating (never married). Parity was defined as the total number of live births at the time of conception. Parity was subdivided into five categories of no/zero children, one child, 2 children, three children, and four or more children (reference). The percentage of pregnancies according to pregnancy intention status, socio-demographic characteristics, and age at conception is summarized in Table 4.1.

Independent Variables – Pregnancy History

Age at first pregnancy was divided into the same four categories used for categorical age at conception. In order to measure prior pregnancy intention, three

dichotomous lagged dummy variables were created, which were coded as 1 if a woman had ever had an intended, mistimed, or unwanted pregnancy. For example, a woman whose first pregnancy was reported as mistimed, would be coded as 1 for prior mistimed pregnancy for all subsequent pregnancies. Prior intended pregnancy was used as the reference category. A similar process was used to create variables for the construct of prior pregnancy outcome, which included live birth (reference), elective abortion, and pregnancy loss (miscarriage or stillbirth). Women who responded that they were currently pregnant (n=330) were excluded from the analysis. Due to the severe underreporting of elective abortion in the NSFG (USDHHS, 2010), results for this control variable will not be interpreted. Interaction terms were also created by multiplying continuous age of conception with prior pregnancy intention and prior pregnancy outcomes. The percentage of pregnancies according to pregnancy intention status, pregnancy history, and categorical age at conception is summarized in Table 4.2.

ANALYSIS

This analysis explores the relationship between pregnancy history, age at conception, and pregnancy intention. Of the women who were ever pregnant, respondents averaged a mean of 2.37 pregnancies; therefore analyses needed to contend with a lack of statistical independence for multiple pregnancies from the same woman. Pregnancies from the same women share certain constant socio-demographic characteristics (i.e., race/ethnicity) as well as a common pregnancy history for higher order pregnancies. Two-level multinomial generalized hierarchical linear modeling (HLM) with a reference category of intended pregnancy was chosen to address this concern. Level 1 variables were drawn from the NSFG pregnancy file, while Level 2

variables were selected from woman-level NSFG data. Population-averaged models are reported, as subject-specific models with random effects for individuals were unable to converge and thus could not be used. Therefore, sample weights were only included at Level 2. Analyses were also limited to those factors that could be directly linked to the time of conception for each individual pregnancy (e.g., marital status at the time of conception).

Four stages of analysis were performed. The first stage (Model 1) provides a baseline exploration of the relationship between socio-demographic factors and pregnancy intention. Particular attention was paid to the association between categorical age of conception and pregnancy intention. Model 2 assesses the role of pregnancy history as a predictor of pregnancy intention, focusing on how the inclusion of such factors may mediate the influence of socio-demographic predictors from Model 1, especially categorical age at conception.

A main interest of this analysis was to learn more about pregnancy intention as women age. Model 4 expands upon the analysis in Model 2 with the inclusion of interaction terms between age and prior pregnancy intention, as well as age and prior pregnancy outcomes. In the interest of parsimony, continuous age at conception was utilized to create the interaction terms. In order to assess the impact of these interaction terms, Model 3 replicates the analysis in Model 2, but replaces categorical age with a continuous variable.

With the exception of age at first pregnancy, which was removed from the analysis, Models 5-8 replicate Model 2 in separate analyses for each of the four categorical age groups. Separate analyses provided an opportunity for direct

comparison, as well as evidence for a particular age group driving or obscuring results in Model 2. Results from Models 5-8 could also prove useful in explaining potential results from the interaction terms used in Model 4.

Two sets of formulas are presented below which include Level 1 and Level 2 models for the relationship between pregnancy history and pregnancy intention. Level 1 variables were derived from pregnancy-level data, while Level 2 variables came from woman-level files. As the dependent variable was multinomial, formulas for both mistimed and unwanted pregnancies are included at both levels of analysis. Models for Level 1 and Level 2 are presented separately here, but were combined into a single model for analyses in HLM. The first set of formulas presents a model of the relationship between pregnancy intention and pregnancy history with interaction terms (Model 4). The second set of formulas presents Level 1 and Level 2 models for separate analyses of the relationship between pregnancy history and pregnancy intention by categorical age at conception (Model 8). As Hypothesis 2 proposes a strengthening of the expected associations as women age, the formulas for women ages 30-44 at conception are included.

Level 1 Model of the relationship between pregnancy intention and pregnancy history with interaction terms (Model 4)

$$\text{Prob}[Y(1) = 1|B] = P(1)$$

$$\text{Prob}[Y(2) = 1|B] = P(2)$$

$$\text{Prob}[Y(3) = 1|B] = P(3) = 1 - P(1) - P(2)$$

$$\begin{aligned} \log[P(1)/P(3)] = & B0(1) + B1(1)*(AGECON) + B2(1)*(WIDDIVSE) + \\ & B3(1)*(COHABIT) + B4(1)*(NEVMAR) + B5(1)*(CHILDLES) + B6(1)*(CHILD1) + \\ & B7(1)*(CHILD2) + B8(1)*(CHILD3) + B9(1)*(CSUM_MIS) + \\ & B10(1)*(CSUM_UNW) + B11(1)*(CSUM_AB) + B12(1)*(CSUM_PLS) + \\ & B13(1)*(AGEPMIS) + B14(1)*(AGEPUNW) + B15(1)*(AGEPAB) + \\ & B16(1)*(AGEPPL) \end{aligned}$$

$$\begin{aligned} \log[P(2)/P(3)] = & B0(2) + B1(2)*(AGECON) + B2(2)*(WIDDIVSE) + \\ & B3(2)*(COHABIT) + B4(2)*(NEVMAR) + B5(2)*(CHILDLES) + B6(2)*(CHILD1) + \\ & B7(2)*(CHILD2) + B8(2)*(CHILD3) + B9(2)*(CSUM_MIS) + \\ & B10(2)*(CSUM_UNW) + B11(2)*(CSUM_AB) + B12(2)*(CSUM_PLS) + \\ & B13(2)*(AGEPMIS) + B14(2)*(AGEPUNW) + B15(2)*(AGEPAB) + \\ & B16(2)*(AGEPPL) \end{aligned}$$

Level 2 Model of the relationship between pregnancy intention and pregnancy history with interaction terms (Model 4)

$$\begin{aligned} B0(1) = & G00(1) + G01(1)*(NHBLACK) + G02(1)*(HISPANIC) + G03(1)*(LESSHS) + \\ & G04(1)*(HSGED) + G05(1)*(SCOLLEGE) + G06(1)*(P1UND20) + G07(1)*(P12024) \\ & + G08(1)*(P12529) \end{aligned}$$

$$\begin{aligned} B0(2) = & G00(2) + G01(2)*(NHBLACK) + G02(2)*(HISPANIC) + G03(2)*(LESSHS) + \\ & G04(2)*(HSGED) + G05(2)*(SCOLLEGE) + G06(2)*(P1UND20) + G07(2)*(P12024) \\ & + G08(2)*(P12529) \end{aligned}$$

Level 1 Model of the relationship between pregnancy intention and pregnancy history for women ages 30-44 at conception (Model 8)

$$\begin{aligned} \text{Prob}[Y(1) = 1|B] &= P(1) \\ \text{Prob}[Y(2) = 1|B] &= P(2) \\ \text{Prob}[Y(3) = 1|B] &= P(3) = 1 - P(1) - P(2) \end{aligned}$$

$$\begin{aligned} \log[P(1)/P(3)] = & B0(1) + B1(1)*(WIDDIVSE) + B2(1)*(COHABIT) + \\ & B3(1)*(NEVMAR) + B4(1)*(CHILDLES) + B5(1)*(CHILD1) + B6(1)*(CHILD2) + \\ & B7(1)*(CHILD3) + B8(1)*(CSUM_MIS) + B9(1)*(CSUM_UNW) + \\ & B10(1)*(CSUM_AB) + B11(1)*(CSUM_PLS) \end{aligned}$$

$$\begin{aligned} \log[P(2)/P(3)] = & B0(2) + B1(2)*(WIDDIVSE) + B2(2)*(COHABIT) + \\ & B3(2)*(NEVMAR) + B4(2)*(CHILDLES) + B5(2)*(CHILD1) + B6(2)*(CHILD2) + \\ & B7(2)*(CHILD3) + B8(2)*(CSUM_MIS) + B9(2)*(CSUM_UNW) + \\ & B10(2)*(CSUM_AB) + B11(2)*(CSUM_PLS) \end{aligned}$$

Level 2 Model of the relationship between pregnancy intention and pregnancy history for women ages 30-44 at conception (Model 8)

$$\begin{aligned} B0(1) = & G00(1) + G01(1)*(NHBLACK) + G02(1)*(HISPANIC) + G03(1)*(LESSHS) + \\ & G04(1)*(HSGED) + G05(1)*(SCOLLEGE) \end{aligned}$$

$$\begin{aligned} B0(2) = & G00(2) + G01(2)*(NHBLACK) + G02(2)*(HISPANIC) + G03(2)*(LESSHS) + \\ & G04(2)*(HSGED) + G05(2)*(SCOLLEGE) \end{aligned}$$

Models at Levels 1 and 2 contain two sets of equations: the first for unwanted (1) and the second for mistimed (2) pregnancies. The Level 1 model proposes that pregnancy intention is a function of marital status, parity, continuous age at conception (first set of models only), history of pregnancy intention and pregnancy outcome, and the interaction between age and pregnancy history (first set of models only). Marital status includes three variables: the single category of widowed, divorced, or separated (WIDDIVSE), cohabitating (COHABIT), and never married and not cohabitating (NEVMAR). Parity includes the four variables: zero children (CHILDLES), one child (CHILD1), two children (CHILD2) and three children (CHILD3). History of pregnancy intention is represented in the formula by prior mistimed (CSUM_MIS) and prior unwanted (CSUM_UNW) pregnancies. Prior elective abortion (CSUM_AB) and history of pregnancy loss (CSUM_PLS) are also included for past pregnancy outcomes. Interaction terms are represented at Level 1 by continuous age by: past mistimed pregnancy (AGEPMIS), past unwanted pregnancy (AGEPUNW), prior elective abortion (AGEPAB), and prior pregnancy loss (AGEPPL).

Level 2 models propose that pregnancy intention is simultaneously a function of race and ethnicity, respondent's mother's highest level of education, and in the first set of models, categorical age at first pregnancy. Both non-Hispanic black (NHBLACK) and Hispanic (HISPANIC) women are included in the models. Respondent's mother's educational attainment includes the variables less than high school (LESSHS), high school graduate or GED (HSGED), and some college (SCOLLEGE). For models testing Hypothesis 1, categorical age of conception at first pregnancy includes under age 20 (P1UND20), ages 20-24 (P12024), and 25-29 (P12529).

RESULTS

Model 1: Socio-demographic Variables and Pregnancy Intention

In order to establish a baseline for the relationship between pregnancy intention and age, a population-averaged fixed effects model (Model One) was run with socio-demographic characteristics that could be directly linked to the conception of each individual pregnancy. Results are summarized in Table 4.3. For all results, a positive coefficient means that a woman with either a mistimed or unwanted pregnancy is more likely to fall into a particular category (e.g. never married) compared to women with an intended pregnancy while a negative coefficient means that she is less likely.

All three age at conception categories in Model 1 were significantly associated with mistimed pregnancies. Compared to women ages 20-24 at conception, adolescents were more likely to report a mistimed pregnancy, while women ages 25-29 and 30-44 were less likely. Marital status was also significantly associated with mistimed pregnancies in Model 1. Compared to women who were married at the time of conception, women who were widowed, divorced, or separated (single category), cohabitating, or had never been married were more likely to report their pregnancies as mistimed. In terms of parity, women with no live births were more likely to experience a mistimed pregnancy while women with one or two children were less likely. Race/ethnicity and mother's education were not found to be significantly associated with mistimed pregnancies.

Unwanted pregnancies in Model One were also significantly associated with age at conception, although only for pregnancies conceived by women under age 20, who were more likely to have an unwanted pregnancy compared to women ages 20-24. In

terms of race and ethnicity, non-Hispanic black women were significantly more likely to experience an unwanted pregnancy. Women who were never married, cohabitating, and widowed, divorced or separated, as well as women whose mothers had a high school education or had completed some college were also more likely to have an unwanted pregnancy. Compared to women with four or more children, a negative association was found between women with one, two, or three children and unwanted pregnancy.

Model 2: Pregnancy History and Pregnancy Intention

Model 2, also summarized in Table 4.3, includes three variables related to pregnancy intention (categorical age at first pregnancy, prior pregnancy intention, and prior pregnancy outcome) in addition to the socio-demographic controls from Model 1. The purpose of the inclusion of pregnancy history variables in Model 2 is two-fold: to assess the predictive value of pregnancy history on pregnancy intention and to examine if the presence of such factors mediates the association between socio-demographic controls and intent.

Prior pregnancy intention was found to be significantly associated with the intention of subsequent pregnancies. Women with a previous unwanted pregnancy were significantly more likely to report a future pregnancy as mistimed or unwanted. Women with a history of at least one mistimed pregnancy were also more likely to report a later pregnancy as mistimed.

Prior pregnancy outcome was also found to be significantly associated with pregnancy intention. Women with a history of pregnancy loss were less likely to report a subsequent pregnancy as mistimed or unwanted. Categorical age at first pregnancy was also associated with pregnancy intention, but the findings ran counter to

hypothesized expectations, as women whose first pregnancy occurred as an adolescent were less likely to report a mistimed pregnancy.

In terms of socio-demographic controls in Model 2, younger age continued to be significantly associated with pregnancy intention. Adolescent women were more likely than women ages 20-24 to have both mistimed and unwanted pregnancies, while women ages 25-29 were less likely. Women ages 30-44 were also significantly less likely to have a mistimed pregnancy compared to the reference group. Being unmarried, cohabitating, or widowed, divorced, or separated at the time of conception remained significantly associated with reports of mistimed pregnancy compared to married women. Women who were cohabitating or never married were also more likely to have an unwanted pregnancy. Women with no live births were more likely to have an unintended pregnancy, while the opposite relationship was found for women with two children. Race/ethnicity, as well as mother's education, with the exception of a negative association between mother's who had completed high school and mistimed pregnancy, was not significantly associated with pregnancy intention in Model 2.

Models 3 and 4: Pregnancy History, Pregnancy Intention, and Interaction Terms

Model 3 replicates the analyses in Model 2 with the exception of age as a continuous, as opposed to categorical variable. Results between Models 2 and 3 were largely consistent, with the only notable exception being that all three categorical age of first pregnancy variables (< 20, 20-24, and 25-29) were negatively associated with mistimed pregnancies compared to women who first became pregnant between ages 30-44. Continuous age of conception was negatively associated with both mistimed and unwanted pregnancies, meaning that as women age, they are less likely to experience an

unintended pregnancy. Results for analyses from both Models Three and Four are summarized in table 4.4.

In the interaction model (Model 4), the interaction terms indicate if the effect of age differs for a particular category (e.g., past mistimed pregnancy) compared to the reference of women with an intended pregnancy. Significant and positive interactions were found between age and prior mistimed pregnancy, prior unwanted pregnancy, and a history of pregnancy loss for both mistimed and unwanted pregnancies. The inclusion of these interaction terms, however, rarely altered the significance of the associations found in Models 2 and 3. Compared to Model 3, the addition of interaction terms resulted in a newly significant negative association between prior mistimed pregnancy and subsequent unwanted pregnancy, while the association between prior unwanted pregnancy and subsequent unwanted pregnancy found in Model 3 was no longer significant.

Models 5 through 8: Pregnancy History and Pregnancy Intention by Categorical Age of Conception

Models 5-8 ran analyses similar to Model 2 (with the omission of categorical age at first pregnancy), but did so separately for each of the four categorical age groups. The results of these analyses are summarized in Table 4.5. Women of all ages with a history of mistimed pregnancy were more likely to report a later pregnancy as mistimed. Similarly, all age groups with a history of unwanted pregnancy were more likely to experience a subsequent unwanted pregnancy. Prior pregnancy outcomes continued to be significantly associated with pregnancy intention in separate analyses. Women of all ages with at least one prior pregnancy loss were less likely to report a later pregnancy as unwanted or mistimed.

In terms of socio-demographic findings, women of all ages who were never married at the time of conception were more likely to report an unwanted or mistimed pregnancy. Adolescents and women ages 20-24 in cohabitating relationships at the time of conception were also more likely to have an unwanted or mistimed pregnancy. Women who were widowed, divorced, or separated were more likely to label their pregnancy as mistimed at ages 20-24, and as unwanted as adolescents or at ages 25-29.

Race/ethnicity was rarely associated with pregnancy intention in Models 5-8. Non-Hispanic black women were less likely to report a mistimed pregnancy between ages 20-24, while more likely to label a pregnancy as unwanted between ages 25-29. Mother's education was also rarely significant. Women ages 30-44 whose mother's highest educational attainment was a high school diploma or GED were less likely to report a mistimed or unwanted pregnancy. Women in this age groups whose mothers had attended some college were similarly less likely to report an unwanted pregnancy.

DISCUSSION

Models 1 and 2

Pregnancy history, as proposed in Research Question 1, was found to be a significant predictor of pregnancy intention in a nationally representative sample of reproductive aged women. This result was most strongly exhibited through the positive relationship between prior pregnancy intention and the intentionality of subsequent pregnancies. In comparing the influence of prior mistimed and unwanted pregnancies, the largest and most consistent coefficients were found between history of unwanted pregnancy and a subsequent unwanted pregnancy. This finding suggests that women

who have previously become pregnant after achieving desired parity may be considered at greater risk for additional unwanted pregnancies.

In contrast, the relationship between age at first pregnancy and intention of subsequent pregnancies contradicted the expectations in Hypothesis 1b. While younger age at first pregnancy was predicted to increase the risk of a later unintended pregnancy, women who first became pregnant as adolescents were less likely to report a mistimed pregnancy. One potential explanation is that women who become pregnant at an earlier age are more highly motivated to take steps to prevent unintended pregnancies in the future. An alternative explanation is that women who first become pregnant as adolescents may not view subsequent pregnancies as mistimed. Boardman and colleagues (2006) found that 34% of adolescent mothers reporting a rapid repeat pregnancy classified the higher order pregnancy as intended. The timing of a subsequent pregnancy that for example, results in the expansion of an existing family unit, may not be perceived as sooner than desired.

Analyses also revealed some unexpected findings related to socio-demographic controls. In Model 2, no significant associations were found between race/ethnicity and pregnancy intention. Non-Hispanic black women were more likely to report an unwanted pregnancy in Model 1, but the significance of this association was attenuated by the inclusion of pregnancy history. While the effect of pregnancy history on race/ethnicity confirms Hypothesis 1e, this lack of statistical significance was surprising given the consistency with which non-Hispanic black women have reported higher rates of unintended pregnancy (Finer and Henshaw, 2006). This suggests that race and

ethnicity may not be as strong of an antecedent of pregnancy intention as previously assumed.

The inclusion of pregnancy history in Model 2 was also expected to mediate the influence of categorical age at conception on pregnancy intention that was clearly present in Model 1. Instead, the association between categorical age and intent was actually stronger in Model 2 compared to Model 1. Age at conception before 20, for example, continued to be significantly associated with mistimed pregnancies, but resulted in larger coefficients in Model 2 (1.458) compared to Model 1 (0.809). Considering that significance associated with three other socio-demographic controls (marital status, race/ethnicity, mother's education, and parity) generally weakened between Models 1 and 2, one possible explanation is that the factors associated with pregnancy history are more closely aligned with socio-demographic variables other than age.

Models 3-8

Although the inclusion of pregnancy history may not mediate the influence of categorical age at conception on pregnancy intention, significant interactions were found between continuous age and pregnancy history and distinct differences were observed when analyses were conducted separately according to categorical age group (Models 5-8). The inclusion of interaction terms did reverse the finding between past intent and subsequent intention found in Model 2 (as well as Models 5-8) where past unwanted pregnancies were no longer significantly associated with subsequent unwanted pregnancies. The simultaneous change that past mistimed pregnancies were now significantly associated with subsequent unwanted pregnancies in the interaction model

(Model 4), does not negate the overall potential for prior intent as a factor in intentionality.

The relationship between prior unwanted and subsequent unwanted pregnancies, while statistically significant for all age groups, became slightly stronger as women aged. A similar pattern was found for the relationship between a history of mistimed pregnancy and subsequent reports of mistiming. This finding supports Hypothesis 2, suggesting that as women age the experience of previous pregnancies is more likely to influence intent.

While the differences were small, the results for pregnancy loss ran counter to the expectations in Hypothesis 2. While a history of at least one pregnancy loss was negatively associated with subsequent unintended pregnancy for respondents of all ages, the smallest coefficients were found for women ages 30-44. It is possible that younger women, perhaps with fewer children, may feel more compelled to become pregnant after a pregnancy loss compared to women with an established or larger family.

The relationship between marital status and pregnancy intention in Models 5-8 is also worthy of noting. Compared to women who were married at conception, unmarried women were consistently more likely to have an unintended pregnancy. Cohabitation, however, which is commonly acknowledged as a predictor of unintended pregnancy (Finer and Henshaw, 2006), was only significant for women under age 25 at conception. This finding suggests that the influence of a cohabiting relationship on pregnancy intention may shift as women age. By their mid-twenties, women may feel more confident in their abilities to raise a child in a cohabitating relationship. Further, the characteristics of that relationship may also be more supportive of planning a pregnancy.

This finding may be reflective of broader societal trends where it has become more acceptable for women to consciously choose to have children outside of marriage.

Policy Implications

The results of this study suggest that the antecedents of pregnancy intention are reflective of a woman's experiences with pregnancy history. This finding is particularly relevant for women 30 and over, who have been largely ignored in the research on intentionality. Further, predictors of pregnancy intention may not always align themselves with common perceptions of women who became pregnant at an earlier age. These findings may have implications for clinical practice. Suggestions for providers, as well as methodological considerations for research on pregnancy intention, are discussed in this section.

Providers may wish to consider looking beyond a woman's history of pregnancy outcomes to consider the history of past pregnancies. Currently, clinical practice guidelines from both the American College of Obstetricians and Gynecologists (AAP, 2007) and the U.S. Preventive Services Task Force (2011) do not mention the potential assessment of pregnancy intention during prenatal care or contraceptive counseling. While the U.S. Preventive Services Task Force does recommend counseling to prevent unintended pregnancy, its recommendations are limited to a, "careful sexual history [that] should take into account the individual preferences, abilities and risks of each patient" (USPSTF, 2011). An assessment of prior intent as part of a clinical prenatal, postpartum, or preconception preventive visit could aid providers in the identification of women most in need of contraceptive counseling. This is a particularly salient point for

the counseling of women in their 30s and 40s, as the significance of the relationship between past and subsequent unintended pregnancy grew stronger as women aged.

These recommendations are also in line with the intentions of the Patient Protection and Affordable Care Act (ACA). With a shift towards an increased emphasis on preventive care highlighted in the ACA, in 2011 the Institute of Medicine's Committee on Preventive Services for Women released recommendations to the U.S. Department of Health and Human Services regarding changes in clinical preventive services for women. Among these recommendations includes the provision of, "the full range of Food and Drug Administration-approved contraceptive methods, sterilization procedures, and patient education and counseling for all women with reproductive capacity (IOM, 2011). If this change occurs, coverage barriers for contraception will weaken, allowing practitioners to more easily counsel women on the most appropriate method based on their individual needs. A more complete assessment of a woman's pregnancy history could aid practitioners in finding such a method.

The results of this chapter may also run counter to common assumptions regarding pregnancy loss in younger women. Adolescent women may actually desire to become pregnant following a pregnancy loss, and it should not be assumed that this outcome is a relief to younger women. Similarly, women who became pregnant at a younger age were less likely to report an unintended pregnancy. Providers should not assume that women who first became pregnant at as adolescents are less able to effectively plan pregnancies in the future.

In terms of methodology, analyses were strengthened by the use of HLM for hypothesis testing. The NSFG has an inherent nesting of multiple pregnancies within

respondents, resulting in a lack of statistical independence between the intentionality of each individual pregnancy. The majority of studies of intentionality that have utilized NSFG data, however, have chosen logistic regression methods, which either assume independence between pregnancies or are unable to take advantage of the data by limiting analyses to one pregnancy per respondent.

Another strength of the analysis was the exclusion of socio-demographic controls that could not be directly linked to the timing of each pregnancy's conception. Borrero et al (2010), for example, utilized a woman's highest educational attainment at the time the survey was administered as constant for all pregnancies. Failing to recognize how such factors can change for women over time ignores the concerns related to the life course that are central to this analysis.

Limitations

Utilization of NSFG presents a number of limitations associated with the retrospective nature of the data. Women reported on pregnancies that may have occurred more than ten years prior, so there is significant potential for recall bias regarding the circumstances associated with each pregnancy. This is especially disconcerting for the history of pregnancy intention at the time of conception, as research has found that women's reporting of intent may shift both during pregnancy as well as postpartum (Poole et al, 2000). Retrospective questioning also eliminated the inclusion of certain variables within the analyses. Information on respondents' income, for example, was only collected at the time of the survey's intake. Therefore, it was impossible to align all desired controls with the timing of pregnancy conception.

The in-person interview process may also result in response bias, as respondents may be hesitant to reveal the socially undesirable experience of an unintended pregnancy. However, the underreporting of unintended pregnancies, especially those that were unwanted, should lead to more conservative estimates within the models.

Two of the pregnancy history constructs, prior pregnancy intention and prior pregnancy outcome, are imperfect measures. A women reporting on her fourth pregnancy, for example, could have experienced a live birth, one pregnancy loss, and one elective abortion. The respondent would then have all three prior outcome categories coded as 1 in analyses of this higher order pregnancy. Likewise, a respondent could have experienced multiple pregnancies that were mistimed, intended, and unwanted. While the possibility of more than one positive designation per construct reflects the complexity of women's experiences throughout the reproductive life course, it does raise concerns regarding the comparative value of the measurement.

A final limitation of the analysis was the inability to include sample weights at the pregnancy level (Level 1). Attempts at running subject-specific models that included random effects for individuals resulted in non-convergence. Considering that the NSFG is intended to be nationally representative of women ages 15-44, it could be argued that the exclusion of these weights in favor of a population-averaged analysis is acceptable.

CONCLUSION

In summary, pregnancy history, especially prior mistimed and unwanted pregnancies, was found to be positively associated with subsequent unintended pregnancies in a nationally representative sample of women ages 15-44. Reports of

unintended pregnancy were negatively associated with a history pregnancy loss. Categorical age at conception remained strongly associated with unintended pregnancy, especially mistimed pregnancies, even following the inclusion of pregnancy history variables in Model 2. Positive associations were also found for the interaction between age and pregnancy history in Model 4. Future research on the antecedents of pregnancy intention should consider factors that reflect the complexity of women's lives throughout their reproductive life course.

Results regarding the relationship between pregnancy history and pregnancy intention varied when analyses were conducted separately for each age group. Associations between prior and subsequent unwanted pregnancy were generally the strongest for women ages 30-44. Conversely, the negative association between a history of pregnancy loss and unintended pregnancy was strongest for adolescent women.

A woman's clinical pregnancy history should include an assessment of past intentionality, especially for the counseling of women in the later stages of their reproductive life course. The intention of pregnancies for women ages 30 and over were found to be strongly influenced by past intent, yet this group is often ignored in the literature on intentionality. The next chapter will focus on the role of pregnancy intention on prevention services that are particularly relevant for women over age 30: utilization of contraception in the interval between pregnancies and the election of tubal sterilization.

Table 4.1. Percentage of Pregnancies According to Pregnancy Intention Status, Socio-Demographic Characteristics and Categorical Age of Conception

Variable	% Intended (n)	% Mistimed (n)	% Unwanted (n)
Race and Hispanic Origin			
Non-Hispanic Black			
<20 at conception	19.49 (197)	53.41 (540)	27.10 (274)
20-24 at conception	39.24 (412)	33.33 (350)	27.43 (288)
25-29 at conception	51.26 (284)	20.58 (114)	28.16 (156)
30-44 at conception	56.67 (187)	13.33 (44)	30.00 (99)
Hispanic			
<20 at conception	29.57 (262)	49.89 (442)	20.54 (182)
20-24 at conception	51.18 (522)	30.39 (319)	17.55 (179)
25-29 at conception	62.22 (448)	20.00 (144)	17.78 (128)
30-44 at conception	68.35 (324)	12.45 (59)	19.20 (91)
Non-Hispanic White			
<20 at conception	21.77 (256)	58.93 (693)	19.30 (227)
20-24 at conception	48.87 (779)	36.51 (582)	14.62 (233)
25-29 at conception	72.46 (968)	16.62 (222)	10.93 (146)
30-44 at conception	78.17 (924)	10.07 (119)	11.76 (139)
Marital Status at Conception			
Never Married and not Cohabiting			
<20 at conception	14.53 (1927)	60.82 (1172)	24.65 (475)
20-24 at conception	29.33 (339)	44.38 (513)	26.30 (304)
25-29 at conception	42.89 (169)	29.19 (115)	27.92 (110)
30-44 at conception	46.19 (91)	16.75 (33)	37.06 (73)
Cohabiting			
<20 at conception	32.50 (248)	47.18 (360)	20.31 (155)
20-24 at conception	44.69 (471)	33.78 (356)	21.54 (227)
25-29 at conception	55.34 (290)	21.18 (111)	23.47 (123)
30-44 at conception	60.38 (160)	14.72 (39)	24.91 (66)
Widowed/Divorced/Separated			
<20 at conception	45.00 (9)	25.00 (5)	30.00 (6)
20-24 at conception	36.17 (51)	32.62 (46)	31.21 (44)
25-29 at conception	33.55 (51)	29.61 (45)	36.84 (56)
30-44 at conception	41.10 (67)	17.18 (28)	41.72 (68)
Married			
<20 at conception	49.04 (178)	38.02 (138)	12.95 (47)
20-24 at conception	64.89 (852)	25.59 (336)	9.52 (125)
25-29 at conception	77.27 (1190)	13.57 (209)	9.16 (141)
30-44 at conception	82.07 (1117)	8.96 (122)	8.96 (122)

Variable	% Intended (n)	% Mistimed (n)	% Unwanted (n)
Less than High School			
<20 at conception	30.55 (326)	48.17 (514)	21.27 (227)
20-24 at conception	52.03 (642)	30.15 (372)	17.83 (220)
25-29 at conception	60.22 (504)	20.79 (174)	19.00 (159)
30-44 at conception	67.00 (404)	13.10 (79)	19.90 (120)
High School Graduate/GED			
<20 at conception	22.52 (250)	53.69 (596)	23.78 (264)
20-24 at conception	42.36 (535)	35.63 (450)	22.01 (278)
25-29 at conception	65.79 (577)	17.45 (153)	16.76 (147)
30-44 at conception	76.82 (497)	7.88 (51)	15.30 (99)
Some College			
<20 at conception	14.56 (83)	65.61 (374)	19.82 (113)
20-24 at conception	45.25 (329)	38.34 (278)	16.51 (120)
25-29 at conception	70.78 (356)	14.51 (73)	14.71 (74)
30-44 at conception	70.50 (270)	12.53 (48)	16.97 (65)
Bachelor's Degree or Higher			
<20 at conception	17.18 (56)	58.59 (191)	24.23 (79)
20-24 at conception	47.05 (207)	34.32 (151)	18.64 (82)
25-29 at conception	66.92 (263)	20.36 (80)	12.72 (50)
30-44 at conception	74.79 (264)	12.46 (44)	12.75 (45)
Parity			
No Children			
<20 at conception	13.0 (141)	62.3 (674)	24.6 (266)
20-24 at conception	24.8 (288)	44.5 (516)	30.6 (355)
25-29 at conception	46.4 (359)	26.9 (208)	26.6 (206)
30-44 at conception	60.2 (404)	15.6 (105)	24.1 (162)
1 Child			
<20 at conception	27.9 (455)	54.3 (887)	17.8 (291)
20-24 at conception	57.7 (697)	33.1 (400)	9.1 (110)
25-29 at conception	83.0 (589)	11.7 (83)	5.4 (38)
30-44 at conception	88.6 (365)	7.3 (30)	4.1 (17)
2 Children			
<20 at conception	30.4 (130)	39.8 (170)	29.7 (127)
20-24 at conception	56.1 (539)	27.4 (263)	16.5 (159)
25-29 at conception	74.3 (512)	16.4 (113)	9.4 (65)
30-44 at conception	83.5 (430)	8.3 (43)	8.2 (42)
3 Children			
<20 at conception	35.0 (28)	26.3 (21)	38.8 (31)
20-24 at conception	30.1 (121)	26.1 (105)	43.8 (176)
25-29 at conception	65.3 (252)	15.8 (61)	18.9 (73)
30-44 at conception	66.7 (206)	14.2 (44)	19.1 (59)

Variable	% Intended (n)	% Mistimed (n)	% Unwanted (n)
4 or More Children			
<20 at conception	16.7 (1)	16.7 (1)	66.7 (4)
20-24 at conception	38.3 (59)	27.9 (43)	33.8 (52)
25-29 at conception	47.0 (111)	20.3 (48)	32.6 (77)
30-44 at conception	60.7 (150)	9.3 (23)	30.0 (74)
Total			
20-24 at conception	23.27 (715)	54.51 (1675)	22.23 (683)
25-29 at conception	46.75 (1713)	34.14 (1251)	19.10 (700)
30-44 at conception	65.13 (1700)	18.39 (480)	16.48 (430)
30-44 at conception	72.26 (1435)	11.18 (222)	16.57 (329)

Table 4.2. Percentage of Pregnancies According to Pregnancy Intention Status, Pregnancy History (Prior Intention and Outcomes), and Categorical Age of Conception

Variable	% Intended (n)	% Mistimed (n)	% Unwanted (n)
Prior Pregnancy Intention			
Prior Intended			
<20	72.8 (311)	19.2 (82)	8.0 (34)
20-24	69.8 (1200)	18.3 (314)	11.9 (205)
25-29	71.6 (1288)	15.2 (274)	13.1 (236)
30-44	75.5 (1251)	10.5 (174)	14.0 (232)
Prior Mistimed			
<20	22.9 (185)	60.3 (487)	16.8 (136)
20-24	38.6 (699)	43.9 (795)	17.5 (316)
25-29	30.3 (646)	31.2 (400)	18.5 (238)
30-44	54.3 (490)	23.9 (216)	21.8 (197)
Prior Unwanted			
<20	11.9 (54)	18.9 (86)	69.2 (315)
20-24	20.4 (183)	14.7 (132)	64.8 (581)
25-29	26.6 (180)	12.4 (84)	61.0 (413)
30-44	72.2 (1555)	11.4 (245)	16.4 (354)
Prior Pregnancy Outcome			
Prior Live Birth			
<20	29.6 (279)	41.5 (392)	28.9 (273)
20-24	47.4 (1131)	29.1 (695)	23.5 (561)
25-29	61.5 (1237)	18.3 (369)	20.1 (405)
30-44	69.2 (1189)	12.1 (208)	18.7 (321)
Prior Abortion			
<20	20.6 (76)	46.3 (171)	33.1 (122)
20-24	32.0 (242)	38.4 (291)	29.6 (224)
25-29	45.0 (243)	22.8 (123)	32.2 (174)
30-44	57.7 (254)	11.4 (245)	16.4 (354)
Prior Pregnancy Loss			
<20	22.3 (97)	43.3 (181)	33.5 (140)
20-24	50.3 (465)	28.6 (265)	21.1 (195)
25-29	66.2 (546)	15.8 (130)	18.1 (149)
30-44	71.6 (653)	11.7 (107)	16.7 (152)

Table 4.3. Fixed Effects of Pregnancy History and Socio-Demographic Factors on Pregnancy Intention

Variable	Model 1†		Model 2	
	Mistimed	Unwanted	Mistimed	Unwanted
Age at Conception				
<20	0.809**	0.908**	1.458**	1.452**
20-24	Ref	Ref	Ref	Ref
25-29	-0.913**	-0.217	-1.163**	-0.452**
30-44	-1.559**	-0.139	-1.766**	-0.362
Race and Ethnicity				
Non-Hispanic Black	0.028	0.510*	-0.045	0.200
Hispanic	-0.103	0.096	-0.043	-0.252
Non-Hispanic White	Ref	Ref	Ref	Ref
Marital Status				
Married	Ref	Ref	Ref	Ref
Widowed/Div./Separated	1.195**	1.724**	0.991**	0.904
Cohabiting	0.640**	0.982**	0.632**	0.672**
Never Married	1.532**	1.776**	1.610**	1.736**
Mother's Education				
< High School	-0.003	0.386*	-0.126	-0.074
High School/GED	-0.224	0.158	-0.264*	-0.282
Some College	-0.227	0.513**	0.092	-0.146
Bachelor's or Higher	Ref	Ref	Ref	Ref
Parity				
No Children	0.447*	-0.327	1.201**	1.329**
1 Child	-0.708**	-2.168**	0.311	-0.011
2 Children	-0.679**	-1.443**	-0.974**	-0.901**
3 Children	-0.233	-0.608*	-0.529	-0.204
4 or More Children	Ref	Ref	Ref	Ref
Age at First Pregnancy				
<20			-1.205**	-0.582
20-24			-0.456	-0.026
25-29			-0.027	-0.055
30-44			Ref	Ref
Prior Pregnancy Intention				
Prior Intended Pregnancy			Ref	Ref
Prior Mistimed Pregnancy			2.276**	-0.110
Prior Unwanted Pregnancy			0.606**	5.160**
Prior Pregnancy Outcome				
Prior Live Birth			Ref	Ref
Prior Abortion			-0.790**	-1.141**
Prior Pregnancy Loss			-1.574**	-1.416**

Note: For Models 1 and 2, Level 1 N = 12,059; Level 2 N = 4,508.

† The reference category for both models is intended pregnancies. A positive coefficient, for example, means that a woman with a mistimed or unwanted pregnancy is more likely to fall into the category compared to a woman with a intended pregnancy.

*p<.05; **p<.01; Ref = reference category.

Table 4.4. Fixed Effects of Pregnancy History and Socio-Demographic Factors with Interaction Terms on Pregnancy Intention

Variable	Model 3†		Model 4	
	Mistimed	Unwanted	Mistimed	Unwanted
Age at Conception	-0.002**	-0.001**	-0.003**	-0.004**
Race and Ethnicity				
Non-Hispanic Black	-0.089	0.159	-0.015	0.227
Hispanic	-0.045	-0.281	-0.048	-0.251
Non-Hispanic White	Ref	Ref	Ref	Ref
Marital Status				
Married	Ref	Ref	Ref	Ref
Widowed/Div./Separated	0.926*	0.847	0.905*	0.775
Cohabiting	0.621**	0.638**	0.628**	0.649**
Never Married	1.629**	1.814**	1.464**	1.566**
Mother's Education				
< High School	-0.134	-0.032	-0.235	-0.157
High School/GED	-0.278*	-0.265	-0.338**	-0.363*
Some College	0.059	-0.145	0.039	-0.196
Bachelor's or Higher	Ref	Ref	Ref	Ref
Parity				
No Children	1.234**	1.419**	1.194**	1.281*
1 Child	0.395	0.113	0.229	-0.162
2 Children	-0.945**	-0.912**	-0.822**	-0.674*
3 Children	-0.536**	-0.248	-0.434	-0.045
4 or More Children	Ref	Ref	Ref	Ref
Age at First Pregnancy				
<20	-1.221**	-0.524	-2.811**	-3.698**
20-24	-0.769**	-0.452	-2.114**	-3.168**
25-29	-0.480*	-0.346	-1.267**	-2.053**
30-44	Ref	Ref	Ref	Ref
Prior Pregnancy Intention				
Prior Intended Pregnancy	Ref	Ref	Ref	Ref
Prior Mistimed Pregnancy	2.614**	-0.241	-1.788**	-3.111**
Prior Unwanted Pregnancy	0.625**	5.105**	-1.607**	-0.473
Prior Pregnancy Outcome				
Prior Live Birth	Ref	Ref	Ref	Ref
Prior Abortion	-0.824**	-1.234**	-0.059	-0.239
Prior Pregnancy Loss	-1.543**	-1.419**	-2.692**	-2.734**
Age-Prior Intent Interaction				
Age-Past Intended Pregnancy			Ref	Ref
Age-Past Mistimed Pregnancy			0.002**	0.001**
Age-Past Unwanted Pregnancy			0.001**	0.003**
Age-Prior Outcome Interaction				
Age-Past Live Birth			Ref	Ref
Age-Past Abortion			-0.000	-0.000
Age-Past Pregnancy Loss			0.001*	0.001*

Note: For Models 3 and 4, Level 1 N = 12,059; Level 2 N = 4,508.

† The reference category for both models is intended pregnancies. A positive coefficient, for example, means that a woman with a mistimed or unwanted pregnancy is more likely to fall into the category compared to a woman with a intended pregnancy.

*p<.05; **p<.01; Ref = reference category.

Table 4.5. Fixed Effects of Pregnancy History and Socio-Demographic Factors Separated by Categorical Age of Conception

Variable	Model 5† (Age <20) n=2126		Model 6 (Age 20-24) n=2567	
	Mistimed	Unwanted	Mistimed	Unwanted
Race and Ethnicity	-0.053	0.157	-0.419*	-0.021
Non-Hispanic Black	0.029	-0.196	-0.157	-0.510
Hispanic	Ref	Ref	Ref	Ref
Non-Hispanic White				
Marital Status	Ref	Ref	Ref	Ref
Married	0.882*	0.935*	1.781**	1.166
Widowed/Div./Sep.	1.032**	0.877**	0.684**	0.958**
Cohabiting	2.244**	2.173**	1.553**	1.767**
Never Married				
Mother's Education	-0.033	0.012	-0.229	0.193
< High School	-0.160	-0.213	-0.033	0.126
High School/GED	0.204	-0.040	0.106	-0.002
Some College	Ref	Ref	Ref	Ref
Bachelor's or Higher				
Parity	2.041**	1.780**	0.947*	1.328**
No Children	1.419**	0.620	0.016	-0.520
1 Child	-0.133	-0.535	-1.184**	-1.177*
2 Children	-0.160	-0.062	-1.029*	-0.303
3 Children	Ref	Ref	Ref	Ref
4 or More Children				
Prior Preg. Intention				
Prior Intended Preg.	Ref	Ref	Ref	Ref
Prior Mistimed Preg.	2.503**	-0.241	2.010**	-0.557*
Prior Unwanted Preg.	0.408*	5.025**	0.326	4.817**
Prior Preg. Outcome				
Prior Live Birth	Ref	Ref	Ref	Ref
Prior Abortion	-1.211**	-1.387**	-0.728**	-1.157**
Prior Pregnancy Loss	-1.839**	-1.572**	-1.553**	-1.492**

†The reference category for both models is intended pregnancies. A positive coefficient means that a woman with a mistimed or unwanted pregnancy is more likely to fall into the category compared to a woman with an intended pregnancy.

*p<.05; **p<.01; Ref = reference category.

Table 4.5 (continued). Fixed Effects of Pregnancy History and Socio-Demographic Factors Separated by Categorical Age of Conception

Variable	Model 7† (Age 25-29) n=1965		Model 8 (Age 30-44) n=1340	
	Mistimed	Unwanted	Mistimed	Unwanted
Race and Ethnicity				
Non-Hispanic Black	-0.092	0.775*	0.630	-0.002
Hispanic	0.000	-0.450	0.227	-0.325
Non-Hispanic White	Ref	Ref	Ref	Ref
Marital Status				
Married	Ref	Ref	Ref	Ref
Widowed/Div./Sep.	0.391	1.727**	0.255	-0.169
Cohabiting	0.242	0.479	0.194	0.339
Never Married	1.456**	0.911*	1.392**	2.251*
Mother's Education				
< High School	0.211	0.113	-0.136	-1.038
High School/GED	0.103	-0.530	-0.723*	-1.315**
Some College	0.066	-0.195	-0.113	-1.149*
Bachelor's or Higher	Ref	Ref	Ref	Ref
Parity				
No Children	1.757**	1.844**	1.836**	1.634**
1 Child	0.739	0.361	1.690**	0.291
2 Children	-0.280	-0.505	0.478	-0.037
3 Children	-0.265	0.213	0.385	0.316
4 or More Children	Ref	Ref	Ref	Ref
Prior Preg. Intention				
Prior Intended Preg.	Ref	Ref	Ref	Ref
Prior Mistimed Preg.	2.666**	-0.419	3.792**	0.416
Prior Unwanted Preg.	0.424	5.377**	0.518	5.927**
Prior Preg. Outcome				
Prior Live Birth	Ref	Ref	Ref	Ref
Prior Abortion	-0.708*	-1.023**	-1.559**	-1.571**
Prior Pregnancy Loss	-1.739**	-1.577**	-1.041**	-1.111**

†The reference category for both models is intended pregnancies. A positive coefficient means that a woman with a mistimed or unwanted pregnancy is more likely to fall into the category compared to a woman with an intended pregnancy.

*p<.05; **p<.01; Ref = reference category.

CHAPTER V

PAPER THREE

The Effect of Pregnancy Intention, Pregnancy History, and Age of Conception on the Utilization of Pregnancy Prevention Services: Impact on Post-Pregnancy Contraceptive Use and Tubal Sterilization

Between 2006 and 2008, approximately two-thirds of women aged 15-44 were at risk for an unintended pregnancy (Mosher and Jones, 2010). Of those women, more than 10% reported nonuse of a contraceptive method. Contraceptive use among women at risk for an unintended pregnancy increased with age, as adolescent women (18.7%) were almost 2.5 times as likely as women over the age of 30 (7.6%) to report nonuse. Within this at-risk group, 16.3% of non-Hispanic black women were not using a method, compared to 9.0% of Hispanic women and 9.4% of non-Hispanic white women. Compared to married women at risk for an unintended pregnancy (6.6%), never married women (18.1%) were almost three times more likely to report nonuse.

Tubal sterilization remains the most popular contraceptive choice for women ages 30 and over (Mosher and Jones, 2010). Although the number of procedures performed in the U.S. declined from 687,000 in 1995 to 643,000 in 2006, 8% to 9% of all live births were followed by a postpartum tubal sterilization (Chan and Westhoff, 2010). Women who choose tubal sterilization were more likely to be poor, have low educational attainment, and higher parity (ibid.). Tubal sterilizations are more common among Hispanic and non-Hispanic black women, although this effect has been found to be

attenuated by both income and reports of unintended pregnancy (Borrero et al, 2007; 2010).

In a study of the relationship between pregnancy intention, race, and the election of tubal sterilization, Borrero and colleagues (2010) conclude that racial disparities in tubal sterilization may be explained by the greater prevalence of unintended pregnancies in African-American and Hispanic women. The authors surmise that underrepresented minority women may choose this procedure in order to gain back the sense of control lost to the unintended pregnancy.

This chapter shares Borrero et al's goal of looking beyond socio-demographic factors in order to better understand the role of pregnancy intention in women's decision to elect a tubal sterilization post-pregnancy. While the data for Borrero et al's (2010) study comes from the 2002 NSFG, there are a number of significant methodological differences. In terms of analysis, this study uses multi-level modeling as opposed to multivariate logistic regression. Analyses in this study are also limited to those variables that can be directly linked to the timing of each pregnancy's conception, which was not the case with Borrero and colleagues for the majority of their controls (insurance status, income, education, and religion).

Borrero et al's (2010) definition of prior unintended pregnancy is if a woman has ever reported an unintended pregnancy prior to her tubal sterilization. In this study, pregnancy intention refers to the pregnancy immediately preceding the tubal sterilization. A history of unintended pregnancy, also referred to in this chapter as prior pregnancy intention, refers to the intentionality of any additional pregnancies prior to the one which measures pregnancy intention. Another difference between the two studies was that

Borrero and colleagues' choice to treat pregnancy intention as a dichotomous variable as opposed to differentiating between mistimed and unwanted pregnancies. Analyses in this chapter will also expand upon Borrero et al's inquiry with the inclusion of additional pregnancy history factors, including age at first pregnancy and prior pregnancy outcomes (live birth, pregnancy loss, and elective abortion).

The prevention of unintended pregnancies remains an important goal for women's reproductive health practitioners. A requisite piece of post-pregnancy education for all women, regardless of the pregnancy's outcome, is to discuss options for short- and long-term contraception. This discussion may be particularly relevant for women ages 30 and over who may have achieved, or even exceeded, desired parity. The analyses in this chapter will explore the relationship between pregnancy intention, pregnancy history, age at conception, and the utilization of pregnancy prevention services. It is hypothesized that women with unintended pregnancies will not use contraception as frequently in the subsequent interval between pregnancies, but will be more likely to choose post-pregnancy tubal sterilization. These proposed relationships, in addition to those associated with pregnancy history, are further hypothesized to vary according to age group, with the strongest associations expected for women ages 30-44.

RESEARCH QUESTIONS AND HYPOTHESES

Research Question 1: Is pregnancy intention significantly associated with contraceptive use during the subsequent interval between pregnancies?

Hypothesis 1: Women with an unintended pregnancy will be less likely to utilize contraception during the subsequent interval between pregnancies.

Research Question 2: Is pregnancy history significantly associated with contraceptive use during the subsequent interval between pregnancies?

Hypothesis 2a: Women with a younger age of first pregnancy will be more likely to utilize contraception post-pregnancy.

Hypothesis 2b: Women with a history of unintended pregnancy will be less likely to utilize contraception in the pregnancy interval.

Hypothesis 2c: Women with a history of pregnancy loss will be less likely to utilize contraception in the pregnancy interval.

Research Question 3: Is pregnancy intention significantly associated with the election of post-pregnancy tubal sterilization?

Hypothesis 3: Women with an unintended pregnancy, especially of that pregnancy was unwanted, will be more likely to elect a post-pregnancy tubal sterilization.

Research Question 4: Is pregnancy history significantly associated with the election of post-pregnancy tubal sterilization?

Hypothesis 4a: Women with a younger age at first pregnancy will be more likely to elect a post-pregnancy tubal sterilization.

Hypothesis 4b: Women with a history of unintended pregnancy, especially prior unwanted pregnancy, will be more likely to elect a post-pregnancy tubal sterilization.

Hypotheses 4c: Women with a history of pregnancy loss will be less likely to elect a post-pregnancy tubal sterilization.

Research Question 5: Does the relationship between pregnancy intention, pregnancy history, and the utilization of pregnancy prevention services change as women age?

Hypothesis 5: The predicted associations between pregnancy intention, pregnancy history, and the utilization of pregnancy prevention services will strengthen as women age.

The research hypotheses in this chapter propose that a woman's pregnancy intention will influence her post-pregnancy decisions related to the utilization of pregnancy prevention services. Hypothesis 1 expects that women with unintended pregnancies will be less likely to utilize contraception during the subsequent interval between pregnancies. Building upon the findings of the last chapter, Research Question 2 considers the influence of both pregnancy intention and pregnancy history on post-

pregnancy contraceptive use. Women with a history of one or more unintended pregnancies and/or a history of pregnancy loss, which are both expected to be associated with lower rates of pregnancy planning behavior, are expected to report lower rates of contraceptive use in the pregnancy interval.

In contrast to Hypothesis 1, Hypothesis 3 proposes that a positive association will exist between women with an unintended pregnancy and the choice of post-pregnancy tubal sterilization. Hypothesis 3 and the hypotheses associated with Research Question 4 propose that women with an unintended pregnancy and/or a history of unintended pregnancy are more likely to perceive a future unintended pregnancy as a sufficiently strong threat to choose a method that removes the possibility of pregnancy and the need for compliance. Providers may also be more likely to encourage women with an unintended pregnancy to become sterilized. Women with a history of pregnancy loss are also expected to be less likely to choose tubal sterilization, as they may have a greater desire to become pregnant in the future.

Both Hypotheses 2a and 4a predict a positive association between earlier age at first pregnancy and the utilization of pregnancy prevention services. Women who become pregnant at an earlier age are hypothesized to choose tubal sterilization due to the increased likelihood of having achieved desired parity. While intuitively, one could hypothesize that a woman who first becomes pregnant at a younger age would be more likely to have history of unintended pregnancies and would therefore be less likely to use contraception. However, the results in the preceding chapter found that early age of first pregnancy was negatively associated with future mistimed pregnancies, suggesting higher rates of contraceptive utilization among this population.

Hypothesis 5 proposes that expected relationships associated with Research Questions 1-4 will strengthen as women age. Women ages 30-44, for example, are expected to be the most susceptible to the cumulative influence of pregnancy history on the utilization of contraception during the interval between pregnancies. As discussed in Chapter 4, as women mature, they may be more likely to engage in a conscious process where the barriers of preventing an unintended pregnancy no longer outweigh the significant threat of such an event. Further, women in their thirties and forties may also possess higher self-efficacy in their ability to follow through with a contraceptive method or the decision for a post-pregnancy tubal sterilization. As the likelihood of selecting tubal sterilization increases with age, the associations between pregnancy intention, pregnancy history, and the election of this procedure are also expected to be strongest for women 30 and over.

DATA AND MEASUREMENT

This chapter uses the data from Cycle 7 of the National Survey of Family Growth (NSFG). As reported in the previous chapter, the 2010 release of the NSFG contains the results of interviews from a nationally representative sample of 7,356 women, ages 15-44, from 33 Primary Sampling Units. Interviews were conducted continuously 48 weeks of each year between June, 2006 and June, 2008. Women, teens, non-Hispanic blacks and Hispanics were oversampled. The response rate was 76%. Analysis for this paper included 4,508 women who reported on 12,059 pregnancies.

Dependent Variables – Contraceptive Use in the Interval between Pregnancies and Post-Pregnancy Tubal Sterilization

Contraceptive utilization during the interval between pregnancies is defined as *any* use of *any* method between a pregnancy outcome and the time of conception of the

next reported pregnancy. This dichotomous variable, computed in the NSFG pregnancy files, excludes from the analyses post-pregnancy contraceptive use in women who have become pregnant only once; nor is it able to capture utilization following a woman's last reported pregnancy. The interval between pregnancies is not synonymous with a birth interval, as all pregnancies are included regardless of outcome. A descriptive summary of the percentage of pregnancies according to contraceptive utilization during the pregnancy interval, socio-demographic characteristics, and categorical age of conception is found in Table 5.1.

A dichotomous variable was also created to measure post-pregnancy tubal sterilization. A summary of the percentage of pregnancies according to post-pregnancy tubal sterilization, socio-demographic characteristics, and categorical age of conception is found in Table 5.2. Women who responded positively to the question, "Have you ever had both your tubes tied, cut or removed? This procedure is often called a tubal ligation or tubal sterilization." subsequently provided interviewers with the date of their procedure. Since women occasionally became pregnant after a tubal sterilization, procedures were matched to the specific pregnancy that preceded it. This insured that the variable captured the intent of the pregnancy immediately prior to the respondent's decision.

Independent Variables – Socio-Demographic and Pregnancy History

Socio-demographic variables in the analysis include: pregnancy intention, categorical age at conception, race/ethnicity, marital status, mother's education, and parity. Age at first pregnancy, prior pregnancy intention, and prior pregnancy outcomes were included to assess the influence of pregnancy history. Interactions terms were also

created to examine the relationship between continuous age and prior pregnancy intention, as well as age and prior pregnancy outcomes. An in-depth description of these constructs, including excluded and reference variables, is found in Chapter 4.

ANALYSIS

As in the preceding chapter, two-level generalized hierarchical linear modeling (HLM) was used to test the hypothesized relationships between pregnancy intention, pregnancy history, and the utilization of pregnancy prevention services. Level 1 variables were drawn from the NSFG pregnancy file, while Level 2 variables were selected from woman-level data. Level 2 weights were included in all analyses (Lepkowski et al, 2010). As in the preceding chapter, population-averaged models are reported, as subject-specific models with random effects for individuals were unable to converge.

Analyses to test each hypothesis were performed in four stages for each of the two dependent variables. The first stage (Models 1a and 1b) tested the baseline relationship between the dependent variable of interest, pregnancy intention, and five socio-demographic controls: age at conception, race/ethnicity, marital status, mother's education, and parity. The second set of models (Models 2a and 2b) incorporated pregnancy history into the analyses. Similar to analyses in Chapter 4, the third stage (Models 3a/b and 4a/b) builds upon Models 2a and 2b with the inclusion of interaction terms between continuous age and both prior pregnancy intention and outcomes. The fourth stage ran separate analyses for each of the categorical age groups (Models 5a, 6a, 7a, and 8a; Models 6b, 7b and 8b). Women who became pregnant before age 20 (Model

5b) were excluded from fourth stage analyses of post-pregnancy tubal sterilization due to the low numbers of procedures in this population (1.6%, n=49).

Formulas for the relationship between pregnancy intention, pregnancy history (including interaction terms), and the dependent variables of interest are included below. Although analyses combined models from both levels into a single combined or mixed model, models for Level 1 and Level 2 are presented separately for ease of interpretation. The second set of models is an example of separate analyses by categorical age at conception. As the research hypotheses are focused on the relationships for women ages 30-44, the tubal sterilization models for this age group are highlighted.

Level 1 Model for the relationship between pregnancy intention, pregnancy history, and the post-pregnancy utilization of pregnancy prevention services with interaction terms (Models 4a/b)

$$\text{Prob}(Y=1|B) = P$$

$$\log[P/(1-P)] = P0 + P1*(AGECON) + P2*(MISTIMED) + P3*(UNWANTED) + P4*(WIDDIVSE) + P5*(COHABIT) + P6*(NEVMAR) + P7*(CHILDLES) + P8*(CHILD1) + P9*(CHILD2) + P10*(CHILD3) + P11*(CSUM_MIS) + P12*(CSUM_UNW) + P13*(CSUM_AB) + P14*(CSUM_PLS) + P15*(AGEPMIS) + P16*(AGEPUNW) + P17*(AGEPAB) + P18*(AGEPPL)$$

Level-2 Model for the relationship between pregnancy intention, pregnancy history, and the post-pregnancy utilization of pregnancy prevention services with interaction terms (Models 4a/b)

$$P0 = B00 + B01*(NHBLACK) + B02*(HISPANIC) + B03*(LESSHS) + B04*(HSGED) + B05*(SCOLLEGE) + B06*(P1UND20) + B07*(P12024) + B08*(P12529)$$

Level 1 Model for the relationship between pregnancy intention, pregnancy history, and the election of tubal sterilization in women ages 30-44 at conception (Model 8b)

$$\text{Prob}(Y=1|B) = P$$

$$\log[P/(1-P)] = P0 + P1*(MISTIMED) + P2*(UNWANTED) + P3*(WIDDIVSE) + P4*(COHABIT) + P5*(NEVMAR) + P6*(CHILDLES) + P7*(CHILD1) + P8*(CHILD2) + P9*(CHILD3) + P10*(CSUM_MIS) + P11*(CSUM_UNW) + P12*(CSUM_AB) + P13*(CSUM_PLS)$$

Level 2 Model for the relationship between pregnancy intention, pregnancy history, and the election of tubal sterilization in women ages 30-44 at conception (Model 8b)

$$P0 = B00 + B01*(NHBLACK) + B02*(HISPANIC) + B03*(LESSHS) + B04*(HSGED) + B05*(SCOLLEGE)$$

Outcomes for the first set of models are either utilization of contraception in the interval between pregnancies or post-pregnancy tubal sterilization. Level 1, which represents pregnancy-level factors, includes pregnancy intention for the pregnancy immediately preceding the dependent variable (MISTIMED and UNWANTED), with intended pregnancies as the reference. Marital status at the time of conception, which uses married women as the reference, follows with the single category of widowed, divorced or separated (WIDDIVSE), as well as cohabitating (COHABIT), and never married and not cohabitating (NEVMAR). Parity includes the four variables: zero children (CHILDLES), one child (CHILD1), two children (CHILD2) and three children (CHILD3). Continuous age at conception (AGECON) is also included at Level 1.

Level 1 models also contain two of the pregnancy history categories: prior pregnancy intention and prior pregnancy outcomes. CSUM_MIS represents women with a history of mistimed pregnancies while CSUM_UNW refers to women with a prior unwanted pregnancy. History of pregnancy outcomes uses prior live birth as a reference, and includes prior elective abortion (CSUM_AB), as well as previous pregnancy loss (CSUM_PLS) in the formula. Interaction terms are represented at Level 1 by continuous age by: past mistimed pregnancy (AGEPMIS), past unwanted pregnancy (AGEPUNW), prior elective abortion (AGEPAB), and prior pregnancy loss (AGEPPL).

Level 2 models represent woman-level predictors. The first variable included in the Level 2 equation represents non-Hispanic black (NHBLACK) and Hispanic

(HISPANIC) race and ethnicity. Respondent's mother's highest educational achievement uses a bachelor's degree or higher as a reference, and is divided into less than high school (LESSHS), high school graduate/GED (HSGED), and some college (SCOLLEGE). The final variables in the population-level Level 2 models represent respondent's age at first pregnancy (Models 2-4 only): before age 20 (P1UND20), between ages 20-24 (P12024), and ages 25-29 (P12529).

RESULTS

Utilization of Contraception during the Interval between Pregnancies

A population-averaged model (Model 1a) was first run to establish a baseline for the hypothesized relationship between pregnancy intention and the utilization of contraception between pregnancies. For all results, a positive coefficient means that a woman is more likely to use contraception during the pregnancy interval while a negative coefficient means that she is less likely. The results of this analysis are summarized in Table 5.3. In contrast to Hypothesis 1, pregnancy intention was not significantly associated with contraceptive use between pregnancies. In terms of socio-demographic results, non-Hispanic black women and Hispanic women were significantly less likely to use contraception during the interval between pregnancies. Women who were widowed, divorced or separated (one category) at the time of conception were also less likely to utilize contraception post-pregnancy. Women with either one or two children were more likely to use contraception following the outcome of a pregnancy, which was also the case for women ages 20-24. Mother's education was not significantly associated with contraceptive use in the pregnancy interval.

The inclusion of pregnancy history (Model 2a), also summarized in Table 5.3, resulted in a number of significant associations with post-pregnancy contraceptive use. Women whose first pregnancy occurred as adolescents or in their 20s (ages 20-25 and 25-29) were significantly more likely to use contraception in the pregnancy interval compared to women whose first pregnancy occurred at age 30 or over. A history of unwanted pregnancies was also negatively associated with contraceptive use. Similarly, women with at least one prior pregnancy loss were less likely to use contraception between pregnancies. The inclusion of pregnancy history factors resulted in a positive association between unwanted pregnancy and subsequent contraceptive use.

In terms of socio-demographic controls, the positive association found in Model 1a between being ages 20-24 at conception and subsequent use of contraception was no longer significant with the inclusion of pregnancy history variables. Non-Hispanic black women, Hispanic women, and women who were widowed, divorced or separated remained significantly less likely to utilize contraception in the pregnancy interval, while having one child continued to be positively associated with contraceptive use. Mother's education was not significantly associated with post-pregnancy contraceptive use.

Model 3a replicates the analyses in Model 2a with the exception of age as a continuous, as opposed to categorical variable. Results between Models 2a and 3a were largely consistent, with the only notable exception being that parity was no longer significantly associated with contraceptive use in the continuous age model. Continuous age of conception was negatively associated with utilization of contraception in the pregnancy interval. The results for Model 3a are summarized in Table 5.4.

In the interaction model (Model 4b), the interaction terms indicate if the effect of age differs for a particular category (e.g., past mistimed pregnancy) compared to the reference of women who did not use contraception in the pregnancy interval. Significant and positive interactions were found between age and prior mistimed pregnancy, while negative associations were found for the age-prior pregnancy loss interaction. The inclusion of these interaction terms did not change the significance of any of the relationships between socio-demographic controls and contraceptive use. However, compared to Model 2b, having a history of a mistimed pregnancy (as opposed to unwanted in Model 2b) was negatively associated with contraceptive use in the interaction model. The negative association between a prior pregnancy loss and use of contraception in the pregnancy interval was no longer significant.

The relationship between pregnancy intention, pregnancy history, and utilization of contraception in the interval between pregnancies was examined separately for each of the four categorical age groups (Models 5a-8a). Results of these analyses are summarized in Table 5.7. Unwanted pregnancy was positively associated with subsequent contraceptive use in the pregnancy interval for women in all four age groups. In terms of pregnancy history, only women ages 30-44 with at least one prior mistimed pregnancy were less likely to use contraception post-pregnancy. Women ages 20-24, 25-29, and 30-44 were also less likely to use contraception in the pregnancy interval if they reported a history of pregnancy loss.

The significance of socio-demographic controls was fairly consistent across the age groups. All non-Hispanic black women, as well as Hispanic women under age 20, ages 20-24 and 30-44, were less likely to utilize contraception in the interval between

pregnancies. Adolescent women and those ages 25-29 remained less likely to use contraception if they were widowed, divorced, or separated. Women under age 30 were more likely to use contraception if they had one child. This positive association was also found for women ages 20-24 with two children.

Post-Pregnancy Tubal Sterilization

In order to establish a baseline for the relationship between pregnancy intention and post-pregnancy tubal sterilization, analysis was first conducted of a population-averaged fixed effects model (Model 1b) including socio-demographic characteristics that could be directly linked to the conception of each individual pregnancy. Results are summarized in Table 5.5. For all results, a positive coefficient means that a woman is more likely to elect a post-pregnancy tubal sterilization while a negative coefficient means that she is less likely.

In Model 1b, reports of an unwanted pregnancy were positively associated with the election of a post-pregnancy tubal sterilization. Women whose mothers had less than a high school education or had graduated from high school/completed a GED were also more likely to have a post-pregnancy tubal sterilization. Younger age at conception (under 20 and ages 20-24), as well as having zero, one, or two children, were all negatively associated with post-pregnancy tubal sterilization.

Unwanted pregnancy remained significantly associated with post-pregnancy tubal sterilization when pregnancy history variables were included in Model 2b. All three pregnancy history constructs, however, were not significantly associated with the outcome. The relationships between socio-demographic controls and post-pregnancy tubal sterilization were also fairly consistent between Models 1b and 2b. Women under

age 30 at conception were all significantly less likely to have a post-pregnancy tubal sterilization compared to those ages 30-44. Mother's education (less than high school, high school/GED) and parity (zero and one child) also remained negatively associated with the election of this procedure. The inclusion of age and pregnancy history interactions terms in Model 4b, summarized in Table 5.6, also yielded similar results.

Analyses similar to that in Model 2b (Models 6b-8b) were separately analyzed for women in three categorical age groups: 20-24, 25-29, and 30-44. Pregnancies to women under the age of 20 were excluded due to the low percentage of adolescents (1.6%) electing to be sterilized. Although age did not significantly interact with pregnancy history factors in Model 4b, history of pregnancy loss was positively associated with post-pregnancy tubal sterilization, but only for women ages 20-24. Unwanted pregnancy intention for the pregnancy immediately preceding the procedure was no longer significantly associated with post-pregnancy tubal sterilization for any of the categorical age groups.

Of the socio-demographic controls in Models 6b-8b, parity was most consistently associated with post-pregnancy tubal sterilization. All women with zero or one child were less likely to elect this procedure. Women ages 20-24 with two or three children were also less likely to have a post-pregnancy tubal sterilization. Women ages 25-29 and 30-44 whose mothers had less than a high school education or had completed high school/GED were more likely to elect a post-pregnancy tubal sterilization. Election of this procedure was also positively associated for women ages 25-29 whose mothers had finished some college. Hispanic women ages 20-24 were significantly less likely to have a post-pregnancy tubal sterilization.

DISCUSSION

This discussion is organized into two separate sections corresponding to the dependent variables: utilization of contraception in the interval between pregnancies and post-pregnancy tubal sterilization. Each section will include a discussion of the relevance of specific results from the models; consideration of the broader policy implications will follow.

Utilization of Contraception during the Interval between Pregnancies

Pregnancy history was found to be associated with utilization of contraception in the interval between pregnancies in a nationally representative sample of women ages 15-44. As expected, analyses in Model 2a found that women with a history of unwanted pregnancies, as well as a history of pregnancy loss, were less likely to use contraception in the pregnancy interval. However, the introduction of interaction terms in Model 4a limited these negative associations between past mistimed pregnancies and contraceptive use. When analyses were run separately by categorical age group, the negative relationship between prior pregnancy loss and contraceptive use was found for women ages 20 and over. A positive association between utilization of contraception and a history of mistimed pregnancies was also observed; but only for women ages 30-44.

The strongest relationships between contraceptive use and pregnancy history were almost uniformly found for women ages 30-44. In addition to influence of prior mistimed pregnancies, the largest negative coefficients were observed for women ages 30-44 with a prior pregnancy loss. The positive relationship between an unwanted pregnancy and the subsequent decision to utilize contraception was also stronger for women ages 25 and older. These findings further support Hypothesis 5 that women ages

30 and over are the most susceptible to the influence of pregnancy intention and pregnancy history on the utilization of pregnancy prevention services.

One exception to this trend was the positive relationship between having one child and contraceptive use was significant for all age groups but those ages 30-44. Women ages 30 and over with an only child may believe that they are less capable of becoming pregnant or may be more inclined to abstain from contraception post-pregnancy in order to space children more closely together.

One variable that held fairly constant across all stages of analysis was the negative association between non-Hispanic black women, Hispanic women, and the utilization of contraceptives in the interval between pregnancies. When analyses were separated by age group, the strongest associations were found for the oldest (30-44) age group. These findings suggest that the influence of race and ethnicity on contraceptive use, unlike other socio-demographic controls, is not subject the mediating influences of pregnancy history.

As the descriptive data illustrates in Table 5.1, there remains a great need for acceptable contraceptive methods post-pregnancy. Although the breadth of the dependent variable permitted *any* use of *any* method during the pregnancy interval to be coded as 1, positive reports of utilization ranged from 46.98% of women ages 30-44 to 61.02% of women under age 20. There are a number of reasons why a woman might choose to abstain from contraception post-pregnancy. Women may have a strong desire to become pregnant following the loss of a pregnancy or may choose to space their children closely together due to older maternal age, religious beliefs, or simple personal preference. However, the consensus in the research literature is to recommend at least 18

months between pregnancy intervals following a live birth. Women with short interpregnancy intervals are at the highest risk for adverse perinatal outcomes such as preterm birth and low birth weight (Conde-Agudelo et al, 2006; DeFranco et al, 2007). Therefore, women at risk and open to counseling should be advised on the benefits of pregnancy spacing.

Results suggest that women ages 30 and over may be most motivated by their pregnancy history in the decision to use contraception between pregnancies. Among those at risk for unintended pregnancy, women ages 30-44 were the least likely to use a contraceptive method in the pregnancy interval. As suggested in Chapter 4, clinicians should consider a full assessment of a women's pregnancy history, especially for women over the age of 30. An assessment of pregnancy history could frame contraceptive counseling in a way that emphasizes women's own knowledge regarding the barriers and benefits of a particular method. Instead of assuming that women with a history of unintended pregnancies are less able or willing to use contraception, providers should openly value women's experiences in order to arrive at the most acceptable method.

Post-Pregnancy Tubal Sterilization

Having an unwanted pregnancy was consistently associated with an increased likelihood of subsequently choosing post-pregnancy tubal sterilization. However, unlike the relationship between pregnancy history and subsequent contraception use, no significant associations were found between pregnancy history and post-pregnancy tubal sterilization. Instead, only socio-demographic factors including parity, age at conception, and mother's education were found to be significantly associated with this decision.

Not surprisingly, parity was the strongest and most consistent predictor of a procedure intended to remove the possibility of any future pregnancy. Women with zero or one child were found to be less likely to elect post-pregnancy tubal sterilization. While an increasing percentage of women consciously choose to remain childless and/or raise only children (Abma and Martinez, 2006), these two groups are less likely to have achieved desired parity. Analyses not reported in this chapter that excluded parity from the model found positive associations between pregnancy history factors such as early age of first pregnancy and prior unintended pregnancy with post-pregnancy tubal sterilization. The removal of parity also resulted in a negative association between prior pregnancy loss and the election of this procedure.

The relationship between a number of pregnancy history factors and tubal sterilization can be explained, at least in part, by parity. Women with a history of early age of first pregnancy are more likely to have achieved desired parity, and would therefore be stronger candidates for this procedure. Similarly, women with a prior unintended pregnancy, particularly if that pregnancy was unwanted, are more likely to have larger families and be more highly motivated to elect tubal sterilization. Conversely, women with a history pregnancy loss may have fewer children than desired (as well as fewer overall children), and would in turn, reject the possibility of tubal sterilization.

When separated by categorical age at conception, lower levels of mother's educational attainment was positively associated with tubal sterilization for women ages 25 and older. Although mother's education is an imperfect proxy for socio-economic status, this finding is consistent with research that has found poor women to

disproportionately favor tubal sterilization over other methods (Chan and Westhoff, 2010). Coverage and counseling for the complete range of contraceptive options, as recommended by the IOM's Committee on Preventive Services for Women (IOM, 2011), may help lessen this socio-economic disparity.

This discussion has consciously remained value-neutral on the issue of tubal sterilization. It is important to recognize the history of past abuse related to this procedure, especially in terms of forced and covert sterilizations of poor and minority women (Gamble, 1997). There is no doubt that tubal sterilization is an invasive surgical procedure that places the onus of responsibility for family planning directly on the woman. With that acknowledgement, there are also many women who have a strong independent desire for this procedure, and feel no regret about the decision. This may be particularly true for women who have a tubal sterilization immediately following a cesarean section, where additional incisions are not required. Therefore, in this discussion tubal sterilization will not necessarily be viewed as a problematic outcome, but as one of a number of contraceptive choices.

What is unknown from these findings is if and how providers may influence women's decisions to choose tubal sterilization over another method. Provider biases concerning poor women's and/or certain racial and ethnic group's inability to comply with a contraceptive method may lead them to encourage tubal sterilization in the place of alternative short- or long-term methods. Similarly, an awareness of contraceptive failure resulting in an unintended pregnancy may lead providers to steer women towards an option with no potential for user error. If a woman's pregnancy intention does indeed impact her decision to elect a tubal sterilization, a woman's active participation in a full

assessment of this history may lead to a more informed decision. Providers need to be aware of their own biases to insure that all patients are making a truly informed decision regarding tubal sterilization.

The findings in this study may also be applicable to the increasing popularity of long-acting reversible contraceptive methods, including intrauterine contraception (IUDs) and contraceptive implants. The IUD in particular has been heavily marketed towards women over the age of 30 who have reached desired parity. Between 2002 and 2006-2008, long-acting reversible contraceptive use among U.S. women more than doubled from 2.4% to 5.6% (Kavanaugh et al, 2011). As tubal sterilization rates decline, it is feasible that the same pregnancy history and intention factors associated with the election of pregnancy prevention services could likewise influence a woman's decision for IUD insertion. Madden et al (2011), for example, found that women who were offered contraception immediately post-abortion were more than three times as likely to choose an IUD and 50% more likely to choose contraceptive implants. Women at risk for unintended pregnancy considering tubal sterilization should be made aware of these long-term reversible alternatives.

Limitations

As discussed in Chapter 4, there are a number of limitations associated with the use of retrospective reporting in the NSFG. In addition to concerns regarding a respondent's ability to remember details associated with the timing, intentions, and outcomes of each pregnancy, there is also potential for recall bias with each of the dependent variables. Although allowing for any use of any contraceptive method during the pregnancy interval appears sufficiently broad, women may have a difficult time with

recall of contraceptive use, particularly if they have been pregnant many times and/or if a significant amount of time has elapsed. Issues with recall may also bias reporting of the specific date of a respondent's tubal sterilization. Therefore, potential for error remains in the matching process between the tubal sterilization procedure and the intent of the preceding pregnancy.

In-person data collection also raises the potential for response bias. Women may not want to admit nonuse of contraception during the intervals between pregnancies. The emphasis on contraceptive methods in the NSFG may send an implicit message regarding an obligation to report "responsible" choices. Women may also be hesitant to reveal that they have been sterilized, particularly if they have encountered any stigma or feel any personal regret related to the procedure.

The choice of dependent variables led to a number of respondents being excluded from analysis. Post-pregnancy contraceptive measurement, for example, was limited to use in the pregnancy interval. This limited analyses to women with more than one pregnancy while excluding post-pregnancy contraceptive use following all final pregnancies. In addition, asking respondents if they had used any method for any amount of time during the pregnancy interval clearly lacks specificity. More detailed responses could reveal a range from a woman using a barrier method once following a pregnancy loss to choosing to have an IUD inserted immediately postpartum.

Receipt of tubal sterilization is also an imperfect measure of women's intent to definitively prevent future unintended pregnancies. There are significant regional differences in tubal sterilization rates (Chan and Westhoff, 2010), and some women may feel coerced into accepting the procedure from partners, family members, or providers.

Medicaid recipients and uninsured women have been found to have higher rates of tubal sterilization (ibid.); therefore poor women may choose this covered procedure if access to reversible methods is in question. It should also be noted that not all women who request tubal sterilization from their providers eventually receive the procedure (Zite et al, 2005; Thurman and Janecek, 2010). Although much of this disparity between initial request and fulfillment is due to the woman changing her mind, receipt of a tubal sterilization may also be dependent on provider acquiescence.

Analyses of the relationship between pregnancy intention, pregnancy history, and choice for sterilization were limited to female sterilization. A variable which matched male partner sterilization to the pregnancy which preceded it was also created for this study. Even in a nationally representative sample such as the NSFG, the number of post-pregnancy vasectomies (2.4%, n=288) was insufficient for analysis. When selected as the dependent variable for preliminary analyses using HLM, even the most basic models examining the relationship between intent and post-pregnancy male partner sterilization would not converge.

Similarly, another set of independent variables were also omitted from analyses. One potential influence on the decision to either use contraceptives and/or have a tubal sterilization post-pregnancy may be the preceding pregnancy's outcome. A history of pregnancy loss, for example, was found to be negatively associated with contraceptive use post-pregnancy. However, the inclusion of prior pregnancy outcomes as a part of pregnancy history was too highly correlated with the individual outcomes for each pregnancy to be included in the analysis.

CONCLUSION

Pregnancy intention was found to be significantly associated with utilization of contraception and the election of post-pregnancy tubal sterilization in a nationally representative sample of women ages 15-44. In addition, pregnancy history was found to be significantly associated with contraceptive use. A history of both prior unintended pregnancy as well as pregnancy loss was negatively associated with contraceptive use in the pregnancy interval.

The relationships between pregnancy history and the utilization of contraception in the pregnancy interval were generally strongest for women ages 30-44. These findings suggest that as women age, the cumulative influence of their experiences with pregnancy may be more influential on decisions related to post-pregnancy prevention than the circumstances surrounding the single pregnancy preceding that decision. It follows that providers who assess, acknowledge, and value women's entire pregnancy history, including age at conception, the intent for, and outcomes of these pregnancies, may help women make the most acceptable choices for preventing unintended pregnancy. This recommendation may be especially relevant for women ages 30 and over, who are most likely to have reached desired parity, and therefore may be motivated by their more complex pregnancy histories to consider long-term contraceptive solutions.

The final chapter of the dissertation will further summarize and connect the findings of the three empirical papers presented in Chapters 3 through 5. Contributions, as well as directions for future research on pregnancy intention, will also be discussed.

Table 5.1. Percentage of Pregnancies According to Utilization of Contraception during the Interval between Pregnancies, Socio-Demographic Characteristics, and Age of Conception

Variable	% Used Contraception (n)	% Did Not Use Contraception (n)
Pregnancy Intention		
Intended		
<20	56.53 (411)	43.47 (316)
20-24	60.35 (1044)	39.65 (686)
25-29	57.86 (990)	42.14 (721)
30-44	46.84 (676)	53.15 (767)
Mistimed		
<20	63.39 (1070)	36.61 (618)
20-24	60.82 (767)	39.18 (494)
25-29	52.67 (256)	47.33 (230)
30-44	50.44 (114)	49.56 (112)
Unwanted		
<20	59.97 (415)	40.03 (277)
20-24	59.49 (420)	40.51 (286)
25-29	50.69 (219)	49.31 (213)
30-44	45.18 (150)	54.82 (182)
Race/Ethnicity		
Non-Hispanic Black		
<20	62.87 (640)	37.13 (378)
20-24	55.92 (590)	44.08 (465)
25-29	48.03 (268)	51.97 (290)
30-44	40.00 (132)	60.00 (198)
Hispanic		
<20	50.61 (453)	49.39 (442)
20-24	56.96 (585)	43.04 (442)
25-29	51.04 (368)	48.96 (353)
30-44	39.87 (191)	60.13 (288)
Non-Hispanic White		
<20	67.25 (803)	32.75 (391)
20-24	65.39 (1056)	34.61 (559)
25-29	61.41 (829)	38.59 (521)
30-44	51.76 (617)	48.24 (575)
Marital Status		
Married		
<20	57.14 (208)	42.86 (156)
20-24	63.44 (838)	36.56 (483)
25-29	59.42 (921)	40.58 (629)
30-44	48.21 (659)	51.79 (708)

Variable	% Used Contraception (n)	% Did Not Use Contraception (n)
Widowed/Div./Separated		
<20	31.82 (7)	68.18 (15)
20-24	53.15 (76)	46.85 (67)
25-29	44.08 (67)	55.92 (85)
30-44	44.84 (74)	54.17 (91)
Cohabiting		
<20	57.00 (444)	43.00 (335)
20-24	57.83 (617)	42.17 (450)
25-29	51.42 (272)	48.58 (257)
30-44	46.67 (126)	53.33 (144)
Never Married		
<20	63.70 (1237)	36.30 (705)
20-24	60.03 (700)	39.97 (466)
25-29	51.51 (205)	48.49 (398)
30-44	40.70 (81)	59.30 (118)
Mother's Education		
< High School		
<20	55.48 (592)	44.52 (475)
20-24	57.86 (714)	42.14 (520)
25-29	52.24 (454)	45.76 (383)
30-44	41.29 (249)	58.71 (354)
High School/GED		
<20	63.78 (708)	36.22 (402)
20-24	61.76 (780)	38.24 (483)
25-29	56.33 (494)	43.67 (383)
30-44	50.70 (328)	49.30 (319)
Some College		
<20	62.98 (359)	37.02 (211)
20-24	61.62 (448)	38.38 (279)
25-29	56.06 (282)	43.94 (221)
30-44	46.48 (178)	53.52 (205)
Bachelor's or Higher		
<20	66.87 (218)	33.13 (108)
20-24	60.45 (266)	39.55 (174)
25-29	55.98 (220)	44.02 (173)
30-44	50.14 (177)	49.86 (176)

Variable	% Used Contraception (n)	% Did Not Use Contraception (n)
Parity		
No Children		
< 20	59.3 (641)	40.7 (440)
20-24	53.1 (616)	46.9 (543)
25-29	43.5 (336)	56.5 (437)
30-44	34.4 (231)	65.6 (440)
1 Child		
< 20	63.4 (1036)	36.6 (597)
20-24	67.2 (811)	32.8 (396)
25-29	72.3 (513)	27.7 (197)
30-44	60.9 (251)	39.1 (161)
2 Children		
< 20	57.1 (244)	42.9 (183)
20-24	65.0 (625)	35.0 (336)
25-29	59.6 (411)	40.4 (279)
30-44	53.6 (276)	46.4 (239)
3 Children		
< 20	50.0 (40)	50.0 (40)
20-24	56.0 (225)	44.0 (177)
25-29	53.1 (205)	46.9 (181)
30-44	48.2 (149)	51.8 (160)
4 Children		
< 20	16.7 (1)	83.3 (5)
20-24	60.2 (62)	39.8 (92)
25-29	38.1 (90)	46.9 (181)
30-44	42.1 (104)	57.9 (143)
Total		
<20	61.02 (1896)	38.98 (3107)
20-24	60.35 (2231)	39.65 (1466)
25-29	55.72 (1465)	44.28 (1164)
30-44	46.98 (940)	53.02 (1061)

Table 5.2. Percentage of Pregnancies According to Post-Pregnancy Tubal Sterilization, Socio-Demographic Characteristics, and Age of Conception

Variable	% Post-Pregnancy Tubal Sterilization	% No Post-Pregnancy Tubal Sterilization
Pregnancy Intention		
Intended		
<20	1.79 (13)	98.21 (714)
20-24	7.51 (130)	92.49 (1600)
25-29	10.11 (173)	89.89 (1538)
30-44	11.30 (163)	88.70 (280)
Mistimed		
<20	1.13 (19)	98.87 (1669)
20-24	5.87 (74)	94.13 (1187)
25-29	9.88 (48)	90.12 (438)
30-44	12.83 (29)	87.17 (197)
Unwanted		
<20	2.46 (17)	97.54 (675)
20-24	13.31 (94)	86.69 (612)
25-29	16.20 (70)	83.80 (362)
30-44	23.80 (79)	76.20 (253)
Race/Ethnicity		
Non-Hispanic Black		
<20	1.77 (18)	98.23 (1000)
20-24	8.63 (91)	91.37 (964)
25-29	14.52 (81)	85.48 (477)
30-44	19.39 (64)	80.61 (266)
Hispanic		
<20	0.89 (8)	99.11 (887)
20-24	5.45 (56)	94.55 (971)
25-29	11.51 (83)	94.73 (683)
30-44	18.79 (90)	81.21 (389)
Non-Hispanic White		
<20	1.93 (23)	98.07 (1171)
20-24	9.35 (151)	90.65 (1464)
25-29	9.41 (127)	90.59 (1223)
30-44	9.82 (117)	90.18 (1075)
Marital Status		
Married		
<20	2.47 (9)	97.53 (355)
20-24	9.46 (125)	90.54 (1196)
25-29	11.35 (176)	88.65 (1374)
30-44	12.07 (165)	87.93 (1202)

Widowed/Div./Separated		
<20	0.00 (0)	100.00 (22)
20-24	13.99 (20)	86.01 (123)
25-29	11.85 (18)	88.16 (134)
30-44	18.18 (30)	81.82 (135)
Cohabiting		
<20	1.54 (12)	98.46 (767)
20-24	8.34 (89)	91.66 (978)
25-29	10.59 (56)	89.41 (473)
30-44	17.78 (48)	82.22 (222)
Never Married		
<20	1.44 (28)	98.56 (1914)
20-24	5.49 (64)	94.51 (1102)
25-29	10.30 (41)	89.70 (357)
30-44	14.07 (28)	85.93 (171)
Mother's Education		
< High School		
<20	1.97 (21)	98.03 (1067)
20-24	8.18 (101)	91.82 (1133)
25-29	14.10 (118)	85.90 (719)
30-44	19.24 (116)	80.76 (487)
High School/GED		
<20	1.71 (19)	98.29 (1091)
20-24	10.37 (131)	89.63 (1132)
25-29	11.52 (101)	88.48 (776)
30-44	13.91 (90)	86.09 (557)
Some College		
<20	1.23 (7)	98.77 (563)
20-24	4.68 (34)	95.32 (693)
25-29	9.54 (48)	90.46 (455)
30-44	8.62 (33)	91.38 (350)
Bachelor's or Higher		
<20	0.61 (2)	99.39 (326)
20-24	5.91 (26)	94.09 (414)
25-29	5.60 (22)	94.40 (371)
30-44	8.78 (31)	91.22 (322)
Parity		
No Children		
< 20	0.2 (2)	99.8 (1079)
20-24	1.7 (20)	98.3 (1139)
25-29	1.7 (13)	98.3 (760)
30-44	3.1 (21)	96.9 (650)

1 Child		
< 20	1.2 (19)	98.8 (1614)
20-24	1.7 (21)	98.3 (1186)
25-29	1.8 (13)	98.2 (697)
30-44	1.9 (8)	98.1 (404)
2 Children		
< 20	4.2 (18)	95.8 (409)
20-24	12.3 (118)	87.7 (843)
25-29	16.7 (115)	57.5 (74.4)
30-44	16.3 (84)	83.7 (431)
3 Children		
< 20	8.8 (7)	91.3 (73)
20-24	23.1 (93)	76.9 (309)
25-29	25.6 (99)	74.4 (287)
30-44	31.7 (98)	68.3 (211)
4 Children		
< 20	50.0 (3)	50.0 (3)
20-24	33.8 (52)	66.2 (102)
25-29	25.8 (61)	74.2 (175)
30-44	30.8 (76)	69.2 (171)
Total		
<20	1.58 (49)	98.42 (3058)
20-24	8.06 (298)	91.94 (3399)
25-29	10.88 (291)	89.08 (2383)
30-44	13.54 (271)	86.51 (1730)

Table 5.3. Fixed Effects of Socio-Demographic Factors, Pregnancy Intention, and Pregnancy History on Utilization of Contraception during the Interval between Pregnancies

Variable	Model 1a†	Model 2a
Pregnancy Intention		
Intended	Ref	Ref
Mistimed	0.177	0.127
Unwanted	0.193	0.333**
Age at Conception		
< 20	0.232	0.030
20-24	0.439**	0.165
25-29	0.445	0.200
30-44	Ref	Ref
Race and Ethnicity		
Non-Hispanic Black	-0.370**	-0.351**
Hispanic	-0.452**	-0.502**
Non-Hispanic White	ref	Ref
Marital Status		
Married	Ref	Ref
Widowed/Div./Separated	-0.841**	-0.827**
Cohabiting	-0.137	-0.066
Never Married	-0.054	-0.091
Mother's Education		
< High School	0.007	-0.016
High School/GED	0.045	-0.043
Some College	-0.054	-0.107
Bachelor's Degree or Higher	Ref	Ref
Parity		
No Children	-0.131	-0.093
1 Child	0.576**	0.396*
2 Children	0.316*	0.177
3 Children	0.221	0.097
4 or More Children	Ref	Ref
Age at First Pregnancy		
< 20		0.406*
20-24		0.712**
25-29		0.525**
30-44		Ref
Prior Pregnancy Intention		
Past Intended Pregnancy		Ref
Past Mistimed Pregnancy		-0.013
Past Unwanted Pregnancy		-0.286*
Prior Pregnancy Outcome		
Past Live Birth		Ref
Past Pregnancy Loss		-0.698**
Past Elective Abortion		-0.004

Note: For Models 1a and 2a, Level 1 N=12,059; Level 2 N=4,508

† The reference category for both models is women who did utilize contraception during the interval between pregnancies

*p<.05; **p<.01; Ref = reference category.

Table 5.4. Fixed Effects of Socio-Demographic Factors, Pregnancy Intention, and Pregnancy History with Interaction Terms on Utilization of Contraception during the Interval between Pregnancies

Variable	Model 3a†	Model 4a
Pregnancy Intention		
Intended	Ref	Ref
Mistimed	0.075	0.103
Unwanted	0.292*	0.285*
Age at Conception	-0.000*	-0.000
Race and Ethnicity		
Non-Hispanic Black	-0.345**	-0.345**
Hispanic	-0.504**	-0.509**
Non-Hispanic White	Ref	Ref
Marital Status		
Married	Ref	Ref
Widowed/Div./Separated	-0.788**	-0.825**
Cohabiting	-0.092	-0.111
Never Married	-0.158	-0.167
Mother's Education		
< High School	-0.020	-0.010
High School/GED	0.034	0.055
Some College	-0.114	-0.099
Bachelor's Degree or Higher	Ref	Ref
Parity		
No Children	-0.188	-0.139
1 Child	0.268	0.317
2 Children	0.091	0.199
3 Children	0.050	0.091
4 or More Children	Ref	Ref
Age at First Pregnancy		
< 20	0.214	0.271
20-24	0.651**	0.654**
25-29	0.533**	0.519**
30-44	Ref	Ref
Prior Pregnancy Intention		
Past Intended Pregnancy	Ref	Ref
Past Mistimed Pregnancy	0.033	-1.230**
Past Unwanted Pregnancy	-0.240	-0.300
Prior Pregnancy Outcome		
Past Live Birth	Ref	Ref
Past Pregnancy Loss	-0.669**	0.637
Past Elective Abortion	0.047	1.158*
Age-Prior Intent Interaction		
Age-Past Intended Pregnancy		Ref
Age-Past Mistimed Pregnancy		0.000*
Age- Past Unwanted Pregnancy		0.000
Age-Prior Outcome Interaction		
Age-Past Live Birth		Ref
Age-Past Abortion		-0.000*
Age-Past Pregnancy Loss		-0.000**

Note: For Models 3a and 4a, Level 1 N=12,059; Level 2 N=4,508

† The reference category for both models is women who did not utilize contraception during the interval between pregnancies

*p<.05; **p<.01; Ref = reference category.

Table 5.5. Fixed Effects of Socio-Demographic Factors, Pregnancy Intention, and Pregnancy History on Post-Pregnancy Tubal Sterilization

Variable	Model 1b†	Model 2b
Pregnancy Intention		
Intended	Ref	Ref
Mistimed	0.118	0.043
Unwanted	0.742**	0.509*
Age at Conception		
< 20	-1.738**	-1.992**
20-24	-0.505**	-0.755**
25-29	-0.264	-0.393*
30-44	Ref	Ref
Race and Ethnicity		
Non-Hispanic Black	0.165	0.118
Hispanic	-0.314	-0.316
Non-Hispanic White	Ref	Ref
Marital Status		
Married	Ref	Ref
Widowed/Divorced/Separated	0.043	-0.089
Cohabiting	0.071	-0.026
Never Married	0.058	0.103
Mother's Education		
< High School	0.965**	0.883**
High School/GED	1.027**	0.967**
Some College	0.490	0.430
Bachelor's Degree or Higher	Ref	Ref
Parity		
No Children	-2.753**	-2.554**
1 Child	-2.605**	-2.161**
2 Children	-0.480*	-0.236
3 Children	0.121	0.234
4 or More Children	Ref	Ref
Age at First Pregnancy		
< 20		0.398
20-24		0.361
25-29		-0.283
30-44		Ref
Prior Pregnancy Intention		
Past Intended Pregnancy		Ref
Past Mistimed Pregnancy		0.197
Past Unwanted Pregnancy		0.254
Prior Pregnancy Outcome		
Past Live Birth		Ref
Past Pregnancy Loss		-0.058
Past Elective Abortion		-0.034

Note: For Models 1b and 2b, Level 1 N=12,059; Level 2 N=4,508

† The reference category for both models is women who did not elect a post-pregnancy tubal sterilization

*p<.05; **p<.01; Ref = reference category.

Table 5.6. Fixed Effects of Socio-Demographic Factors, Pregnancy Intention, and Pregnancy History with Interaction Terms on Post-Pregnancy Tubal Sterilization

Variable	Model 3b†	Model 4b
Pregnancy Intention		
Intended	Ref	Ref
Mistimed	-0.034	0.011
Unwanted	0.442	0.460*
Age at Conception	0.001**	0.001**
Race and Ethnicity		
Non-Hispanic Black	0.143	0.135
Hispanic	-0.323*	-0.326*
Non-Hispanic White	Ref	Ref
Marital Status		
Married	Ref	Ref
Widowed/Divorced/Separated	-0.071	-0.078
Cohabiting	-0.032	-0.062
Never Married	-0.077	-0.080
Mother's Education		
< High School	0.884**	0.886**
High School/GED	0.969**	0.985**
Some College	0.431	0.433
Bachelor's Degree or Higher	Ref	Ref
Parity		
No Children	-2.611**	-2.545**
1 Child	-2.283**	-2.149**
2 Children	-0.290	-0.214
3 Children	0.229	0.237
4 or More Children	Ref	Ref
Age at First Pregnancy		
< 20	0.414	0.727
20-24	0.480	0.729
25-29	-0.170	-0.031
30-44	Ref	Ref
Prior Pregnancy Intention		
Past Intended Pregnancy	Ref	Ref
Past Mistimed Pregnancy	0.241	0.111
Past Unwanted Pregnancy	0.262	0.928
Prior Pregnancy Outcome		
Past Live Birth	Ref	Ref
Past Pregnancy Loss	0.051	1.053
Past Elective Abortion	-0.109	1.437
Age-Prior Intent Interaction		
Age-Past Intended Pregnancy		0.000
Age-Past Mistimed Pregnancy		-0.000
Age-Past Unwanted Pregnancy		Ref
Age-Prior Outcome Interaction		
Age-Past Live Birth		Ref
Age-Past Abortion		-0.001
Age-Past Pregnancy Loss		-0.000

Note: For Models 3b and 4b, Level 1 N=12,059; Level 2 N=4,508

† The reference category for both models is women who did not elect a post-pregnancy tubal sterilization

*p<.05; **p<.01; Ref = reference category.

Table 5.7 Fixed Effects Socio-Demographic Factors, Pregnancy Intention, and Pregnancy History on Utilization of Contraception during the Interval between Pregnancies Separated by Categorical Age of Conception

Variable	Model 5a† Age <20 n=2126	Model 6a Age 20-24 n=2567	Model 7a Age 25-29 n=1965	Model 8a Age 30-44 n=1340
Pregnancy Intention				
Intended	Ref	Ref	Ref	Ref
Mistimed	0.121	0.136	0.127	0.171
Unwanted	0.320*	0.441*	0.739*	0.714*
Race and Ethnicity				
Non-Hispanic Black	-0.322**	-0.377*	-0.557**	-0.658**
Hispanic	-0.487**	-0.430*	-0.287	-0.664**
Non-Hispanic White	Ref	Ref	Ref	Ref
Marital Status				
Married	Ref	Ref	Ref	Ref
Widowed/Div./Sep.	-0.842**	-0.349	-1.071**	-0.722
Cohabiting	-0.077	-0.096	-0.257	-0.102
Never Married	-0.152	-0.161	-0.227	-0.460
Mother's Education				
< High School	-0.001	0.102	0.225	-0.144
High School/GED	0.040	0.232	0.203	0.043
Some College	-0.085	0.189	-0.017	-0.453
Bachelor's or Higher	Ref	Ref	Ref	Ref
Parity				
No Children	-0.085	0.588	-0.385	-0.357
1 Child	0.407*	0.414**	0.741*	-0.157
2 Children	0.205	0.910*	0.450	-0.117
3 Children	0.134	0.612	0.095	0.042
4 or More Children	Ref	Ref	Ref	Ref
Prior Pregnancy Intention				
Past Intended Preg.	Ref	Ref	Ref	Ref
Past Mistimed Preg.	0.018	-0.253	-0.003	0.483**
Past Unwanted Preg.	-0.299	-0.285	-0.433	-0.553
Prior Pregnancy Outcome				
Past Live Birth	Ref	Ref	Ref	Ref
Past Pregnancy Loss	-0.731	-0.671**	-0.525**	-1.091**
Past Elect. Abortion	-0.000	0.022	0.058	-0.055

† The reference category for all models is women who did not utilize contraception during the interval between pregnancies

*p<.05; **p<.01; Ref = reference category.

Table 5.8. Fixed Effects Socio-Demographic Factors, Pregnancy Intention, and Pregnancy History on Post-Pregnancy Tubal Sterilization Separated by Categorical Age of Conception

Variable	Model 6b Age 20-24	Model 7b Age 25-29	Model 8b Age 30-44
Pregnancy Intention			
Intended	Ref	Ref	Ref
Mistimed	-0.170	0.070	-0.009
Unwanted	0.162	0.748	0.531
Race and Ethnicity			
Non-Hispanic Black	-0.211	0.306	0.499
Hispanic	-0.932**	-0.059	0.196
Non-Hispanic White	Ref	Ref	Ref
Marital Status			
Married	Ref	Ref	Ref
Widowed/Div./Separated	0.920	-1.078	-0.415
Cohabiting	-0.251	-0.007	0.464
Never Married	-0.194	0.143	-0.138
Mother's Education			
< High School	0.371	1.080*	1.064*
High School/GED	0.368	1.382**	1.118**
Some College	-0.401	1.283**	0.356
Bachelor's Degree or Higher	Ref	Ref	Ref
Parity			
No Children	-3.816**	-2.486**	-2.116**
1 Child	-2.665**	-2.315**	-3.021**
2 Children	-1.076**	0.006	-0.418
3 Children	-0.867*	0.597	0.385
4 or More Children	Ref	Ref	Ref
Prior Pregnancy Intention			
Past Intended Pregnancy	Ref	Ref	Ref
Past Mistimed Pregnancy	0.524	0.135	0.354
Past Unwanted Pregnancy	0.698	-0.163	0.205
Prior Pregnancy Outcome			
Past Live Birth	Ref	Ref	Ref
Past Pregnancy Loss	0.560*	-0.159	-0.171
Past Elective Abortion	0.391	-0.031	-0.004

† The reference category for all models is women who did not elect a post-pregnancy tubal sterilization

*p<.05; **p<.01; Ref = reference category.

CHAPTER VI

CONCLUSION

The final chapter in this dissertation will review the motivation for this research, followed by a summary of each of the empirical chapter's findings. Contributions to the research literature on pregnancy intention will then be discussed. This chapter will conclude with policy implications and directions for future research.

Motivation for Research

Initial motivation for this research came from the finding that approximately two-thirds of the women in the Friendly AccessSM Survey reported either a mistimed or unwanted pregnancy. The relatively equal distribution of intention status among this sample encouraged an inquiry into the potential influence of pregnancy intention on patient satisfaction, which was consistent with the goals of this program to assess and improve pregnancy related services. Further, at the time of this dissertation's proposal, no studies of these proposed relationships had been reported in the research literature. The subsequent publication by Humbert and colleagues (2010) did find a significant association between these factors and serves as a means for comparison in the exploratory stages of this research.

The false dichotomy often present in the literature between prevention of adolescent pregnancies and the preservation of fertility for women at the opposite end of the reproductive life course further motivated this research. By focusing on adolescent pregnancy, studies ignored the significant number of women who experience unintended

pregnancies in their later reproductive years. Second, while theoretical antecedents of pregnancy intention beyond socio-demographic predictors have been proposed (Gipson et al, 2008), the influence of these factors was untested. Both of these gaps motivated the research questions and hypotheses concerning the potential relationships between pregnancy history, age, and pregnancy intention in Chapter 4.

The research in Chapter 5 was motivated by an interest in the value of intentionality as a predictor of pregnancy prevention behavior. The research questions and hypotheses were further influenced by the results in Chapter 4, which provided direction regarding the hypothesized relationships between pregnancy history, pregnancy intention, and the utilization of pregnancy prevention services. Chapter 5 was similarly motivated by an interest in differences in these associations as women age. Tubal sterilization, which remains the most popular form of contraception for women ages 30 and over (Mosher and Jones, 2010), was therefore selected as a dependent variable in addition to the utilization of contraception in the interval between pregnancies.

The research in all three empirical chapters was motivated by the ubiquitous nature of experiencing an unintended pregnancy in the U.S. population. Although the statistics in Chapter 4 exclude a number of respondents from the analyses (i.e., women who were currently pregnant), based on analyses presented in Chapter 4 (Table 4.1) of the 2006-2008 NSFG data, the overall percentage of unintended pregnancies appears to have increased since 2001. While adolescents in these analyses reported a similar percentage of unintended pregnancies compared to 2001 (77% in 2006-2008 v. 78% in 2001) the percentage of unintended pregnancies increased for all other age groups. Compared to 2001(Chandra et al, 2005), results from Chapter 4 found that unintended

pregnancy increased from 44% to 53% for women ages 20-24, 27% to 35% in the 25-29 age group, and from 22% to 28% in women ages 30-44. This finding suggests that the issue of intentionality remains highly relevant to women's reproductive health and will continue to impact women, children, and families.

Summary of Empirical Research Findings

Chapter 3 examined the potential relationship between pregnancy intention and satisfaction with prenatal and hospital-based labor and delivery care in a sample of Medicaid-eligible women from the Flint, Michigan metropolitan area. Women were interviewed following the delivery of a live birth regarding their satisfaction with these pregnancy related services. Outcomes included both global and specific measures of satisfaction.

Results revealed that women with unwanted pregnancies were more likely to report lower global satisfaction with their prenatal care provider. Unwanted pregnancy was also negatively associated with satisfaction with the prenatal care provider's communication skills. In terms of labor and delivery care outcomes, women with unwanted pregnancies were less likely to be satisfied with their perceived sense of control. Mistimed pregnancies were not significantly associated with any of the global or specific satisfaction measures.

Chapter 4 focused on pregnancy intention as a dependent variable, testing the potential for pregnancy history (age at first pregnancy, prior intent and prior pregnancy outcomes) as an antecedent of intentionality in a nationally representative sample of women ages 15-44. Analyses were conducted using two-level multinomial generalized hierarchical linear modeling (HLM) to account for the lack of independence between

multiple pregnancies per respondent. Analyses also hypothesized that the inclusion of pregnancy history factors would mediate the effects of socio-demographic controls on intention, especially the influence of age at conception. Separate analyses were further conducted by categorical age at conception to examine if these hypothesized relationships changed as women aged. Pregnancy history was expected to be most strongly associated with intentionality for women ages 30-44.

Pregnancy history was found to be significantly associated with pregnancy intention. The strongest positive relationships were observed between prior mistimed and unwanted and subsequent mistimed and unwanted pregnancies. Conversely, women with a history of pregnancy loss were less likely to report their pregnancies as unintended. Women who first became pregnant as adolescents were also less likely to report a subsequent pregnancy as mistimed. While pregnancy history did attenuate the influence of some socio-demographic variables (race/ethnicity, marital status, and parity), age at conception remained strongly associated with pregnancy intention with the inclusion of pregnancy history variables.

When analyzed separately by age group, associations between prior and subsequent unintended pregnancies were generally strongest for women ages 30-44. One exception to this trend was the negative association between history of pregnancy loss and unintended pregnancy, which was strongest for women under age 20.

Chapter 5 expanded on the findings of this dissertation by examining the potential relationship between pregnancy intention, pregnancy history, and the utilization of pregnancy prevention services in the 2006-2008 NSFG, specifically utilization of contraception in the interval between pregnancies and the election of post-pregnancy

tubal sterilization. Similar to Chapter 4, analyses of these relationships were also conducted using two-level multinomial generalized hierarchical linear models. Similar models were further analyzed separately according to categorical age at conception.

Pregnancy history was found to be significantly associated with the utilization of contraception in the interval between pregnancies. Women who first became pregnant in before age 30 were more likely to utilize contraception in the pregnancy interval. A history of both unwanted pregnancy and pregnancy loss were negatively associated with contraceptive use. While unwanted pregnancy was positively associated with the subsequent election of a post-pregnancy tubal sterilization, pregnancy history factors were not significantly associated with this procedure.

In contrast to the preceding chapter, separate analyses according to categorical age at conception did not consistently result in the strongest associations for women ages 30-44. This was particularly the case for post-pregnancy tubal sterilization, where no patterns emerged according to age group. However, the positive relationship between mistimed pregnancy and utilization of contraception in the pregnancy interval was exclusive to women ages 30-44. Similarly, the strongest associations were found between a history of pregnancy loss (negative relationship) and contraceptive use in the pregnancy interval for women in the oldest age group.

Contributions to the Pregnancy Intention Literature

Although exploratory in nature due to the small sample size, the findings from Chapter 3 suggest that women with unwanted pregnancies may be less satisfied with the interpersonal relationship with their prenatal care provider, as well as their perceived sense of control during labor and delivery. This result is consistent with that of Humbert

et al (2010), which also found that women with unwanted pregnancies were more likely to rate the satisfaction with their prenatal care provider as low. These findings propose that the negative or ambiguous feelings that women may have in deciding to carry an initially unwanted pregnancy to term may carry over into the clinical encounter.

The most central result of this dissertation was the significance of the relationship between pregnancy history and pregnancy intention. The finding that prior intentions and outcomes were consistently associated with subsequent pregnancy intention provides support for a more complex set of antecedents of intentionality. The conclusion that a woman's individual experience with pregnancy may be a more valuable predictor of intention than socio-demographic factors was further supported by the finding that the inclusion of pregnancy history attenuated the influence of race/ethnicity, marital status, mother's education, and parity.

One common finding from Chapters 4 and 5 was that the associations between pregnancy history and the outcome of interest were generally stronger for women ages 30-44. Performing separate analyses according to categorical age of conception permitted side-by-side comparisons that revealed if one age group was driving or obscuring significance in the model for the whole population. The stronger associations for women ages 30-44 supports the hypothesis that as women age, they are more likely to be influenced by their past experiences with pregnancy. While the mechanism is unknown, the emotional maturation process may enable women to better evaluate the perceived benefits and barriers of pregnancy prevention and planning.

Methodologically, most pregnancy intention studies assume independence between multiple pregnancies from the same women. In failing to recognize the potential

for correlation between these pregnancies, prior studies may have overestimated the influence of established predictors of unintended pregnancy, such as race, education, and income. In Chapter 4, for example, an examination of the raw data in Table 4.1 led to expectations for large coefficients between non-Hispanic black women and unintended pregnancy. However, non-Hispanic black race was only positively associated with unwanted pregnancies prior to the inclusion of pregnancy history variables into the model. The use of multi-level modeling in the examination of these relationships may be responsible in part for the disparities in these results.

The majority of pregnancy intention research utilizing nationally representative samples of retrospective data, such as the NSFG, also ignore the importance of aligning the timing of socio-demographic controls with the intentionality of each particular pregnancy. Considering that the NSFG surveys women ages 15-44, factors such as insurance status, educational attainment and income are unlikely to remain constant over the course of a woman's reproductive life course. When combined with the analytical concerns discussed above, a number of the antecedents of and outcomes associated with pregnancy intention reported in the literature should be viewed with skepticism.

The findings in all three empirical chapters of this dissertation support the differentiation of mistimed from unwanted pregnancies (Gipson, 2008). In Chapter 3, mistiming was not significantly associated with any of the global or specific satisfaction outcomes. Not surprisingly, results based on a trichotomous measure of pregnancy intention were considerably stronger compared to analyses using a dichotomous measure. Differences in the associations between prior mistimed pregnancies, prior unwanted

pregnancies, and the outcomes of interest reported in Chapters 4 and 5 further supports the utilization of a trichotomous measure for the history of pregnancy intention as well.

Policy Implications

Results from all three empirical chapters have implications for providers of women's reproductive health services. The assessment of pregnancy history factors and the intent of a current pregnancy may help providers identify women with the greatest need for complementary support services. Identification of these women could further improve upon the potential deficits in communication between patients and providers found in Chapter 3, enabling women to make better informed decisions while pregnant and for subsequent pregnancy prevention services. Additional support in preparation for the child could also help address disparities for women with unwanted pregnancies in perceived lack of control during the labor and delivery process.

The findings from Chapters 4 and 5 suggest that an assessment of intentionality should not be limited to the current or last known pregnancy, but should take into account a woman's cumulative pregnancy history. Especially for women in their later reproductive years, the intentions and outcomes of previous pregnancies may be more influential predictors of pregnancy prevention and planning behaviors than the isolated intent of a single pregnancy. For example, providers may find that a more in-depth assessment of a woman's prior pregnancy intention may help frame the trade-offs associated with contraceptive methods in terms of a woman's personal experience. Tailoring these discussions to an individual's preferences may lead to increased satisfaction with the chosen method.

Directions for Future Research

One potential area for future research is to examine the relationship between pregnancy intention, pregnancy history, and the choice of long-acting reversible contraception (LARC). As rates of tubal sterilization continue to decline (Chan and Westhoff, 2010), women who may have previously chosen sterilization may instead be encouraged to select an IUD or contraceptive implants. Pregnancy history and intention status may impact both the perception of and the decision to utilize LARC. Although family planning advocates are beginning to push for increased utilization of LARC in younger women, age differences in these relationships may also be observed, as older women of reproductive age remain more likely to use these methods (Sonfield, 2007).

Another area of potential inquiry is the assessment of health care provider perceptions of pregnancy intention. Analyses in Chapter 3 found that women with unwanted pregnancies were less satisfied with their prenatal care providers and their communication skills. Are providers, for example, even aware of the intention of a woman's current and/or past pregnancies? If so, was this the result of a direct assessment? If providers are aware of a pregnancy's intention status, does this information influence how they treat pregnant patients? Do assumptions and/or an awareness regarding intentionality influence the recommendations providers make for short- and long-term, as well as permanent contraceptive methods?

Although unreported in this dissertation due to poor reliability of the construct, future research could also consider further examination of the significant associations between prior elective abortion and the dependent variables of interest. One line of potential inquiry would be to replicate the research questions, but with a more reliable

source of abortion reporting. Although not nationally representative, surveying women from abortion providers could potentially confirm the negative association between prior elective abortions and subsequent unintended pregnancy. Research into the extent of contraceptive counseling, women's expressed level of motivation to use contraception, and longitudinal reports of contraceptive use post-abortion could provide evidence for the mechanisms behind this result. Further, research could examine if these relationships are sensitive to a dose-response effect in terms of the influence of single versus multiple prior elective abortions on subsequent intention and pregnancy prevention behavior.

The proposed research questions merely scratch the surface of the potential for pregnancy intention research. Additional antecedents, as well as the discovery of if and how intentionality may impact a range of short- and long-term outcomes remain unknown. The findings in this dissertation, especially concerning the relationship between pregnancy history, pregnancy intention and the utilization of pregnancy prevention services, further complicated by the influence of age, support the view of intentionality as a complex construct. Enhanced understanding of pregnancy intention and its role over the reproductive life course may eventually contribute to efforts where the experience of an unintended pregnancy becomes the exception for the majority of U.S. women.

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