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THE TICKING OF THE “BIOLOGICAL CLOCK”: WORRY ABOUT FUTURE FERTILITY
IN NULLIPAROUS WOMEN

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of
Philosophy at Virginia Commonwealth University

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Acknowledgment

This dissertation would not have been possible without ongoing support and encouragement from several people. I would like to thank my advisor, Kathleen M. Ingram, J.D., Ph.D., for her excellent mentoring, thoughtful guidance, and academic wisdom. I am profoundly grateful to have had the opportunity to work with her during my graduate studies. I would also like to thank my friends and family for their support, particularly Colleen J. Ross for her great ideas, Patricia Kersting for lovingly checking up on my progress, and my mom, Sandra Cordes, for always believing in me. Additionally, I am most grateful for the love and support of my partner, Robin Palm, who always puts a smile of my face and helps me get unstuck.

I would also like to thank all the women who participated in my study for so thoughtfully sharing information about their personal experiences.

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Abstract

Title: THE TICKING OF THE “BIOLOGICAL CLOCK”: WORRY ABOUT FUTURE FERTILITY IN NULLIPAROUS WOMEN

By: Karen Kersting, M.A., M.S.

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

Virginia Commonwealth University, 2013.

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Modern women are waiting until later in their lives to have children than women of previous generations, a trend influenced by a number of factors including financial stability, dating norms, and career goals and responsibilities. As women age, their fertility may decline in ways that make it less likely that they will be able to become pregnant and increase the odds having a child born with a birth defect. Some women are known to experience worry about whether they will be able to become pregnant when they are ready to try. The primary purpose of this study was to assess how much women are worrying, what demographic and cultural factors predict higher

levels of worry, and if worry about future fertility is related to symptoms of distress. Through online recruitment, 598 nulliparous women between the ages of 25 and 40 years completed a cross-sectional, self-report survey. Mean scores on measures of future fertility worry revealed a low-to-moderate, but consistently present level of worry. As hypothesized, multiple regression analysis showed that higher levels of endorsement of the personal importance of motherhood were related to higher levels of future fertility worry, as was age and the interaction of age and importance, but to a lesser extent. Knowledge of fertility was not related to increased worry. Additionally, higher levels of future fertility worry were shown to be related to higher levels of symptoms of depression and symptoms of anxiety. And an open-ended question revealed that women hold a variety of reasons for not wanting to become pregnant presently, including career, relationship, and financial concerns. Overall, the study contributes rigorous findings to a previously unstudied research question and population: How much do nulliparous women who have not experienced infertility worry about their fertility? And what influences that worry? The findings imply that media, researchers, practitioners, the general public, and even women themselves may have held errant assumptions about the thoughts and feelings of nulliparous women, and that worry about fertility is complex, generally moderate, and closely related to personal values.

The Ticking of the “Biological Clock”: Worry about Future Fertility in Nulliparous Women

Women in the United States and around the world are delaying pregnancy until later in their lives and having their first children at later ages (Martin et al., 2011). Doing so increases the statistical likelihood of women experiencing difficulty getting pregnant, experiencing health problems during pregnancy, and having a child who experiences health problems (Balasch, 2010). Information that women receive from medical professionals, friends and family, and the media results, for many, in knowledge of their potentially decreasing chances of achieving a healthy pregnancy (Lampi, 2011) and, therefore, may result in repetitive thought about fertility concerns. Though the idea of the ticking “biological clock” is popular, and associations between diagnosed infertility and distress are well established (Greil, Slauson-Blevins, & McQuillan, 2010), little is known about which and how many women experience worry and distress related to future fertility, how much worry they experience, and how it affects their psychological well-being.

Control theory proposes that individuals hold ideas about their desired futures, which may be in conflict with what people know about their current reality and future prospects (Watkins, 2008.) Individuals take actions to resolve the discrepancies between their realities and hopes for the future, and “actions” can include cognitive patterns such as repetitive thoughts, or worries. When the actions people take to resolve discrepancies fail to produce change, individuals may experience distress.

Worry about future fertility could be considered a form of unproductive action to resolve the discrepancy between life circumstances and the desire to become pregnant, and therefore, according to control theory, may cause distress.

The current study aimed to contribute to understanding of thoughts and experiences related

to future fertility among women who have never been pregnant. Specifically, the study contains three main research aims. First, the percentage of women who experience repetitive thought about future fertility were measured and described. Second, factors such as age, individual thoughts about the importance of motherhood, and fertility knowledge, were examined as predictors of worry about future fertility. And finally, the relationship between worry about future fertility and psychological distress, such as depressive symptoms and anxiety symptoms, was examined.

Review of Literature

Changes in childbearing trends

In the United States and in many other Western countries, more women than ever are making the choice to postpone having children until later in life. According to statistics provided by the Centers for Disease Control and Prevention, the average age of first-time mothers has increased significantly over the last few decades, rising from an average age of 21.4 years in 1970 to 25.1 years in 2008 (Martin et al., 2011). In the U.S., the proportion of first birth to women at ages 35-39 years has increased 50% over the past two decades (Martin, 2010). In 2006, 1 in 12 women in the U.S. gave birth to their first child after the age of 35 years, eight times more than in 1970 when only 1 in 100 women gave birth for the first time after age 35 (Mathews & Hamilton, 2009). Furthermore, the pregnancy rate for women ages 35 to 39 years was 78.5 per 1,000 women in 2008 and for women ages 40 to 44 years it was 18.8 per 1,000, both rates having increased steadily since 1991 (Ventura, Curtin, Abma, & Henshaw, 2012).

The average age of first-time mothers increased in all states and in the District of Columbia between 1970 and 2006 (Mathews & Hamilton, 2009), with the states on the East and

West Coasts and in the upper Midwest seeing the greatest increase in average age of first-time mothers.

The average age at first birth increased for all racial and ethnic groups in the U.S. between 1990 and 2006, with the increases ranging from 0.6 years among American Indian or Alaska Native women to 1.7 years among Asian or Pacific Islander women (Mathews & Hamilton, 2009). In 2006, averages for Asian or Pacific Islander women (28.5 years) and non-Hispanic White women (26.0 years) were both above the national average of 25.0 years. Also in 2006, average ages of first birth for Hispanic women (23.1 years), non-Hispanic Black women (22.7), and American Indian or Native Alaskan women (21.9) were all below the national average (Mathews & Hamilton).

Compared to other developed countries, the United States is in the middle of the range for increases in average age of first-birth, with a change of 3.6 years. However, in both 1970 and 2006 the United States had the lowest age of first birth when compared with other developed countries. In Switzerland, in 2006, the average age of first birth was 29.4 years, in Japan it was 29.2 years, in Ireland it was 28.7 years, in Canada it was 28 years, and in France it was 27.8 years (Mathews & Hamilton, 2009).

Overall in the U.S., according to 2010 census data, among women 25 to 39 years old, 80.3% have borne a child, and among women who have ever been married in that same age group, 87.1% have had a child (U.S. Census, 2010).

Why women are having children later in life

With the introduction of the oral contraceptives and other reliable, non-coital contraceptive methods in the 1960s, women began to be able to strictly control the timing of their own reproduction (Wu & MacNeill, 2002). At the same time, educational, employment, and

career opportunities opened up for women, giving them a variety of alternatives to occupying only the role of mother. This led young women to pursue goals, other than motherhood, during their early adulthood. Coinciding with the enhancement of women's roles in the workforce, societal shifts in the normative timing of marriage and cohabitation have also changed the timetable for having children (Lesthaeghe & Neidert, 2006). Furthermore, with the responsibility of childcare more often falling on women than men, social policies that fail to provide affordable childcare options for the children of working adults may lead working women to delay having children out of fear of not being able to afford care (Misra, Moller, & Budig, 2007; Slaughter, 2012). And women who leave work for any amount of time to care for a child, are known to come back to lower wages than their male counterparts, a trend that increases with the education level of the woman (Anderson, Binder, & Krause, 2002).

What constitutes advanced maternal age?

There is no universal definition of advanced reproductive age, or advanced maternal age, but research literature often points to age 35 years as the point at which declines in fertility become significant (Balasch & Gratacós, 2012). There is clear research evidence of this decline in fertility, as well as evidence of increased risk of health complications for both mother and baby. However, there are also protective factors found in older mothers, like positive health behaviors and economic stability, that may ameliorate problems associated with age.

Important to the current study's considerations of how individual women view themselves with respect to age and potential motherhood, one study out of Europe focused on "social age deadlines" for childbearing, which are defined as proscriptions against engaging in certain behaviors too early or too late (Billari et al., 2011). Over 20,000 men and women age 15 years and up were surveyed in 25 countries through the European Social Survey, which included

a question about at which age women and men are “too old” to consider having children. Of this sample, 57.2% perceived a maternal social age deadline of 40 years or less and 46.2% perceived a paternal social age deadline of 45 years or less.

Health problems associated with advanced maternal age

With the decision to start having children later in life, women increase the risk of having difficulty getting pregnant, the risk losing the pregnancy, the risk of experiencing health problems during pregnancy, and the risk of having a child who experiences health problems.

Fertility. *Fertility* is technically defined as the rate of childbearing in a population. Another term — “fecundity” — is defined as the capacity to bear a child. Throughout the academic literature on reproduction and in media reports, “fertility” and “fecundity” are used interchangeably with both having an implied meaning of ability to have a child. So “fertility” ends up being the most-used term to imply ability to have a child, something known in both academic and lay environments to be most affected by a woman’s age.

The decrease in fertility related to female aging is mainly due to the ongoing reduction in the quantity and quality of oocytes, or female egg cells, housed in the ovaries starting at the time of a woman’s birth (Balasch & Gratacós, 2011). Female infants have 1-2 million oocytes at the time of birth, about 250,000 oocytes at menarche (time of first menstrual cycle), 25,000 oocytes at 37 years of age, and only a few thousand at menopause. This decline is a normal process associated with aging, and variation in the rate of oocyte loss is mainly related to genetic factors (Balasch & Gratacós). Beyond the reduction in the number of eggs, as a woman ages, more of her oocytes will have genetic abnormalities that cause spontaneous abortion and miscarriage (Balasch & Gratacós). Additionally, some decline in fertility is related to uterine factors, or the uterus being able to successfully support the growth of a fertilized egg, but this is mainly a factor

in women age 45 years or older.

The overall natural fertility of humans, as related to female age, is best studied in populations where contraceptives are not used. Historical data for 10 such groups, living between the 17th and 20th centuries, were examined by Menken, Trussell, and Larsen (1986) for the effect of maternal age on the average rate of pregnancy. They found that fertility was relatively stable through 30 years of age, at more than 400 pregnancies per 1,000 married (sexually active) women per year. Then at age 35, fertility begins to decline rapidly, nearing 200 pregnancies per 1,000 married women per year. And by age 45 years, the fertility rate is only 100 pregnancies per 1,000 married women. Another way to think of this is in terms of percent decline; Menken et al. found that fertility, compared to that of women 20 to 24 years, is reduced on average by 6% for women 25 to 29 years, 14% for those 30 to 34 years, and 31% for women 35 to 39 years, with larger declines thereafter.

One criticism of historical research on fertility is it fails to account for varying rates of sexual activity between partners, which may decline with age and length of partnership, and the timing of that activity in relation to ovulation. To deal with this problem, researchers in a 2000 study of 782 European couples using natural family planning tracked daily information about intercourse and menstruation. That study clearly showed women's fertility begins to decline in the late 20s, with substantial decreases by the late 30s (Dunson, Colombo, & Baird, 2002).

Notably, overall fertility is also affected by paternal age, through both quantity and quality of spermatozoa. Descriptive studies have shown a decline in fertility associated with increased male age starting in a man's 30s (Dunson, Baird, & Colombo, 2004). A study examining pregnancy and miscarriage rates after intrauterine insemination found a significant decrease in the pregnancy rate was attributable to paternal age of more than 40-45 years (Balasch

& Gratacós, 2011). Additionally, a study of pregnancy and miscarriage rates after in vitro fertilization and embryo transfer using a donor oocytes showed significant decreases in pregnancy outcomes among males age 50 years and older, after controlling for female age (Balasch & Gratacós).

Overall, about 6% of married women 15–44 years of age in the United States are unable to get pregnant after one year of unprotected sex (infertility), in any given year (CDC, 2013). Also, about 11% of women 15–44 years of age in the United States have difficulty getting pregnant or carrying a pregnancy to term, regardless of marital status (impaired fecundity).

Becoming pregnant. With these population-based fertility rates in mind, when a woman decides to become pregnant, if she is over the age of 30 years, she may already face declines in fertility that will delay her or prevent her from becoming pregnant. And for the woman wanting to become pregnant, the amount of time it takes to become pregnant may be a more salient measurement than overall fertility rates. In fact, infertility is defined by the World Health Organization (WHO) as the inability of a couple to conceive after a 1-year period of regular, unprotected intercourse (WHO, 1991). To quantify the likely amount a time a woman will wait to become pregnant at a variety of ages, the French epidemiologist Leridon developed a computer simulation model of reproduction based on a combination of historic and modern marriage and birth data on over 3,500 families (Leridon, 2004). His model estimates the percentages of women at varying ages who will become pregnant within 1, 2, 3 and 4 years. He found that at age 30 years, 75.4% of women conceived within 1 year, an additional 10.9% within 2 years, an additional 3% within 3 years, and an additional 1.4% within 4 years. At age 35 years, 66% conceived within 1 year, 12.3% more did within 2 years, 3.9% more within 3 years, and 1.7% more within 4 years. And for women age 40 years, 44.3% conceived within 1 year, 12.7%

more within 2 years, 4.7% more within 3 years, and 2.0% more within 4 years. A total of 93.9% of 30-year-old women were eventually able to conceive, 85.9% of 35-year-old women, and 65.1% of 40-year-old women.

Infertility treatment. Medical treatments for infertility are an option for women who find they have trouble becoming pregnant. Medical guidelines suggest that clinical evaluation for infertility is appropriate for couples who have tried for a year or more to get pregnant, and for women with certain medical problems and those who are older than 35 years (Smith, Pfeifer, & Collins, 2003). Evaluation includes examination of a woman's anatomy, ovulation patterns, and hormone production, and of a man's anatomy, semen, and hormones. Treatment options depend on the specific problems faced by a couple, but can include intrauterine insemination, administration of hormones, surgeries to repair anatomy, and in vitro fertilization (IVF), as well as use of donor sperm or eggs. *Traditional* treatments mainly include surgeries to repair anatomy and procedures to help introduce semen past the cervical opening. *Assisted Reproductive Technology*, or ART, is the pharmacological induction of multiple oocytes which are then fertilized *in vitro* (IVF), or outside of the body and in a lab, to be implanted in later (Smith et al.).

Options and success rates. A number of variables affect the success rates of infertility treatments, including the age at which a woman and her partner pursue treatment, which researchers say markedly affects the success of infertility treatment (Balasch, 2010; Smith et al., 2003). The age of male partners had a large effect on the results of traditional treatments, and pregnancy rates for these treatments were significantly lower in women over 35 years of age, who likely have older males partners, when compared to younger patients, who presumably had younger male partners (Balasch & Gratacós, 2011). Similarly, in ART treatments, there is a decline in success rates related to maternal age (Smith et al., 2003). According to Leridon's

model, among women 30 years old who have experienced infertility and turned to ART, 30% will conceive; among women 35 years old, 24% will conceive, and among women 40 years old, 17% will conceive (Leridon, 2004) Overall, Leridon says that ART can reduce age-related declines in fertility by about 50%, and he encourages women over 35 years of age to consider using ART sooner rather than later.

Costs and access. The overall impact of ART treatments has been minimal because few people are able to access the treatment; less than 10% of infertile couples in the United States undergo IVF treatment (Smith et al., 2003). The low use is directly related to the high costs of treatment and inconsistent insurance coverage for infertility. According to 2002 data, the average cost of a single IVF cycle in the U.S. was \$9,500 (Smith et al., 2003).

Fertility preservation. Oocyte cryopreservation, or *egg freezing*, and embryo cryopreservation are ways to preserve the health of egg and sperm cells over time. Embryo preservation is most commonly done in the process of IVF and requires sperm cells to fertilize an oocyte. Egg freezing was first used in the late 1980s to preserve the oocytes of women whose fertility was threatened by medical conditions or cancer treatments (Shkedi-Rafid & Hashiloni-Dolev, 2011). At the time, the process for freezing eggs was slow and resulted in low oocyte survival rates, but it was the best option for fertility preservation, short of freezing a fertilized embryo. Recent advances, including “fast-freezing” techniques, have improved the procedure such that survival rates and clinical outcomes are now similar to those of fresh oocytes in IVF treatment. In 2004, an American company began offering the procedure to healthy women who wished to postpone having a baby. As age-related fertility declines during a woman’s 30s and 40s are mainly due to aging oocytes, rather than factors related to the uterus or the physical rigors of pregnancy, egg freezing has been marketed as a way to delay the aging of eggs and

maintain fertility. Oocyte cryopreservation is still considered experimental by the American Society for Reproductive Medicine, but it is currently broadly available at women's health centers in the U.S. (Hirshfeld-Cytron, Grobman, & Milad, 2012).

Research on the efficacy of oocyte cryopreservation is presently limited to studies of fertile women under the age of 30 years, making the effectiveness for older women and women experiencing fertility problems unknown (Shkedi-Rafid & Hashiloni-Dolev, 2011). Average cost for the procedure is estimated at about \$36,000, and one study, assessing the cost-effectiveness of the procedure, suggested oocyte cryopreservation did not offer benefits beyond currently available ART used at the time of the desired pregnancy (Hirshfeld-Cytron et al., 2012).

Risks related to pregnancy outcome. After becoming pregnant, women over 35 years of age face a higher risk for a range of problems including miscarriage, gestational diabetes, preterm delivery, and chromosomal problems in the child (Balasch, 2010; Cleary-Goldman et al., 2005; Luke & Brown, 2007). That said, not every woman who is pregnant at an older age will face problems, and statistically significant findings about increased risk may not accurately reflect the practical significance of increased risk. Additionally, some researchers note conflicting findings and methodological challenges to isolating the causes of adverse outcomes.

Increased risk of miscarriage in advanced maternal age women is mainly attributable to abnormalities in the egg, which is illustrated by improved rates of live birth in older women who use donor eggs (Balasch, 2010). Uterine factors associated with age may also play a role in pregnancy loss, but in a study of more than 3,000 IVF treatments with donor eggs miscarriage rates were increased only in women over age 45 years (Balasch).

A data set from the National Center for Health Statistics on over 8 million live births was evaluated for outcome trends among the increasing population of women giving birth after age

30 years. Luke and Brown (Luke & Brown, 2007) found that mean birthweight decreased and proportions of low and very low birthweight increased with advancing maternal age. Among *primiparas* women, those who are having a baby for the first time, the researcher found an increase in all adverse health outcomes with advancing age. The highest risks for women age 45 year or older, compared to those 30 to 35 years, were for chronic hypertension, diabetes, premature birth, and pregnancy associated hypertension. Similar types of age-related increases in risk were seen for multiparas women, those who had had a successful pregnancy previously, but the level of risk increased more sharply with age among these women. The researchers also found increased rates of unplanned cesarean sections and dysfunctional labor associated with increased age, and found an increased risk of infant death, even after controlling for congenital abnormalities.

Considering the viewpoint of a woman thinking about becoming pregnant, specific changes in the risk for problems in women of various ages may be more useful to consider. Luke and Brown (Luke & Brown, 2007) reported that the overall rate of full-term births for primiparas women was 89.7% , 90.4% for women ages 30 to 34 years, 88.5% for women ages 35 and 39 years, 86.8% for women ages 40 and 44 years, and 83.8 for women 45 years or older. The percentage of women with fetal congenital abnormalities was 1.4% for the overall population, 1.3% for women 30 to 34 years, 1.4% for women 35 to 39 years, 1.8% for women 40 to 44 years, and 2.6 for women age 45 years and older.

From a public health perspective, the increase in maternal and fetal complications associated with age are certainly significant and reason for general concern about the population's increasing age of first birth. However, several authors point out that the increases are small enough that individual women may not need to be overly concerned, and in fact, may

be done a disservice when risks are overstated. Taking this into account, sociologist John Mirowsky contextualized the *biodevelopmental* health risks, such as oocyte aging, with *biosocial* considerations, such as social support and financial stability (2005), finding that, in general, “better health and survival come from delaying as long as possible.” Based on a data from a U.S. sample of women ages 25 through 95, Mirowsky found that when both factors are considered the optimal age for childbirth may be in the mid-thirties, and cited evidence that older mothers may have better overall physical health, better health behaviors, like not smoking, social and economic stability, and even more effective parenting skills.

Desire to be a mother

Due to the availability and acceptability of contraception and abortion, modern women have, perhaps for the first time in history, a great deal of choice over whether or not they will become mothers (Sevon, 2005). The advent of this “choice” requires a new examination of the reasons why women choose to become mothers, contextualized through both biological factors as well as social constructions about motherhood.

According to feminist scholar Rosemary Gillespie “motherhood has predominantly been perceived as natural for women, the desire for it inevitable, unquestioned and central to constructions of ‘normal’ femininity” (2000, p. 223.) But that view has come into question as more women have chosen not to have children, or have delayed having children while prioritizing other goals.

Motherhood mandate. The idea that motherhood is central to all women’s identities and built into social institutions is what feminist authors like Nancy Felipe Russo have named the Motherhood Mandate (1976.) She and others suggest that we live in a *pronatalist* or *prochildbearing* society that encourages reproduction and holds the role of parenthood in high

esteem. Alternately, the choice to not have children is often seen as “deviant, unfeminine, and an unhealthy choice for women; one that transgresses traditional constructions of femininity” (Gillespie, 2003). Research on perceptions has shown that women who choose to be childfree are often seen by others as unfortunate or psychologically flawed, selfish, and deviant (Smith 1997; Gillespie, 2000).

Childless versus childfree. The language used to define the state of not giving birth to children – for example “infertility” or “childlessness” – mostly exists in terms of an absence or deficiency of motherhood (Gillespie, 2000). However, with women’s increased ability to control their fertility, more women are choosing to not parent children, and the term *childfree* has been claimed by those who want to emphasize the childlessness can be an active and fulfilling choice (Bartlett, 1996).

Ambivalence. The complicated set of influences on the decisions of women to choose to have a child or to remain childfree create what some authors call an intense state of ambivalence about motherhood (Wager, 2000). Shelton and Johnson (2006) interviewed women who had delayed pregnancy until after age 30 year and found many thought of the decision to have a child as a “double-edged sword”, with significant benefits and positive emotions related to having a baby, but also sacrifice of personal goals and identity. Pinquart, Stotzka, and Silbereisen (2010) surveyed 267 German adults ages 25 to 30 years and found that people with high levels of ambivalence about parenthood were more likely to delay the decision to have children and were more likely to have fewer children.

Choosing pregnancy. Despite the fact that about half of all pregnancies in the U.S. are planned, little research has looked at why women choose to plan pregnancies when they do (Montgomery et al., 2010).

Stanford, Hobbs, Jameson, DeWitt, and Fischer (2000) studied how 27 pregnant women in the U.S. thought about what their intentions for their pregnancy had been. Using qualitative interviews, the researchers found that women's preconception desire for pregnancy was related to personal goals and values, employment circumstances, financial and emotional circumstances, and the desires of their partner, family and friends. They also found that preconception desires were not static, but changed over time with shift in social circumstances integrated with long-term goals (Stanford et al.). Additionally, the researchers found that women volunteered information about specific actions they took to get ready to have a baby, including caring for their personal health through behaviors like doctors visits and diet changes, defining relationships through discussions with partners or getting married, and changing life circumstances, such as finishing school or moving to a new home.

Wilson and Koo (2006) looked at data from 1,114 low-income women in the U.S. who were currently in a relationship and found that those who were in a more established relationship, who had not previously had a child with their partner, and who had high expectations for their partner's willingness to help with childcare were more likely to want a child with their partner.

Benzies et al. (2006) conducted a qualitative study of 45 Canadian women to identify factors that influenced their decisions about the timing of motherhood. The majority of women in the study valued completing college-level education before starting a family as a way to establish independence. Older women in the study, up to age 48, described the importance of fulfilling life experiences they had before they were ready to have children. Surprisingly, the authors of this study reported finding that partner readiness and family pressures had little influence on timing (Benzies, 2008).

In a study of data collected by the Centers for Disease Control and Prevention in 1998 on more than 25,000 women, researchers found that 57% of births were intended, 32% were mistimed, and 11% were unwanted (D'Angelo, Gilbert, Rochat, Santelli, & Herold, 2004). Among the intended pregnancies, 57% of the women were between 25 and 34 years old, 82.9% were married, 55% had more than a high school education, 86% were White, and 72.9% had private insurance. Compared to women with unwanted or mistimed pregnancies, women who had planned their pregnancies were less likely to smoke, drink, experienced physical abuse, or have low birth-weight infants. They were also more likely to received prenatal care, to breastfeed, and to have partners who also wanted the pregnancy (D'Angelo et al., 2004).

Montgomery et al. (2010) conducted descriptive qualitative interviews with 16 women who had given birth in the previous 5 years to identify reasons why they became pregnant when they did. Five themes, or categories, of reasons emerged from the interviews: timing; spacing; meeting personal criteria; desire for the experience of pregnancy, birth, and parenting; and having extended family in close proximity. The theme related to “timing” featured responses related to waiting until goals like financial stability and career success were achieved. The “spacing” theme featured responses about the ideal number of years between siblings and about missing having a baby to take care of after the first child grew into a toddler. The theme “meeting personal criteria” included long-held personal goals to have a certain number of children and achieving relationship stability. For the theme that centered on “experience” related to having a baby, the participants talked about positive emotions related to having children, childhood dreams of being a mother, and fears of childlessness. Finally, participants mentioned that having family members around was directly related to feeling comfortable planning to have a baby (Montgomery et al.).

Overall, the existing research shows that women choose the timing of their pregnancies based on a number of complex, personal factors, and that they may take specific steps to meet goals they connect with readiness to have a baby.

Interest in motherhood. One explanation of why highly-educated working women delay having children is that they lack the “natural” feeling that motherhood is innately important. To examine this more closely, feminist researchers McQuillan, Griel, Shreffler, and Tichenor (2008), developed a 5-item measure of the Importance of Motherhood (IOM). The first four items are answered on Likert scales from 1 (*strongly disagree*) to 5 (*strongly agree*): (1) “Having children is important to my feeling complete as a women,” (2) “I always thought I would be a parent,” (3) “I think my life will be or is more fulfilling with children,” and (4) “It is important for me to have children.” The fifth item, “How important is each of the following in your life... raising children?” was measured on a scale from 1 (*not important*) to 5 (*very important*). In an initial study using the measure, 2,576 women ages 25 to 45 were assessed. A single-factor structure emerged from the results, accounting for 64% of the variance. The researchers found good internal consistency ($\alpha = .86$) and a slight positive skew (1.79.) Information was also collected about “valuing work success” and “valuing leisure,” as well as data about ethnicity, religiosity, motherhood status, and health status.

Based on Rational Choice Theory, which suggests that it makes economic sense for a woman who values her job to value motherhood less, the researchers hypothesized that these variables would have an inverse relationship. However, the data showed a significant positive relationship between valuing work success and the importance of motherhood for mothers, and no significant relationship for non-mothers. McQuillan et al. suggested this meant that many mothers value motherhood and employment simultaneously. The researchers also found a

significant negative association between valuing leisure and the importance of motherhood for non-mothers, and no such relationship among the mothers. Here the researchers speculated that women who delay childbearing for education and career development also gain an appreciation for leisure time and are reluctant to relinquish their free time for the added labor that children bring (McQuillan et al., 2008).

Perceptions of age-related fertility declines

Though media accounts note high interest in procedures like oocyte freezing for preservation of fertility (Restauri, 2012), little formal attention is paid to women's worries about being able to get pregnant when they want to, how much they know about fertility and declining fertility, and how they assess their own risk of experiencing infertility.

A 1997 study conducted in New Zealand measured knowledge about fertility, including what times of the month women were most likely to become pregnant, among 90 women seeking medical treatment for infertility (Blake, Smith, Bargiacchi, France, & Gudex). The researchers found that only 26% of participants had "adequate" knowledge of fertility and argued that physicians should make sure couples understood "ovulation and timed intercourse" when they first inquired about fertility problems.

In 1998, researchers surveyed 8,941 randomly selected adults in six European countries, the U.S., and Australia on the definition and incidence of infertility as well as knowledge about assisted reproductive technology (Adashi et al., 2000). About 50% of participants knew the WHO definition of infertility (inability to conceive over a period of regular unprotected intercourse), 20% said they did not know, and 24% said it was a total inability to conceive. When asked how many couples seek infertility treatment, 16% of all participants answered correctly (one in six couples seeks treatment) and 29% came close to the correct answer; there were no

significant differences between countries or between men and women. Among all the participants, 52% reported that they knew someone who had had difficulty becoming pregnant, with women more likely to know someone. In the U.S., 90% of participants had heard about IVF and 45% correctly reported that the chances of getting pregnant through IVF were “lower” or “much lower” than those of a fertile couple trying to have a baby through unprotected sex. The authors concluded that, in all countries surveyed, participants showed little understanding of medical issues surrounding infertility and the real chances of successful treatment.

Another survey, completed by 2,150 male and female students at a university in Sweden, posed questions about interest in parenting, women’s fertility at difference ages, couples’ chances of achieving a pregnancy, and infertility (Lampic, 2005). Answers to questions about fertility, for example “At what age are women the most fertile?” and “How many couples in Sweden are involuntarily childless?”, showed that most participants were aware of when the most fertile period of a women’s life is, but that few understood that a woman’s fecundity begins to decline before the age of 30 years and starts a marked decrease in her late 30s. Interestingly, a third of the men surveyed believed that a woman’s fertility declines significantly only after reaching age 45 years. All participants overestimated an average couple’s chances of getting pregnant during a year of unprotected intercourse and overestimated the chances of getting pregnant through IVF, though they did have an accurate sense of the percent of couples who experience infertility. The authors concluded that men and women in Sweden overestimated the chances of getting pregnant and were not sufficiently aware of age-related declines in female fertility.

Also related to risk perceptions of delayed pregnancy, but with a different approach, an economist in Sweden examined the way in which women get information about risks (Lampi,

2011). From surveys of about 900 Swedish women, the researchers found that most of the women had gotten information about risk from the media, only one in four had gotten information from a healthcare provider, and about a third got information from friends and family. They also found that women who got their information from the media and from healthcare providers were likely to accurately assess the risk for infertility at various ages, but that women who got information from friends and family were likely to over-estimate the risk for infertility.

Infertility

Though the primary focus of the current study is the experiences of women who have not yet tried to become pregnant, the issues at hand are necessarily linked to conceptions of and experiences around infertility. For example, what is known about the relationship between infertility and distress is relevant to women who worry they may not be able to become pregnant when they are ready to try. Additionally, problems in the existing infertility literature with operational definitions, measurement strategies, and limitations inform the present study.

Infertility in a cultural context. As stated above, infertility is defined by the World Health Organization as an inability to conceive after 12 months of regular unprotected intercourse (WHO, 1991). This definition, largely agreed upon within a biomedical context, has been criticized by, for example, sociologists, who argue that the development of fertility drugs in the United States during the 1950s resulted in the *medicalization* of infertility (Greil, Slauson-Blevins, & McQuillan, 2010). Medicalization is a process by which a common behavior comes to be thought of primarily as a question of health and illness, subject to the authority of medical institutions. Greil et al. (2010) argued that, following medicalization, the current conceptualization of infertility is really a social construction rather than a medical problem. They

pointed out that, regardless of health status, women (and couples) do not see themselves as infertile or request treatment unless they desire the role of parent, and that infertility is often seen as a condition affecting a couple, rather than an individual. Additionally, infertility is defined not as the presence of physiological symptoms, but by the absence of a desired state. And, finally, they pointed out that options other than having a biological child exist to allow individuals to become parents.

Greil et al. (2010) argued that, when examining literature about psychological distress related to infertility, it is important to appreciate both the medical definition of infertility as well as the social construction of infertility. The authors cited problems with early research about infertility and distress, including assumptions that infertility was a “devastating experience” for all, and methodological problems including non-representative samples, failure to study people who had not sought treatment, failure to study economically deprived and culturally distinct populations, and failure to include control groups. Recent research has addressed many of these issues.

Infertility and distress. A study published by Greil, Shreffler, Schmidt, and McQuillan in 2011, described general distress and fertility-specific distress among 1,027 U.S. women who had experienced infertility in the previous 10 years. The study aimed to resolve gaps in the literature in several ways. First, the study participants were those, among a probability sample of 4,796 U.S. women ages 25 to 45 years contacted through the National Survey of Fertility Barriers, who reported at least one episode of infertility within the past 10 years. Reports of infertility included women who answered “yes” to either the question “Was there ever a time when you were trying to get pregnant but did not conceive within 12 months?” or the question “Was there ever a time when you regularly has sex without birth control for a year or more

without getting pregnant?” This strategy allowed the study to include a variety of women, not just those who had sought treatment for infertility and who actively identified their failure to conceive as “infertility.” Second, the study was designed to compare women who had had a prior pregnancy (secondary infertility) with those who had never been pregnant (primary infertility), and to compare women who were trying to become pregnant at the time they experienced infertility with those who met the definition of infertility but were not explicitly trying at the time (intentionality). This methodology resolved a problem in previous literature, which tended to treat women experiencing infertility as a monolithic group (2011). Third, the study was based on a nationally representative sample, with an “over-sample” of high-minority groups, providing sufficient numbers of participants for statistically significant subgroup comparisons.

General distress was measured by a short form of the Center for Epidemiological Studies-Depression scale (CESD-10; Radloff, 1977). Greil, Shreffler et al. (2011) reviewed available measures for fertility-specific distress, but found them to be either too long or not well-enough validated, so developed their own 6-item measure comprised of questions related to other scales, qualitative research, and the clinical experience of the research team. For the fertility-specific distress items, participants were read a statement, such as “You had several months of sex without using birth control without getting pregnant,” and asked to say if they had experienced reactions such as “I felt angry at God,” “I felt inadequate,” and “I felt seriously depressed about it.” Among the women in the study, this fertility-specific distress measure had an alpha level of 0.83. Additional measures, including Importance of Motherhood (IOM; McQuillan et al., 2008), internal medical locus of control, and desire for children, as well as demographic questions were included in the study (Greil, Shreffler et al., 2011).

Of the study's participants, only 34.5% explicitly tried to get pregnant and never had a child. Women with secondary infertility made up 61.1% of the sample and were evenly divided between those who had been trying to become pregnant and those who had not been trying to become pregnant at the time they experienced infertility. Fertility-specific distress varied by infertility group, but general distress (CESD-10) did not. The authors said this finding suggests that, while general measures of distress may be able to discriminate among women of different fertility statuses, distress differences among groups of infertile women need to be measured with a fertility-specific instrument (Greil et al., 2011).

Women who experienced primary infertility and had been trying to get pregnant demonstrated the highest levels of fertility-specific distress, as the authors had hypothesized. Those who had already had a child (secondary infertility) and had been trying to become pregnant (intentionality) experienced significantly less distress than the previous group, but more than all those who had not been trying to become pregnant at the time they experienced infertility (Greil, Shreffler et al., 2011).

Through regression analyses, Greil, Shreffler et al. (2011) found that women explicitly trying to become pregnant when they experienced infertility had higher fertility-specific distress ($\beta = 0.31, p < 0.001$) than infertile women without intent, and women who had received tests or treatment for fertility also had higher fertility-specific distress ($\beta = 0.19, p < 0.05$) than infertile women who had no tests or treatment. Age was the only demographic variable found to be related to fertility-specific distress; it was positively associated with fertility-specific distress in both the full sample ($\beta = 0.07, p < 0.05$) and the sample limited to women who had tests or treatment for infertility ($\beta = 0.12, p < 0.05$). Higher levels of social support were associated with lower fertility-specific distress ($\beta = -0.15, p < 0.001$) and family encouragement of treatment was

associated with higher fertility-specific distress ($\beta = 0.08, p < 0.05$). Additionally, higher Importance of Motherhood scores were associated with higher fertility-specific distress ($\beta = 0.15, p < 0.001$) and having a desire to have more children was associated with higher fertility-specific distress ($\beta = 0.11, p < 0.001$; Greil, Shreffler et al., 2011).

Also through regression analyses, the authors found no association between type of infertility (primary or secondary) or intentionality and scores on the general distress measure, CESD-10. Lower levels of distress as measured by the CESD-10 were associated with being employed ($B = -0.07$), higher levels of education ($B = -0.16$), having health insurance ($B = -0.12$), higher levels of social support ($B = -0.11$), and higher levels of religiosity ($B = -0.08$; Greil, Shreffler et al., 2011).

Among the conclusions made by Greil, Shreffler et al. (2011), the authors observed that many of the characteristics that differentiated more distressed participants from less distressed participants had to do with the *meaning* of infertility, and that greater intentionality to become pregnant seems to lead to greater distress at not having a child (Greil, Shreffler et al., 2011).

Another study, by Greil, McQuillan, Lowry, and Shreffler, used data from the same National Survey of Fertility Barriers, but focused on a sample of 266 women who reported experiencing infertility at two time points 3 years apart (2011). This longitudinal study aimed to disentangle distress related to the condition of infertility from distress caused by pursuing infertility treatment by surveying both women experiencing infertility who received treatment and those who did not. At Wave 1, women who did not receive treatment and did not have a live birth experienced less fertility-specific distress than those who did receive treatment at Wave 1 only, regardless of whether they had had a live birth. Similarly, at Wave 2, women who had not received any treatment reported less fertility-specific distress than women who received

treatment at either Wave 1, or Wave 1 and Wave 2, regardless of whether there had been a resulting live birth. The authors concluded that treatment for infertility was associated with fertility-specific distress over and above the effect of infertility alone, and recommended that counseling for infertility include attention to the treatment process as well as coping with not having a desired child (Greil, McQuillan et al., 2011).

Distress and fertility outcomes

In response to widely held stereotypes, several studies have examined the relationship between psychological stress and feelings of distress to the chances of achieving a viable pregnancy using ART. Several studies (e.g., Barzilai-Pesach et al., 2006; Ebbesen et al., 2009) have shown stress related to infertility, infertility treatments, relationship problems, and environmental difficulties to be associated with reduced chances of live birth following ART treatment, and others (e.g., Klonoff-Cohen, 2005) have shown that symptoms of anxiety and depression are associated with poorer outcomes after ART. However, the magnitude of these relationships is unclear, and other studies (e.g., de Klerk et al., 2008) have failed to demonstrate the associations (Matthiesen, Frederiksen, Ingerslev, & Zachariae, 2011).

Matthiesen, Frederiksen, Ingerslev, and Zachariae (2011) conducted a systematic review and meta-analysis of existing studies on the associations between stress, anxiety, and depression on ART outcomes, which aimed to evaluate the combined effects of stress and distress, with other variables such as age, experience with ART, and duration of infertility, and estimate the strength of any effects found. Thirty-one prospective studies with a total of 4,902 participants were included in the meta-analysis, which concluded, generally, that small but significant associations were found between stress and distress, and reduced chances of pregnancy with ART. And non-significant results were found for associations between trait anxiety and ART

outcome, and state anxiety and ART outcome. However, the authors cautioned that the meta-analysis included a relatively small number of studies with considerable between-study heterogeneity, and argued that overall, the influence of stress and distress on ART outcome appeared limited. Overall, the authors argued that their results were encouraging for the general population of ART patients, as the relationship between stress and distress and the chances of live birth after ART appears to be small (Matthiesen et al., 2011).

Considering the moderating influence of age on the relationships between stress and distress and ART outcome, Matthiesen et al. (2011) found that the relationship between trait anxiety and ART outcome (pregnancy) was stronger in younger participants. They found a similar moderation of age in the relationship between depression and ART outcome, but not in the associations between state anxiety and ART outcome and stress and ART outcome.

A study of 160 women with fertility problems and undergoing in-vitro fertilization in Athens, Greece, published after the Matthiesen et al. meta-analysis was conducted, found that, after controlling for biomedical factors such as age and number of embryos transferred, infertility-specific stress ($OR = 0.964, p = .011$) and nonspecific anxiety ($OR = 0.889, p = .006$) were negatively associated with the likelihood of pregnancy after IVF (Gourounti, Anagnostopoulos, & Vaslamatzis, 2011). This study did not examine age as a moderator of the relationships between stress and anxiety and ART outcome.

Repetitive thought related to anticipated infertility

Understanding that we know little about women's risk perceptions of advanced-age related infertility, even less is currently known about what and how much women think about whether they, personally, will be able to get pregnant when they are ready to do so. There are journalistic accounts of "baby panic" (e.g., Brooks, 2012; Boncompagni, 2011; Rowe-Finkbeiner, 2002) and

quips on television and in movies about “biological clocks” ticking, but almost no scholarly information about who is worrying about what, and if they are worrying at all. To the extent that women are thinking about if they will be able to get pregnant when they are ready to try, it would be useful to know more about these thoughts, how often they occur, in whom, and the impact they have on individuals.

For the purposes of the current study, and in the absence of prior research in the area, it was assumed that ongoing thoughts about fertility in women of, or nearing, advanced maternal age, may be a phenomenon similar to conceptualizations including worry and rumination, and is related to theories of health behavior. To find the conceptualization most similar to the type of thinking and stress potentially common in women concerned about fertility, the literature on various types of repetitive thought was examined.

Importantly, the types of cognitions of interest in this study are explicitly not conceptualized to be a match to the worry and anxiety documented in women actively undergoing treatment for infertility, which have been studied in some detail (see Greil, Slauson-Blevins, & McQuillan, 2010). Worry about being able to get pregnant when ready in women who have never been pregnant – never tested their ability to get pregnant – can be thought of as fundamentally different from the more concrete type of worry and anxiety found in women actively experiencing infertility.

Health psychology theories. As the phenomenon of interest in this study is a psychological process involving thoughts and feelings related to health, it is useful to consult various health psychology theories as a guide to conceptualizing worry about future fertility. The Health Belief Model, the theory of planned behavior, and the transtheoretical model of change are proposed as ways of thinking about how people make decisions to change health-related

behaviors. They all fit the issue of future fertility to some extent, but are focused on behavior changes more readily accessible than those that would likely lead a woman to be ready to try to become pregnant. Additionally, the models are designed to be useful in health interventions aimed at changing health behaviors such as cigarette smoking and exercise, which are fundamentally different than the health behaviors related to choosing to become pregnant. The relative fits of these models are discussed below.

The Health Belief Model (HBM; Rosenstock, Strecher, & Becker, 1994) proposes that behavior change will occur if individuals perceive a threat to their well-being and believe that the benefits of engaging in behavior change outweigh the barriers or costs associated with that behavior, and suggests behavior changes are prompted by cues such as education or physical symptoms, in relation to levels of the perceived threat. The HBM has been used to predict a variety of health behaviors such as breast self-examination, safe-sex practices, and exercise (Friedman & Silver, 2007). This model matches some of the theorized issues faced by women who are considering their future fertility, such as education being a potential cue to behavior and personal assessments of threat. However, the model depends on individuals being able to take action to resolve a potential health threat. In the case of women considering their fertility, there may or may not be actions available for them to take, and the practicality of those actions may be complex. For example, a woman could choose to freeze her eggs if she was concerned about declining fertility, but that action would come with significant monetary costs and psychological stress related to egg harvesting procedures. Also for example, a woman could react to worries about her future fertility by activating a search for a romantic partner with whom to have children, but this action is far from a simple one-to-one reaction to a perceived threat of fertility decline and would likely be influenced by multiple other factors.

The theories of reasoned action and planned behavior propose that for behavior to change, individuals must experience a “strong intention to change” (Friedman & Silver, 2007). And these behavioral intentions are predicted by “(a) expectancies that a behavior will produce a particular outcome, (b) attitudes toward the behavior, (c) beliefs about what others think is appropriate behavior, (d) perceptions of control over one’s behavior, and (e) other behavioral, normative, and control beliefs.” Some aspects of this theory apply directly to worries about future fertility. For example, a woman may experience an intention to change her behavior in a way that would lead to pregnancy, and these intentions may or may not be “strong.” The strength of the potential intention is particularly hard to gauge in light of ambivalence about motherhood and variations in intentions based on age of the woman. Similarly, the factors that predict behavioral intentions may all relate to future fertility, but are complicated by unknowns about fertility declines, a variety of cultural messages about fertility and motherhood, and complicated calculations about one’s “control” over when and if to have a baby in relation to a variety of life circumstances.

The transtheoretical model of change (TMC; Prochaska & DiClemente, 1983) proposes that behavior change is a process, and key elements include stages of change, the process of change, decisional balance, and situational self-efficacy. The stages of change are “precontemplation (not ready to change within the next 6 months), contemplation (thinking about change within the next 6 months), preparation (ready to change within the next 30 days), action, and maintenance (more than 6 months of sustained action)” (Friedman & Silver, 2007). This theory applies to thinking about future fertility in the sense that a woman may go through a process of getting ready to take steps to make change. However, because these steps are often contingent on other life goals being accomplished or available, the process cannot move through an organized cycle as is proposed by the theory.

Overall, traditional theories of health behavior change are limited in their application to worries about future fertility due to the unique nature of worry about declining fertility as a health stressor. Worry about future fertility may be better understood as a normative cognitive process with developmental underpinnings, rather than a traditional health stress concern.

Repetitive thought. Repetitive thought about one's self, one's concerns, and one's experiences is a cognitive process common to all people (Watkins, 2008). Examples of repetitive thinking include worry, rumination, perseverative cognition, emotional processing, cognitive processing, mental stimulation, rehearsal, reflection, and problem solving. All of these constructs have been studied in one domain or another and have considerable conceptual and operational overlap, but generally can be thought of as the process of thinking attentively, repetitively, or frequently about one's self and one's world (Watkins, 2008). The two conceptualizations of repetitive thought most common to psychological study are worry and rumination, which are explored below.

Worry and rumination. Worry, or worrisome thinking, is a common experience that is known to play a role in nearly all anxiety disorders. The working definition most commonly used in psychological research was provided by Borkovec, Ray, and Stober (1998). They said worry is a chain of thoughts and images, laden with negative affect, and relatively uncontrollable, which represent an attempt to engage in mental problem-solving on an issue with an uncertain outcome. The outcome of the issue could be negative, making worry closely related to fear. This definition of worry includes both cognitive and affective components, and focuses on the process of problem-solving, which can be constructive or can be nonconstructive and perseverative, with the nonconstructive type of problem solving thought to exacerbate negative affect. Another definition holds that worry is "primarily a constructive problem-solving process that is thwarted

by cognitive predispositions including anxiety” (Brosschot, Gerin, & Thayer, 2006). At exaggerated levels, worry is known to be a feature of generalized anxiety disorder (Borkovec et al., 1998), but “normal” worry is an activity that can also be associated with constructive problem solving (Davey, Jubb, & Cameron, 1996).

Worry can be divided into a situational or “state”-based type, which is often triggered by an event and sometimes followed by problem-solving, and a dispositional or “trait”-based type, which is characterized by long-term and routine worrying directed at ambiguous or extremely distant events (Borkovec et al., 1998).

Rumination is a concept related to worry, defined generally as the experience of having repetitive, intrusive, and negative cognitions (Watkins, Moulds, & Mackintosh, 2005). Martin and Tesser (1996) provided a broad definition of rumination as a class of conscious thought concerning one’s goals that recurs in the absence of immediate environmental demands requiring the thoughts. Though similar to worry, rumination tends to be related more directly to major depression, and worry is a central aspect of generalized anxiety disorder.

Studies comparing rumination and worry have examined aspects including form and content, appraisals, strategies and, emotional reactions (Watkins et al., 2005). Several studies have found a correlation between depressive rumination and worry on self-report measures, including a study by Segerstrom, Tsao, Alden, and Craske (2000) which found that both worry and rumination significantly correlated with a measure of repetitive thinking. Based on this, Segerstrom et al. concluded that worry and rumination differed in the content of the repetitive thought, but were similar in terms of cognitive process. Alternately, other researchers, including Papageorgiou and Wells (2002), have pointed to important differences between worry and rumination in dimensions of process and meta-cognition. In a non-clinical sample, they found

that depressive thoughts (rumination) were associated with less verbal content, lower effort, lower confidence in problem solving, and more past orientation than anxious thoughts (worry).

In a subsequent study, Watkins, Moulds, and Mackintosh (2005) examined the differences and similarities between ruminative thoughts and worry in a non-clinical sample of women by using the Cognitive Intrusions Questionnaire (CIQ, Freeston, Ladouceur, Thibodeau, & Gagnon, 1992)), which asks individuals to rate a single thought in several categories including general descriptors, appraisal, associated emotions, and strategies used in response. Watkins et al. asked the participants to choose one worry and one ruminative thought and apply the CIQ to each. Overall, the researchers found that worries and ruminative thoughts were very similar among the domains measured by the CIQ, with no differences in reported problem-solving strategies or appraisal of the severity. The only major difference found in this study was that worries tended to be future oriented and ruminative thoughts tended to be past oriented.

Other researchers have examined the varied effects of worry and ruminative thoughts on affective states and cognitions, as well as outcomes such as depression and anxiety disorders. McLaughlin, Borkovec, and Sibrava (2007) found in an undergraduate sample that worry and rumination were both related to increased negative affect and decreased positive affect. Based on the tripartite model of anxiety and depression, which states that increased negative affect and decreased positive affect, along with hyperarousal, create an underlying mood structure that is likely to cause depression and anxiety disorders (Clark & Watson, 1991), McLaughlin, Borkovec, and Sibrava argued that worry and rumination are significant factors predisposing individuals to psychological distress.

Overall, examinations of the worry and rumination have shown the two constructs to be highly similar, with differences related to affect and problem solving. Given the limited research

on repetitive thoughts about being able to get pregnant when ready, it is difficult to match these thoughts precisely to either construct. However, given what we know about some women taking actions prior to conception to get ready to have a child (e.g., Montgomery et al., 2010), I conceptualize repetitive thoughts about being able to get pregnant when ready as likely to be functional and active problems solving, potentially most similar to the worry construct.

Theories of repetitive thought. In a comprehensive review of research on repetitive thought processes thought to be salient to self-regulation, psychopathology, and mental and physical health, Watkins (2008) examined the constructive and unconstructive consequences from such processes as well as theories that account for them. In cross-sectional studies of non-clinical populations, Watkins found repetitive thought (RT) to be significantly and positively correlated with increased levels of concurrent trait and state anxiety as well as increased levels of depressed mood. He also categorized and summarized findings in relation to a range of outcomes, too lengthy to report in detail here.

Importantly, Watkins observed patterns of both constructive and unconstructive outcomes from RT and pointed out that the two could occur simultaneously (Watkins, 2008). He also said that RT has *valence*, or positive or negative associations based on content, affect, and situation. For example, RTs about being able to become pregnant could have a positive connotation with content related to happiness at the possible arrival of a baby, or could have negative connotation with content of risks of congenital disorders. Watkins also proposed that RT occurs at different levels of complexity, or *level of construal*, which can also account for constructive or unconstructive consequences. He said “high-level construals are abstract, general, superordinate, and decontextualized mental representations that convey the essential gist and meaning of events and actions, whereas low-level construals are more concrete mental representations that include

subordinate, contextual, specific, and incidental details of events and actions” (Watkins, 2008, p. 197). In other words, a high-level construal could be a non-specific goal, such as “find meaningful work”, and a low-level construal would be something more tangible, such as “learn to ice skate.” Furthermore, high-level construals can be made up of sub-goals which form a hierarchical structure which can provide an organized progression of goal-attainment behaviors.

Through his examination of theories, including cognitive processing, Watkins concluded an expanded version of control theory provided the best framework to account for the varied consequences of repetitive thought. Control theory proposes that all behavior, including mental processes, is a form a feedback. Individuals perceive their current state, environment, and behavior in comparison with *reference values*, such as goals, standards, or desired outcomes. If there is a discrepancy between perceived reality and the reference value, such as an unresolved goal, behavior will be adjusted to bring the two closer together. RT is theorized to be one of the behaviors an individual can use to attempt to bring their reality closer to their reference value, with the RT intended to facilitate progress toward the reference value. The RT will continue until the goal is met or the individual gives up on the goal (Watkins, 2008).

Watkins points out that “abstract goals that are more important and meaningful to people, such as attaining happiness, and concrete goals that are linked to these important abstracts goals, such as being in a romantic relationship, produce more RT when not attained” (Watkins, 2008, p. 190). And “RT becomes unconstructive if a person experiences an inability to progress toward reducing the discrepancy and at the same time is unable to give up on the reference value or goal. In such a case, RT would serve only to focus attention on the discrepancy between the desired goal and the actual situation, making the unresolved discrepancy more salient, perpetuating the unresolved issue, and exacerbating the negative affect” (Watkins, 2008, p. 191).

At a broader level, control theory is an approach to explaining developmental regulation across the life-span (Heckhausen, 2002). As children, we develop goals and choose behaviors to attain these goals, with varying levels of success, and through this process we learn which behaviors seem to prove most useful. Heckhausen defines two types of control: *primary control*, consisting of behaviors aimed at changing the outside world to better fit the needs and desires of the individual; and *secondary control*, which manages internal processes in an effort to focus and protect motivational resources needed for primary control. Furthermore, Heckhausen says that in a life-span developmental context, goals within control theory hit a “developmental deadline” at which time a person either needs to have achieved a goal or needs to be ready to disengage from it. As an example, Heckhausen, specifically points to childbearing as a goal appropriate to “middle-adulthood” which can regulate the use of primary control for finding a partner and achieving financial stability.

For the purposes of the current study, control theory applies similarly to the goal of having a child. The individual may hold the highly conceptual goal of having a baby at some later date, with nested sub-goals of finding a partner and achieving financial stability. However, if there is a large discrepancy between an individual’s perceived reality and their reference values, or ideas about where they should be developmentally in reference to the goal, there is likely to be repetitive thought of a negative valence, which is likely to produce negative affect unless the individual disengages from the goal.

Summary and Statement of the Problem

Motherhood and childbearing are known to be highly important to many women and thought by many to be an essential experience of womanhood. It is widely accepted that there is significant stigma attached to childlessness in the U.S. and other countries, and significant fear of

infertility throughout the population. It is known that more women are delaying pregnancy and childbearing until older ages, and it is widely accepted in health literature and publicly reported through media and health information that as age increases, fertility decreases. Because this information is available, and prominent in the media and through health professionals, and because women's knowledge of fertility risk has been measured, we know that women are thinking about delayed pregnancy as a behavior that may reduce their chance of having a baby when they are ready.

Using control theory, it was hypothesized that among women for whom motherhood is important who have not previously been pregnant, the goal (or reference value) of having a baby at some developmentally appropriate time in their lives may be discrepant from their perceived reality (advancing age, lack of partner, lack of financial stability). This discrepancy will result in worry (repetitive thought) about being able to have a baby when they are ready, and will be related to distress. The size of the discrepancy, and therefore the amount of worry and related distress, was hypothesized to be related to age (and the known increased risk of infertility with age). The current study was intended to highlight the relationship between significant worry among women about being able to have a baby when desired and distress in the form of anxiety and depressive symptoms, as well as the role of age and self-efficacy in these processes.

Hypotheses

Five hypotheses were tested using hierarchical multiple linear regression.

Hypothesis 1. Age would account for a significant amount of the variance in participants' reports of fertility worry. Specifically, it was predicted that older participants would report more fertility worry.

Hypothesis 2. The importance of motherhood would account for a significant amount of the variance in participants' reports of fertility worry. Specifically, it was predicted that individuals who report a higher importance of motherhood would report more fertility worry.

Hypothesis 3. Level of fertility knowledge would account for a significant amount of the variance in participants' reports of fertility worry. Specifically, it was predicted that individuals who demonstrate a higher level of fertility knowledge would report more fertility worry.

Hypothesis 4. The amount of variance in participants' reports of fertility worry accounted for by the importance of motherhood would vary based on participant age. Specifically, it was predicted that individuals who report a high importance of motherhood would report more fertility worry, and that relationship will grow stronger as age increases.

Hypothesis 5. The amount of variance in participants' reports of fertility worry accounted for by level of fertility knowledge would vary based on participant age. Specifically, it was predicted that individuals who demonstrate a high level of fertility knowledge would report more fertility worry, and that relationship will grow stronger as age increases.

Hypothesis 6. Worry about future fertility would account for a significant amount of the variance in participants' reports of depressive symptoms. Specifically, it was predicted that individuals who report a higher future fertility worry would report more depressive symptoms.

Hypothesis 7. Worry about future fertility would account for a significant amount of the variance in participants' reports of anxiety. Specifically, it was predicted that individuals who report a higher future fertility worry would report more anxiety.

Method

Participants

Participants were women between the ages of 25 and 40 years who had never been pregnant. Women who had given birth, had an abortion, or had a miscarriage were excluded because these women were likely to have more information about their potential fertility by knowing they were previously able to get pregnant and, therefore, did not experience worry about future fertility in precisely the same way as women who had never been pregnant. Similarly, women who had previously been diagnosed with a fertility problem and women who had had experiences that meet the diagnostic criteria for infertility (having unprotected intercourse for 12 months or more without becoming pregnant) were excluded from the study because they, too, were likely to have more information about their potential fertility and not experience worry about future fertility in the same way as women who had not experienced a fertility problem. Women who were trying to get pregnant at the time of the study, or certain they did not want to ever be pregnant, were also excluded.

Demographic information for the participants is presented in Table 1. Because demographic information other than age was collected at the end of the survey, a substantial group of participants ($n = 79$) who were included in at least one analysis did not complete the demographic questionnaire. A total of 596 women completed enough of the survey to be included in at least one analysis, and 517 completed the entire survey including the full demographic questionnaire.

Table 1

Demographic Characteristics of Participants

Variable	Number of Participants	Percent	Valid Percent
Racial/Ethnic Background			
Caucasian (White)	447	75.0	86.5
Hispanic or Latino	14	2.3	2.7
African American (Black)	12	2.0	2.3
Asian/Pacific Islander	12	2.0	2.3
Other ^a	7	1.2	1.4
Multiethnic ^b	25	4.2	4.8
Missing ^c	79	13.3	0.0
Age			
25	62	10.4	10.4
26	63	10.6	10.6
27	76	12.8	12.8
28	76	12.8	12.8
29	61	10.2	10.2
30	60	10.1	10.1
31	37	6.2	6.2
32	37	6.2	6.2
33	36	6.0	6.0
34	33	5.5	5.5
35	21	3.5	3.5
36	11	1.8	1.8
37	9	1.5	1.5
38	7	1.2	1.2
39	4	0.7	0.7
40	3	0.5	0.5
Age (grouped)			
25 through 29	338	56.8	56.8
30 through 34	203	34.0	34.0
35 through 40	55	9.2	9.2

(Table continues)

Table 1 (continued)

Demographic Characteristics of Participants

Variable	Number of Participants	Percent	Valid Percent
Highest Level of Education			
Less than High School	2	0.3	0.4
High School	4	0.7	0.8
Associates Degree	3	0.5	0.6
Some 4-Year College	25	4.2	4.8
Bachelor's Degree	197	33.1	38.0
Master's Degree	194	32.6	37.4
Professional or Doctoral Degree	94	15.8	18.1
Missing ^c	77	12.9	0.0
Highest Level of Education (grouped)			
Less than a Bachelor's Degree	34	5.7	6.6
Bachelor's Degree	197	32.9	38.0
Advanced Degree	288	48.2	55.5
Missing ^c	77	12.9	0.0
Relationship Status			
Single	159	26.7	30.6
In a relationship, not cohabitating	77	12.9	14.8
In a relationship, cohabitating	124	20.8	23.8
Married or in a domestic partnership	160	26.8	30.8
Missing ^c	76	12.8	0.0

(Table continues)

Table 1 (continued)

Demographic Characteristics of Participants

Variable	Number of Participants	Percent	Valid Percent
Sexual Orientation			
Straight	450	75.5	86.7
Gay or Lesbian	15	2.5	2.9
Bisexual	47	7.9	9.1
Other	7	1.2	1.3
Missing ^c	77	12.9	0.0

^a Participants who checked *other* for Racial/Ethnic Background were asked to specify their Racial/Ethnic Background in an open-ended question. Responses were “Biracial (African American, White),” “East Indian,” “Indian,” “Indian/Caribbean,” “Middle Eastern,” “Mixed White and Arab,” “Multi-ethnic family,” “Russian,” and “Scandinavian.”

^b Participants who checked more than one answer option for Racial/Ethnic Background were counted as “Multiethnic.” Five participants checked *American Indian or Alaska Native* and *White*, and 5 participants checked *Hispanic or Latino* and *White*. Four participants checked *White* and *other*, and 4 participants checked *Black or African American* and *White*. Three participants checked *Asian* and *White*. One participant indicated each of the following combinations: *Native Hawaiian or other Pacific Islander* and *White*, *Black or African American* and *Hispanic or Latino*, *Asian* and *Hispanic or Latino*, and *Hispanic or Latino* and *Native Hawaiian or other Pacific Islander*.

^c Participants who failed to complete the full survey were included in the overall participant pool ($N = 596$) if they completed at least the first three measures. A total of 517 participants completed the full survey, which, due to the demographic questions falling at the end of the questionnaire, resulted in missing data for noted items.

Looking at the distribution of ages among the participants, slightly more than half were 22-29, about one-third were 30-34, and the rest were 35-40. The mean age of the participants was 29.5 years ($SD = 3.4$). There were 447 participants who identified themselves as Caucasian (86.5%; percentages reported in this section are percentages of those who reported demographic information), 14 who identified as Hispanic or Latino (2.7%), 12 who identified themselves as African American (2.3%), and 12 who identified themselves as Asian/Pacific Islander (2.3%). Seven participants (1.4%) checked the “other” option for ethnicity, and wrote in a description of

their race/ethnicity, and 25 participants (4.8%) checked more than one ethnicity and are recorded as “multiethnic.” Seventy-nine participants did not report ethnicity (13.3% of all participants).

Of the participants, 34 reported completing less than a bachelor’s degree (5.7%), 197 reported completing a bachelor’s degree (32.9%), and 288 reported completing more than a bachelor’s degree (48.2%). Seventy-seven participants did not report education level (12.9% of all participants). Of the participants, 159 reported being single (30.6%), 77 reported being in a relationship but not cohabitating (14.8%), 124 reported being in a relationship and cohabitating (23.8%), and 160 reported being married or in a domestic partnership (30.8%). Seventy-six participants did not report relationship status (12.8% of all participants).

Of the participants, 450 reported being straight (86.7%), 15 reported being gay or lesbian (2.9%), 47 reported being bisexual (9.1%), and 7 selected the option “other” (1.3%). Seventy-seven participants did not report sexual orientation (12.9% of all participants.)

Participants provided supplemental demographic information at the end of the survey. These data are summarized in Table 2.

Table 2

Additional Demographic Question Responses

Questions	N ^a	Frequency	Percent
Are you, or have you ever been a full-time parent to a non-biological child?	520		
No		513	98.7
Yes		7	1.3
Have you ever tried to get pregnant?	512		
No		503	98.2
Yes		9	1.8
When do you want to get pregnant?	519		
Within the next 2 years		128	24.6
2 to 5 years from now		204	39.3
6 to 10 years from now		74	14.3
More than 10 years from now		1	0.2
Don't know		112	21.6
What is the ideal age for a woman to get pregnant?	514		
Less than 25 years of age		28	5.4
25 to 30 years of age		275	53.5
30 to 35 years of age		202	39.3
35 to 40 years of age		8	1.6
More than 40 years of age		1	0.2
When do you anticipate that you will start trying to get pregnant?	520		
Within the next 2 years		133	25.6
2 to 5 years from now		190	36.5
6 to 10 years from now		65	12.5
More than 10 years from now		2	0.4
Don't know		130	25.0
Is it important to your parents that you have children?	518		
No		163	31.5
Yes		355	68.5

(table continues)

Table 2 (continued)

Additional Demographic Question Responses

Questions	N ^a	Frequency	Percent
Thinking about your family and friends, how many of them have kids?	520		
All		4	0.8
Most		157	30.2
Some		236	45.4
Few		110	21.2
None		13	2.5
Have people in your family experienced infertility?	519		
No		405	78.0
Yes		114	22.0
Have your friends experiences infertility?	518		
No		260	50.2
Yes		258	49.8
Have your family or friends pursued fertility treatments to get pregnant?	517		
No		266	51.5
Yes		251	48.5

^aSample sizes differ among variables because of missing data.

Procedure

Participants were recruited in July 2013 mainly through online contact. The investigator recruited participants through use of advertisements and social media likely to connect to female participants in the desired age range. To minimize selection bias in this study, the investigator attempted to recruit from a variety of organizations connected to social media likely to produce a diverse group of participants. For example, information about the study was posted to Facebook pages for groups interested in women in business, leadership, sports, healthcare, and education.

The survey was developed using *REDCap* software and was hosted on VCU's survey server. The welcome screen for the survey website consisted of three main elements: (a) a letter

describing the study in detail, (b) an informed consent document, and (c) contact information for the investigator. The informed consent contained the following elements of consent: (a) the purpose of the research; (b) risks, discomforts, and benefits of participation; (c) activities required to participate in the research; (d) description of participation as voluntary; and (e) confidentiality of responses. After reading the consent document, participants were asked to indicate consent and voluntary participation in the study.

Internet recruitment and data collection was appropriate for this study, as the subject matter is of broad relevance and the population of interest is likely well-acquainted with computer use. Previous research has established the reliability and validity of web-based surveys and suggests that it is comparable to that of studies conducted offline (Eysenbach & Wyatt, 2002).

Following consent, the survey first established if participants were female, within the desired age range, not previously pregnant, not experiencing infertility, and not yet sure they never wanted to be pregnant. If participants did not meet these criteria for the study, they were thanked for their effort and the survey was discontinued. The three measures of future fertility worry were administered first, followed by the PSWQ. After the worry measures, the measures of distress were included, followed by the Importance of Motherhood measure and fertility knowledge quiz. And, finally, demographic questions were asked at the close of the survey.

Measures

Demographic questionnaire. This questionnaire gathered demographic information and background information about participants related to sex, ethnicity, race, age, sexual orientation, education, employment status, and relationship status. Additionally, this section included three basic questions about family attitudes toward childbearing and fertility treatments, and four

questions about the experiences of the participants' family and friends.

Importance of Motherhood. The Importance of Motherhood scale (IOM, McQuillan et al., 2008) is a 5-item scale used to measure perceptions about the importance of motherhood. The first four items are answered on 4-item Likert scales from 1 (*strongly agree*) to 4 (*strongly disagree*): (1) "Having children is important to my feeling complete as a women," (2) "I always thought I would be a parent," (3) "I think my life will be or is more fulfilling with children," and (4) "It is important for me to have children." The fifth item, "How important is each of the following in your life... raising children?" was measured on a scale from 1 (*very important*) to 4 (*not important*). All items were reverse coded and averaged to create an IOM score. IOM scores may range from 1 to 4 with higher scores reflecting greater importance.

In an initial study using the measure, 2,576 women ages 25 to 45 were assessed. A single-factor structure emerged from the results, accounting for 64% of the variance. The researchers found good internal consistency ($\alpha = .86$) and a slight positive skew (1.79). No other psychometric data are available for this relatively new measure (McQuillan et al., 2008).

In the current study, the IOM scale also showed good internal consistency ($\alpha = .93$). Internal consistency reliability estimates for scales and subscales are presented in Table 3.

Table 3

Internal Consistency Reliability Estimates for Scales and Subscales

Instrument	Alpha
Three-item Future Fertility Worry	.87
Fertility Specific Distress Scale – Future	.82
Impact of Event Scale--Revised (IES-R)	.87
Penn State Worry Questionnaire	.94
Center for Epidemiological Studies Depression Scale (CES-D)	.91
Overall Anxiety Severity and Impairment Scale (OASIS)	.87
Importance of Motherhood	.93

Penn State Worry Questionnaire. The Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) is a 16-item measure of “global” or trait worry. Items include “I am always worrying about something” and “My worries overwhelm me,” and each is answered on a scale of 0 (*not at all typical of me*) to 4 (*very typical of me*). Items 1, 3, 8, 10, and 11 are reverse-scored. All items are then summed to create a total PSWQ score. PSWQ scores may range from 0 to 64 with higher scores reflecting greater worry. The 0 to 4 Likert scale used for this measure in the current study is different than the 1 to 5 Likert scale used for answer options in most literature that references the PSWQ. This change was made in the current study to increase the consistency of the response scales across worry and distress measures, with the goal of reducing participant confusion.

According to Meyer et al. (1990), the PSWQ has strong internal consistency ($\alpha = .93$) and good test-retest reliability over an 8 to 10-week period ($r = .92$). Fresco, Heimberg, Mennin, and Turk (2002) found strong internal consistency ($\alpha = .90$) for the PSWQ in a sample of college students. And a recent analysis of the PSWQ has shown that the instrument measures a unitary

construct of general worry (Hazlett-Stevens, 2004). The PWSQ has demonstrated strong sensitivity and specificity in identifying individuals with and without diagnoses of Generalized Anxiety Disorder (Fresco et al., 2002). It has also been found to be highly correlated with other measures of global worry ($r = .49-.66$) and correlated, but to a lesser extent, with measures of specific worries (Jensen, Bernat, Davis, & Yale, 2010). For example, the PSWQ was found to correlate with the Impact of Event Scale--Revised ($r = .19$). This allows the PSWQ to offer useful information about discriminant validity for measures of specific worry.

In the current study, the PSWQ scale showed good internal consistency ($\alpha = .94$).

Measures of fertility worry. No measure of worry about future fertility was found in the extant literature, so measures of other types of worry with future orientation and relationships to health were reviewed. In a review of worry measures compiled for health behavior researchers through the National Cancer Institute, McCaul and Goetz (2008) recommended adaptation of previously used scales for the measurement of specific worries.

McCaul and Goetz advised that it is possible to construct very brief scales that will measure worry about a particular domain reliably. For example, McCaul, Mullens, Romanek, Erickson, and Gatheridge (2007) used two items to ask directly about the degree of worry about developing smoking-related medical conditions (e.g., “How worried are you about developing a smoking-related medical condition?” and “How much does thinking about a smoking-related medical condition bother you?” 0 = *not at all*, 4 = *extremely*). In a study of college-student smokers, the two items were inter-correlated ($\alpha = .87$) and the average score correlated modestly with the PSWQ ($r = .31$; McCaul et al., 2007).

Similarly, studies of worry about getting cancer among people who had never been diagnosed with cancer produced measures of worry consisting of three to five straightforward

questions about frequency and severity of worry (i.e., Gramling, Anthony, Frierson, & Bowen, 2007; McCaul, Schroeder, & Reid, 1996). Modeling from these studies, worry about future fertility was measured with three items: (a) “How often do you worry about whether you will be able to get pregnant when you’re ready to try”, *never* (1) to *all the time* (5); (b) “On a scale from 1 to 5, how would you rate how worried you are about whether you will be able to get pregnant when you are ready to try?”, *not at all* (1) to *extremely* (5); and (c) “Thinking about whether I’ll be able to get pregnant when I’m ready to try makes me feel upset and frightened,” with responses ranging from *strongly disagree* (1) to *strongly agree* (5).

As was done in the McCaul et al. study, each item was standardized and then summed for a single rating of worry about being able to get pregnant. In the McCaul et al. study, the scale had an alpha of .71 (1996).

In the current study, the three-item Future Fertility Worry (FFW) scale also showed good internal consistency (alpha = .87).

The Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979) was originally constructed as a measure of stress reactions following traumatic events, focusing on the frequency of distressing thoughts. A revision of the IES, the Impact of Event Scale—Revised (IES-R), was developed by Weiss and Marmar (1997) also to measure stress reactions, but with a changed focus on the degree of distress, rather than frequency. The IES-R includes 22 items with three subscales, Intrusion, Avoidance, and Hyperarousal, and items are answered on a scale of 0 to 4 with subscale means reported (Weiss, 2004). Because worry involves negative thoughts, researchers have used the intrusive thoughts subscale of the measure to assess specific areas of worry (McCaul & Goetz, 2008). Importantly, McCaul and Goetz note that intrusive thoughts are actually theorized to be a *product* of worry, rather than a direct measure.

The IES-R Intrusions subscale includes seven items, and it can be used to assess the consequences of various stressors, including health stressors. The IES-S Intrusions subscale measures how distressed a respondent was when they experienced intrusive thoughts about the consequences of different health outcomes. The standard IES-R instructions are “Below is a list of difficulties people sometimes have after stressful life events. Please read each item, and then indicate how distressing each difficulty has been for you DURING THE PAST SEVEN DAYS with respect to (blank) which occurred on (blank). How much were you distressed or bothered by these difficulties?” For the purposes of this study, the instructions were reworded to direct the participant to reflect on how distressed they have been about thoughts of being unable to become pregnant. The directions were “For some women, concerns about being able to get pregnant when they are ready to try are very stressful. DURING THE PAST SEVEN DAYS, how were YOU distressed or bothered by thoughts and feelings about potentially finding you are unable to get pregnant at some point in the future?” Items included “I thought about it when I didn’t mean to” and “I had waves of strong feelings about it,” and were answered on a scale of *not at all* (0) to *extremely* (4).

A review of the IES-R psychometric properties across all types of studies indicated that the intrusive thoughts subscale has strong internal consistency ($\alpha = .86$) and good test-retest reliability ($r = .87$ for 1 week; Sundin & Horowitz, 2002). The intrusion subscale was shown to correlate with the IES-R’s avoidance subscale, ($r = .63$), but to represent a fundamentally different type of reaction (Sundin & Horowitz). And, overall, the IES-R has been shown to contribute different information about reactions to stressful experiences than other symptom inventories and measures (Sundin & Horowitz).

In the current study, the adapted IES-R Intrusion scale (from here on called IES-R) showed good internal consistency ($\alpha = .87$).

The Fertility Specific Distress Scale (FSDS; Jacob, McQuillan, & Greil, 2006) uses four Likert-type items to assess emotional responses to infertility and fertility barriers, and has been used with women currently experiencing fertility problems as well as women who have experienced them in the past. Studies using this scale in both the past and present tense with women who had experienced infertility or were experiencing fertility barriers found that the scale had very good internal consistency ($\alpha = 0.83$; Jacob, McQuillan, & Greil, 2006).

For the current study, the four items were modified to look forward (rather than at current or past emotional experiences), asking participants to speculate how they expect they would feel if they experienced a fertility problem when they were ready to try to have a baby. Though the measure in this format did not evaluate experienced distress, but rather anticipated distress, it is theorized that anticipating higher levels of distress equates to a higher level of current worry about the ramifications of possible future infertility. The items were: “I would feel cheated by life”; “I would feel guilty about somehow causing the fertility problem”; “I would feel seriously depressed about it”; and “I would feel like a failure as a woman.” Participants were asked to respond to these items on a four-point scale with answer options *strongly disagree* (0), *disagree* (1), *agree* (2), and *strongly agree* (3).

In the current study, the Fertility Specific Distress Scale – Future (FSDS-F) showed good internal consistency ($\alpha = .82$).

Measure of Fertility Knowledge. The Fertility Awareness Survey (FAS; Daniluk, Koert, & Cheung, 2011) was designed to assess the knowledge and beliefs of childless women about later childbearing and assisted human reproduction (AHR) treatments. The survey includes

two self-ratings and 16 knowledge questions. The self-ratings ask the participants to report how much they know about fertility and how much they know about AHR on a 4-point scale from 0 (*no knowledge*) to 3 (*very knowledgeable*.) The 16 knowledge items are answered on a 5-point Likert scale from 1 (*definitely not*), to 5 (*definitely*), but can also be assessed on a true/false/don't know basis. Sample knowledge questions include "For women over 30, overall health and fitness level is a better indicator of fertility than age." And "A woman's eggs are as old as she is."

In developing the survey, the authors aimed to identify information gaps and misconceptions about fertility (Daniluk, Koert, & Cheung, 2011). In a sample of 3,345 Canadian women, the knowledge items, when analyzed as a scale, demonstrated very low reliability ($\alpha = 0.52$), and had a mean of about 3 and a standard deviation of about 1, indicating that participants frequently answered "*uncertain*" instead of indicating whether they thought the statement was true or false. The authors also analyzed the responses in a true/false fashion, and, after removing items answered "uncertain," found a mean score of 3.3 correct answers ($SD = 0.32$). Furthermore, they found that these knowledge scores had a low correlation with self-assessments of fertility knowledge and AHR knowledge ($r = 0.26$), indicating the participants' perceptions of their knowledge did not relate to their actual knowledge. For the purposes of the current study, FAS knowledge items were answered either "*true*" or "*false*".

Measures of distress. For the purposes of this study, "distress" was measured through assessments of depression symptoms and anxiety symptoms. Symptoms of depression were measured using the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) and symptoms of anxiety were measured using the Overall Anxiety Severity and Impairment Scale (OASIS; Norman et al., 2006).

The CES-D (Radloff, 1977) assesses the presence or absence of depressive symptoms in a non-clinical population. The scale consists of 20 items, which are rated on a 4-point scale, with options 0 through 3 indicating the frequency of symptoms experienced over the preceding week, and with four of the 20 items reverse-scored. The ratings are summed for a total of up to 60 points and higher scores indicate a greater number of depressive symptom experiences (Orme, Reis, & Herz, 1986). Analyses conducted by Radloff (1977) demonstrated good internal consistency for the scale in a sample of community adults ($\alpha = .85$). The CES-D also has high convergent validity with the Beck Depression Inventory ($r = .81$; Weissman et al., 1977) and high accuracy in detecting depression in a range of populations (Wood, Taylor, & Joseph, 2010). Because the CES-D is designed to measure depressive experiences in the general population, and conceptualizes depression as a continuum rather than a dichotomous state, it is the preferred measure of depressive symptoms in large-scale population surveys (Shaver and Brennan, 1990). In the current study, the CES-D showed good internal consistency ($\alpha = .91$).

The OASIS (Norman et al., 2006) is a 5-item measure of frequency and severity of anxiety, avoidance, work/school/home interference, and social interference due to anxiety. The instructions ask the respondent to consider a wide range of anxiety symptoms, including panic attacks and worries, and to consider the time frame of the past week. Five response options are given for each item and are coded 0 to 4. For example, the item “In the past week, how often have you felt anxious?” included response options of 0 (*No anxiety in the past week.*), 1 (*Infrequent anxiety. Felt anxious a few times.*), 2 (*Occasional anxiety. Felt anxious as much of the time as not. It was hard to relax.*), 3 (*Frequent anxiety. Felt anxious most of the time. It was very difficult to relax.*), and 4 (*Constant anxiety. Felt anxious all of the time and never really*

relaxed.) The responses are summed for a total score, and Norman et al. found that a cut score of 8 best discriminated respondents with anxiety disorders from those without.

Studies using the OASIS with an undergraduate sample (Norman et al., 2006) and with a primary care sample (Campbell-Sills et al., 2009) suggested that the scale is unidimensional and has good internal consistency, test-retest reliability, and convergent and discriminant validity. In the Campbell-Sills et al. study, convergent validity was established through correlations with measures of anxiety ($r = .50$), panic ($r = .60$), social anxiety ($r = .40$), and generalized anxiety ($r = .58$), and discriminant validity was established through negative correlations with measures of social support ($r = -.22$) and physical health ($r = -.23$).

In a non-clinical sample of 171 undergraduate students, the cut score of 8 correctly identified 78% of participants with an anxiety disorder (Norman et al., 2011), showing the usefulness of the measure for survey research. Norman et al. suggested that the OASIS could be used as a continuous measure of anxiety symptoms in a non-clinical population, or could be used with a higher cut score (i.e., > 9) when seeking information about the percentage of a population *not* impaired.

In the current study, the OASIS scale showed good internal consistency ($\alpha = .87$).

Qualitative questions. Two qualitative questions were added at the end of the survey to solicit more detail from participants and to give participants an opportunity to elaborate on their survey responses. The first, “Could you say more about the personal, work, or other life circumstances that are most important to your NOT trying to get pregnant now?”, was added to elicit detail about the reasons women perceive for not being ready to become pregnant. The second, “Is there anything else you would like to say?”, was included to provide participants

with the opportunity to convey additional thoughts or concerns to the researcher without providing identifying information.

Results

Preliminary Data Screening

Project data were downloaded from REDCap servers after the study survey was closed. The data set was reviewed and survey attempts that were not completed were excluded (see Figure 1.) Among participants who were female and within the desired age range, 325 were excluded from the study because they did not meet inclusion criteria assessed by screening questions (see Table 4.) Prior to analysis, the data were checked for errors, missing values, and univariate outliers.

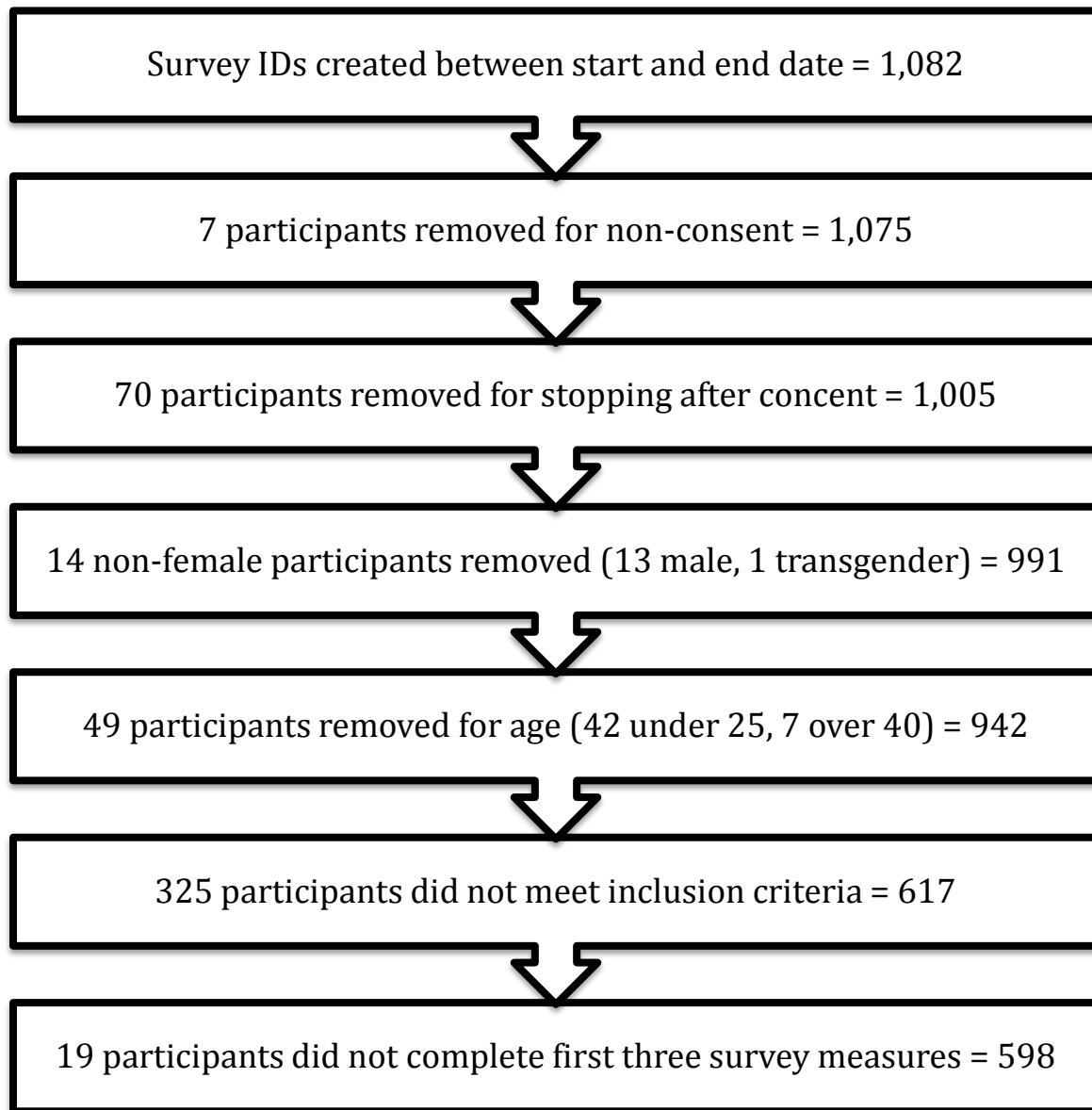


Figure 1. Process for Excluding Cases from Raw Data. This figure describes the steps taken to exclude participants who did not meet study criteria.

Table 4

Screening Question Responses Among Non-Qualifying Participants (N = 325)

Question	Frequency	Percent
Have you ever been pregnant? (Including pregnancies that did not result in a live birth.)		
No	274	84.3
Yes	51	15.7
Are you currently trying to become pregnant?		
No	263	80.9
Yes	61	18.8
Missing	1	0.3
Have you ever been diagnosed with a fertility problem?		
No	260	80.0
Yes	65	20.0
Was there ever a time when you regularly had sexual intercourse without birth control for a year or more without getting pregnant?		
No	207	63.7
Yes	117	36.0
Missing	1	0.3
Have you made the decision that you don't want to ever become pregnant?		
No	196	60.3
Yes	128	39.4
Missing	1	0.3

Missing data. Missing data were evaluated, and if more than 20% of responses were missing from an individual's responses to a scale, that individual was excluded from analyses using that scale (Tabachnick & Fidell, 2007). If a participant failed to answer one item on the scale, but did not miss more than 20% of the responses on the scale, a mean score from the items answered was calculated and was used to impute that individual's full score for the scale.

Outliers. Univariate outliers were tested for variables used in hypothesis testing. Each score was converted into a standard score and compared against a critical value two standard deviations away from the mean. Outliers were found in the data for three measures: IES-R, CES-D, and OASIS. All three of these scales were designed to evaluate symptoms of psychological distress at both clinical and subclinical levels and include cut-off scores which researchers may use to assess whether an individual's level of symptoms is likely to indicate a diagnosable mental illness. The outliers found in these data likely indicate the presence of such levels of symptoms, which would likely exist in a small percentage of the population the study sample is intended to represent. Because the source of the outliers is understood and appropriate to the population, the outliers were not removed.

In order to detect the presence of multivariate outliers, Cook's distance was calculated for each regression performed (Tabachnick & Fidell, 2007). No multivariate outliers were detected.

To check the assumptions of normality, linearity, homoscedasticity, and independence of residuals, regression standardized residual normal probability plots (P-P) and scatterplots were inspected. For two dependent variables, IES-R and OASIS, original regression analyses resulted in non-normal P-P plots. One way to deal with distributions that are not normal is to utilize an analysis technique called bootstrapping. Bootstrapping is a nonparametric approach to statistical inference that substitutes computation for more traditional distributional assumptions (Mooney & Duval, 1993). Because bootstrapping does not require distributional assumptions (such as normally distributed residuals), the bootstrap can provide more accurate inferences when the data are not well behaved or when the sample size is small. In regression, bootstrapping resamples observations multiple times and a "regression estimator" is computed for each of the samples. This "estimator" is a more stable evaluation of the phenomenon being modeled in the regression

procedure, one not affected by non-normal data. For the purposes of this study, all regression analyses were conducted using bootstrapping to resolve problems with any dependent variables.

Preliminary Analyses

Normative data. Means, standard deviations, and ranges for all measures are presented in Table 5.

Table 5

Means, Standard Deviations, and Ranges of Scales Used in Hypothesis Testing

Instrument	<i>N</i> ^a	Mean	<i>SD</i>	Sample Range	Possible Range
Importance of Motherhood (IOM)	531	2.84	.92	1-4	1-4
Fertility Awareness Survey (FAS)	523	10.12	1.74	4-15	0-16
Future Fertility Worry (FFW)	595	7.51	2.75	3-12	3-12
Impact of Event--Revised (IES-R)	596	2.28	3.53	0-20	0-28
Fertility Specific Distress Scale – Future (FSDS-F)	594	5.96	2.89	0-12	0-12
Penn State Worry Questionnaire (PSWQ)	569	37.02	13.45	2-64	0-64
Center for Epidemiological Studies Depression Scale (CES-D)	538	13.70	9.76	0-59	0-60
Overall Anxiety Severity and Impairment Scale (OASIS)	531	5.51	3.56	0-18	0-20

^aSample sizes differ among variables because of missing data.

The participant mean score on the Importance of Motherhood (IOM) scale ($M = 2.84$, $SD = .92$) was calculated by taking an average of five reverse-coded items on a 1-4 Likert scale, with lower scores indicating less identification with the importance of being of mother. A previous study of 496 nulliparous women found similar scores ($M = 2.73$, $SD = .87$; McQuillan et al., 2008).

The Fertility Awareness Survey (FAS) mean ($M = 10.12$, $SD = 1.74$) represents the raw, average score on a 16-item *true/false* “quiz” about fertility. Previous studies that used this measure administered it with a range of answer options representing the participants’ confidence in an answer being true or false (Daniluk, Koert, & Cheung, 2011), so those results are not directly comparable to the present study. For the purposes of this study, it is useful to note that the average “score” on the quiz was about 63% correct.

The three measures of future fertility worry were all based on previously administered scales, but changed significantly, limiting the value of comparisons to previous literature. The Future Fertility Worry (FFW) scale ($M = 7.51$, $SD = 2.75$, *range* = 3-12) and the Fertility Specific Distress Scale – Future (FSDS-F; $M = 5.96$, $SD = 2.89$, *range* = 0-12) both produced scores in the “low” to “medium” portion of their ranges. The Impact of Event--Revised Scale (IES-R) produced scores ($M = 2.28$, $SD = 3.53$, *range* = 0-28) at the very low end of the range.

Scores on the Penn State Worry Questionnaire ($M = 37.02$, $SD = 13.45$) were calculated with answer options ranging from 0 to 4. To compare to previous literature, the mean was converted to a 1 to 5 answer scale, resulting in a mean of 53.02 (same standard deviation). This is comparable to previous literature; for example, a 2010 study of 789 females ranging from 18 to 28 years of age found a mean PSWQ score of 54.87 ($SD = 12.18$; Zlomke & Hahn).

Scores on the CES-D ($M = 13.70$, $SD = 13.45$) were comparable to previous studies. For example, a 2001 study of 179 women ages 20 to 77 years of age found a mean CES-D score of 14.28 ($SD = 11.34$; Thomas & Jones). Similarly, scores on the OASIS ($M = 5.51$, $SD = 3.56$) were comparable to prior studies. For example, a study of 171 undergraduate students found a mean OASIS score of 6.61 ($SD = 4.01$).

Correlations. Pearson correlated were calculated to examine the linear relationships between fertility worry variables and the PSWQ (see Table 6). The PSWQ was found to have small significant positive correlations with all three fertility worry variables (FFW: $r = .18, p < .001$; REIS: $r = .21, p < .001$; FSDS-F: $r = .22, p < .001$). The magnitudes of these correlations support the discriminant validity of the three future fertility worry measures, and suggest that they measure a phenomenon fundamentally different than general worry. Additionally, the three future fertility measures were all found to have positive correlations with each other (see Table 7; FFW/IES-R: $r = .67, p < .001$; FFW/FSDS-F: $r = .55, p < .001$; IES-R/FSDS-F: $r = .43, p < .001$).

Table 6

Correlations Between Future Fertility Worry Measures and PSWQ

	Penn State Worry Questionnaire (PSWQ)
Future Fertility Worry (FFW)	.18*
Impact of Event--Revised Scale (IES-R)	.21*
Fertility Specific Distress Scale – Future (FSDS-F)	.22*

* $p < .01$

Table 7

Correlations Among Scale Variables and Age

Variable	1	2	3	4	5	6	7	8
1. Age	---							
2. Importance of Motherhood (IOM)	-.18**	---						
3. Fertility Awareness Survey (FAS)	.07	.01	---					
4. Future Fertility Worry (FFW)	.12*	.46**	.00	---				
5. Impact of Event--Revised Scale (IES-R)	.16**	.33**	-.02	.67**	---			
6. Fertility Specific Distress Scale – Future (FSDS-F)	-.11**	.56**	-.01	.55**	.43**	---		
7. Center for Epidemiological Studies Depression Scale (CES-D)	.06	-.06	.02	.12*	.27**	.13*	---	
8. Overall Anxiety Severity and Impairment Scale (OASIS)	.00	-.02	.05	.07	.21**	.12*	.70**	---

* $p < .01$. ** $p < .001$.

Pearson correlations were calculated to examine the linear relationships among the variables used in hypothesis testing in the present study (see Table 7). Age was shown to have significant positive correlations with FFW ($r = .12, p = .04$) and REIS ($r = .16, p < .001$), and age was shown to have significant negative correlations with FSDS-F ($r = -.11, p = -.005$) and with IOM ($r = -.18, p < .001$). Age was not significantly correlated with CES-D, OASIS, or FAS. Importance of Motherhood was shown to have significant positive correlations with all three measures of future fertility worry (FFW: $r = .46, p < .001$; REIS: $r = .33, p < .001$; FSDS-F: $r = .56, p < .001$), but was not significantly correlated with CES-D, or OASIS. The Fertility Awareness Scale was not significantly correlated with any of the other measures in the study. Additionally, CES-D was significantly correlated with all three fertility worry measures (FFW: r

= .12, $p = .004$; REIS: $r = .27$, $p < .001$; FSDS-F: $r = .13$, $p = .003$), and OASIS was significantly correlated with IES-R ($r = .21$, $p < .001$) and FSDS-F ($r = .12$, $p = .007$).

Covariates. Tests were conducted to detect associations between dependent variables (future fertility measures, depressive symptoms, and anxiety symptoms) and demographic variables.

To determine whether there were differences in any of the dependent variables by ethnicity, relationship status, sexual orientation, or education level, a series of ANOVAs were conducted. Ethnicity groups included in the analyses were Caucasian, Hispanic or Latino, African American, Asian/Pacific Islander, Other, and Multiethnic. There were no significant differences among race/ethnicity groups for any of the dependent variables, FFW: $F(5, 510) = 1.05$, $p = .39$; IES-R: $F(5, 511) = 1.19$, $p = .31$; FSDS-F: $F(5, 509) = .88$, $p = .49$; CES-D: $F(5, 510) = 1.92$, $p = .09$, OASIS: $F(5, 510) = 1.37$, $p = .23$.

Significant differences were found between relationship status groups on FFW, $F(3, 515) = 3.58$, $p = .01$; FSDS-F, $F(3, 514) = 3.72$, $p = .01$, and the CES-D, $F(3, 515) = 7.51$, $p < .001$. On the FFW, single women ($M = 4.00$, $SD = 2.74$) scored significantly lower than women in a relationship and cohabitating ($M = 4.86$, $SD = 2.86$) and women who were married or in a domestic partnership ($M = 4.85$, $SD = 2.57$), but not significantly different than women who were in a relationship but not cohabitating ($M = 4.27$, $SD = 2.75$). On the FSDS-F, single women scored significantly lower ($M = 5.34$, $SD = 2.83$) than women who were in a relationship and cohabitating ($M = 6.33$, $SD = 2.79$), but not significantly different from women who were in a relationship but not cohabitating ($M = 6.35$, $SD = 3.11$) or women who were married or in a domestic partnership ($M = 6.11$, $SD = 2.92$). On the CES-D, single women scored significantly higher ($M = 16.44$, $SD = 9.97$) than women in a relationship but not cohabitating ($M = 11.09$, SD

= 7.76) and women who were married or in a domestic partnership ($M = 12.19$, $SD = 8.95$), but were not significantly different from women who were in a relationship and cohabitating ($M = 13.50$, $SD = 10.88$).

Significant differences between women grouped by sexual orientation were found on the REIS, $F(3, 515) = 4.04$, $p = .01$. Bisexual women scored significantly higher on the REIS ($M = 3.68$, $SD = 4.83$) than straight women ($M = 2.11$, $SD = 3.31$), but were not significantly different than gay or lesbian women ($M = 3.44$, $SD = 3.67$) or women who reported “other” for sexual orientation ($M = 0.57$, $SD = 0.98$;). It should be noted that the group sizes for both women who identified as gay or lesbian or “other” were very small (2.5% and 1.2%, respectively.)

Education status groups were collapsed into participants who had less than a 4-year college degree, those with a Bachelor’s degree, and those with an advanced degree. Significant differences between women grouped by highest level of education were found on the CES-D, $F(2, 515) = 16.05$, $p < .001$ and on the OASIS, $F(2, 515) = 5.76$, $p = .003$). On the CES-D, women with less than a Bachelor’s degree ($M = 22.20$, $SD = 13.50$) scored significantly higher than women with a Bachelor’s degree ($M = 13.91$, $SD = 9.50$) and women with an advanced degree ($M = 12.45$, $SD = 8.97$). And, similarly, on the OASIS, women with less than a Bachelor’s degree ($M = 7.50$, $SD = 4.83$) scored significantly higher than women with a Bachelor’s degree ($M = 5.35$, $SD = 3.37$) and women with an advanced degree ($M = 5.38$, $SD = 3.49$).

Hypothesis Testing

Seven hypotheses were tested using hierarchical multiple liner regression. Given the limited previous research in this area, an effect size between Cohen’s “small” ($f^2 = .02$) and “medium” ($f^2 = .15$) was sought for this study (Cohen, 1992). A post hoc power analysis was

conducted using the software package, GPower (Faul & Erdfelder, 1992). For Hypotheses 1, 2, and 4, incorporating up to three independent variables (one predictor and up to two covariates), with $p = .05$ and $N = 518$, the post hoc analysis revealed a statistical power of .77 for detecting a small effect, and a power of .99 for detecting a medium effect. For Hypotheses 3, 5, 6 and 7 incorporating up to five independent variables (three predictors and up to two covariates), with $p = .05$ and $N = 518$, the post hoc analysis revealed a statistical power of .69 for detecting a small effect, and a power of .99 for detecting a medium effect size. Thus, there was more than adequate power (i.e., power > .80) at the moderate to large effect size level, and only slightly less than the desired statistical power to detect a small effect size.

Hypothesis 1. Age would account for a significant amount of the variance in participants' reports of fertility worry, measured by the IES-R, the FSDS-F, and the 3-item future fertility worry questionnaire. Specifically, it was predicted that older participants would report more fertility worry.

Analysis of Hypothesis 1. Three hierarchical multiple linear regression analyses were conducted to determine if age predicts the amount of variance in fertility worry, one each using the REIS, the FSDS, and the 3-item future fertility worry questionnaire (FFW) as the dependent variable. In step one, any covariates were entered into the models. In step two, age was entered into the models. Results for Hypothesis 1 are reported in Tables 8, 9 and 10.

For the dependent variable Future Fertility Worry (FFW), the covariate, relationship status, was found to be a significant predictor, $\Delta F(3, 515) = 3.58, p = .01 (\Delta R^2 = .02)$ when entered in the first step. Age was found to be a significant predictor of FFW, $\Delta F(4, 514) = 7.87, p < .001 (\Delta R^2 = .02)$, accounting for an additional 2% of the variance in the dependent variable.

The beta weight for age ($\beta = .10$) indicates a direct relationship with greater age predicting higher FFW.

Table 8

Hierarchical Multiple Linear Regression Model for the Prediction of Future Fertility Worry (FFW) from Age

Step and variable	<i>df</i>	R^2	ΔR^2	ΔF	<i>B</i>	<i>SE B</i>	β	<i>t</i>
1. Relationship Status	(3, 515)	.02	.02	3.58*				
Single (Constant)					4.00	.22	--	18.50**
In relationship, not cohab.					.27	.38	.04	.72
In relationship, cohab.					.86	.33	.14	2.65*
Married					.85	.31	.14	2.79*
2. Age	(4, 514)	.04	.02	7.87**	.10	.04	.12	2.81*

Abbreviation “cohab.” means “cohabitating.”

* $p < .01$. ** $p < .001$.

For the dependent variable IES-R, the covariate, sexual orientation, was found to be a significant predictor, $\Delta F(3, 515) = 4.04, p = .007 (\Delta R^2 = .02)$ when entered in the first step. Age was found to be a significant predictor of IES-R, $\Delta F(4, 514) = 13.18, p < .001 (\Delta R^2 = .02)$, accounting for an additional 2% of the variance in the dependent variable. The beta weight for age ($\beta = .16$) indicates a direct relationship with greater age predicting higher IES-R.

Table 9

Hierarchical Multiple Linear Regression Model for the Prediction of Future Fertility Worry (IES-R) from Age

Step and variable	<i>df</i>	<i>R</i> ²	ΔR^2	ΔF	<i>B</i>	<i>SE B</i>	β	<i>t</i>
1. Sexual Orientation	(3, 515)	.02	.02	4.04*				
Straight (Constant)					2.11	.16	--	12.92**
Gay or Lesbian					1.34	.91	.06	1.47
Bisexual					1.57	.53	.13	2.95*
Other					-1.54	1.32	-.05	-1.17
2. Age	(4, 514)	.05	.02	13.18**	.16	.04	.16	3.63**

* $p < .01$. ** $p < .001$.

For the dependent variable FSDS-F, the covariate, relationship status, was found to be a significant predictor, $\Delta F(3, 514) = 3.72, p = .01$ ($\Delta R^2 = .02$) when entered in the first step. Age was not found to be a significant predictor of FSDS-F, $\Delta F(4, 513) = 5.81, p = .02$ ($\Delta R^2 = .01$), accounting for no additional variance in the dependent variable.

Table 10

Hierarchical Multiple Linear Regression Model for the Prediction of Future Fertility Worry (FSDS-F) from Age

Step and variable	<i>df</i>	<i>R</i> ²	ΔR^2	ΔF	<i>B</i>	<i>SE B</i>	β	<i>t</i>
1. Relationship Status	(3, 514)	.02	.02	3.72*				
Single (Constant)					5.34	.23	--	23.22**
In relationship, not cohab.					1.01	.40	.12	2.51
In relationship, cohab. Married					1.00	.35	.15	2.87*
					.77	.33	.12	2.36
2. Age	(4, 513)	.03	.01	5.81	-0.09	.04	-.11	-2.41

Abbreviation “cohab.” means “cohabitating.”

p* < .01. *p* < .001.

Hypothesis 2. Importance of Motherhood would account for a significant amount of the variance in participants’ reports of fertility worry, measured by the IES-R, the FSDS, and the 3-item future fertility worry questionnaire. Specifically, it was predicted that individuals who reported a higher importance of motherhood would also report more fertility worry.

Analysis of Hypothesis 2. Three hierarchical multiple linear regression analyses were conducted to determine if importance of motherhood predicts the amount of variance in fertility worry, one each using the REIS, the FSDS, and the 3-item future fertility worry questionnaire as the dependent variable. In step one, any covariates were entered into the models. In step two, IOM was centered around the mean entered into the models. Centering around the mean, or standardizing, is important for minimizing multicollinearity and maximizing interpretability (Aiken & West, 1991). Results for Hypothesis 2 are reported in Tables 11, 12 and 13 (see steps 1 and 2 in each of these tables).

For the dependent variable FFW, the covariate, relationship status, was found to be a significant predictor, $\Delta F(3, 515) = 3.58, p = .01 (\Delta R^2 = .02)$ when entered in the first step. Importance of Motherhood was found to be a significant predictor of FFW, $\Delta F(4, 514) = 133.81, p < .001 (\Delta R^2 = .20)$, accounting for an additional 20% of the variance in the dependent variable. The beta weight for age ($\beta = .46$) indicates a direct relationship with higher IOM scores predicting higher FFW.

Table 11

Hierarchical Multiple Linear Regression Model for the Prediction of Future Fertility Worry (FFW) from Importance of Motherhood, Age, and Interaction of Importance of Motherhood and Age

Step and variable	df	R ²	ΔR^2	ΔF	B	SE B	β	t
1. Relationship Status	(3, 515)	.02	.02	3.58*				
Single (Constant)					4.00	.22	--	18.50**
In relationship, not cohab.					.27	.38	.04	.72
In relationship, cohab. Married					.86	.33	.14	2.65*
					.85	.31	.14	2.79*
2. Importance of Motherhood	(4, 514)	.22	.20	133.81**	.27	.02	.46	11.57**
3. Age	(5, 513)	.26	.04	28.76**	.17	.03	.21	5.36**
4. Interaction of IOM X Age	(6, 512)	.29	.23	16.31**	.03	.01	1.32	4.04**

Abbreviation "cohab." means "cohabitating."

*p < .01. **p < .001.

For the dependent variable IES-R, the covariate, sexual orientation, was found to be a significant predictor, $\Delta F(3, 515) = 4.04, p = .007 (\Delta R^2 = .02)$ when entered in the first step.

Importance of Motherhood was found to be a significant predictor of IES-R, $\Delta F(4, 514) = 71.01,$

$p < .001$ ($\Delta R^2 = .12$), accounting for an additional 12% of the variance in the dependent variable.

The beta weight for age ($\beta = .35$) indicates a direct relationship with higher IOM scores predicting higher IES-R.

Table 12

Hierarchical Multiple Linear Regression Model for the Prediction of Future Fertility Worry (IES-R) from Importance of Motherhood, Age, and Interaction of Importance of Motherhood and Age

Step and variable	df	R ²	ΔR^2	ΔF	B	SE B	β	t
1. Sexual Orientation	(3, 515)	.02	.02	4.04*				
Straight (Constant)					2.11	.16	--	12.92**
Gay or Lesbian					1.34	.91	.06	1.47
Bisexual					1.57	.53	.13	2.95*
Other					-1.54	1.32	-.05	-1.17
2. Importance of Motherhood	(4, 514)	.14	.12	71.01**	.27	.03	.35	8.43**
3. Age	(5, 513)	.19	.05	30.72**	.23	.04	.23	5.54**
4. Interaction of IOM X Age	(6, 512)	.25	.06	37.80**	.05	.01	2.06	6.15**

* $p < .01$. ** $p < .001$.

For the dependent variable FSDS-F, the covariate, relationship status, was found to be a significant predictor, $\Delta F(3, 514) = 3.72$, $p = .01$ ($\Delta R^2 = .02$) when entered in the first step. Importance of Motherhood was found to be a significant predictor of FSDS-F, $\Delta F(4, 513) = 231.75$, $p = .000$ ($\Delta R^2 = .31$), accounting for an additional 31% of the variance in the dependent variable. The beta weight for age ($\beta = .56$) indicates a direct relationship with greater IOM predicting higher FSDS-F scores.

Table 13

Hierarchical Multiple Linear Regression Model for the Prediction of Future Fertility Worry (FSDS-F) from Importance of Motherhood, Age, and Interaction of Importance of Motherhood and Age

Step and variable	<i>df</i>	R^2	ΔR^2	ΔF	<i>B</i>	<i>SE B</i>	β	<i>t</i>
1. Relationship Status	(3, 514)	.02	.02	3.72**				
Single (Constant)					5.34	.23	--	23.22**
In relationship, not cohab.					1.01	.40	.12	2.51
In relationship, cohab. Married					1.00	.35	.15	2.87*
					.77	.33	.12	2.36
2. Importance of Motherhood	(4, 513)	.33	.31	231.75**	.36	.02	.56	15.22**
3. Age	(5, 512)	.33	.00	.07	-.01	.03	-.01	-.27
4. Interaction of IOM X Age	(6, 511)	.34	.01	8.76**	.02	.01	.93	2.96*

Abbreviation "cohab." means "cohabitating."

* $p < .01$. ** $p < .001$.

Hypothesis 3. The amount of variance in participants' reports of fertility worry, measured by the IES-R, the FSDS, and the 3-item future fertility worry questionnaire, accounted for by the Importance of Motherhood would vary based on participant age. Specifically, it was predicted that individuals who report a high importance of motherhood would report more fertility worry, and that the relationship will grow stronger as age increases.

Analysis of Hypothesis 3. To test this hypothesis, two additional steps were added to the regression models that were used to test Hypothesis 2. See Tables 11, 12 and 13, steps 3 and 4 in each of these tables. After entering any covariates in the first step, Importance of Motherhood in the second step, and age in the third step, the interaction of Importance of Motherhood and age was centered about the mean and entered in the fourth step.

For the dependent variable FFW, when age was entered in the third step (after covariates and IOM) it was found to be a significant predictor $\Delta F(5, 513) = 28.76, p < .001 (\Delta R^2 = .04)$. And when the interaction of IOM and age was added in the fourth step, it was also found to be significant $\Delta F(6, 512) = 16.31, p < .001 (\Delta R^2 = .23)$, accounting for an additional 23% of the variance in the dependent variable. The interaction of IOM and Age on FFW is plotted in Figure 2. The plotted variables show that the relationship between higher IOM scores and higher FFW scores is stronger in the highest age group.

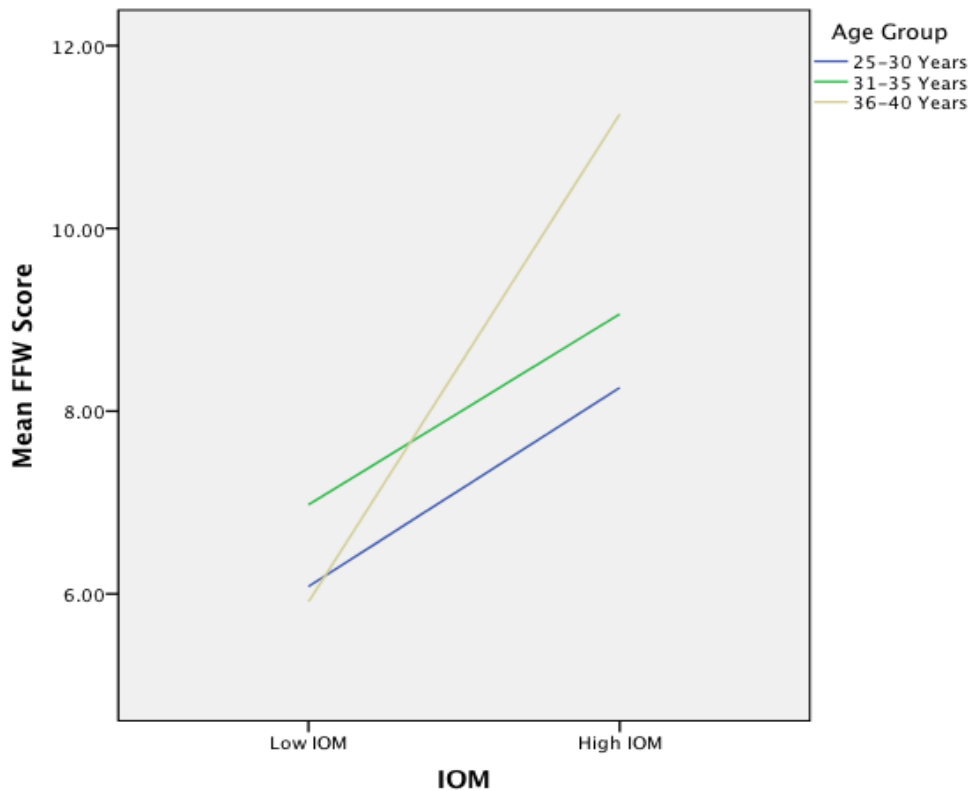


Figure 2. Plotted interaction between IOM and Age predicting FFW. This graph shows the relationship between IOM and FFW for each of three age groups.

For the dependent variable IES-R, when age was entered in the third step (after covariates and IOM) it was found to be a significant predictor $\Delta F(5, 513) = 30.72, p < .001 (\Delta R^2 = .05)$.

And when the interaction of IOM and age was added in the fourth step, it was also found to be significant $\Delta F(6, 512) = 37.80, p < .001 (\Delta R^2 = .06)$, accounting for an additional 6% of the variance in the dependent variable. The interaction of IOM and Age on IES-R is plotted in Figure 3. The plotted variables show that the relationship between higher IOM scores and higher IES-R scores is stronger in the higher age group.

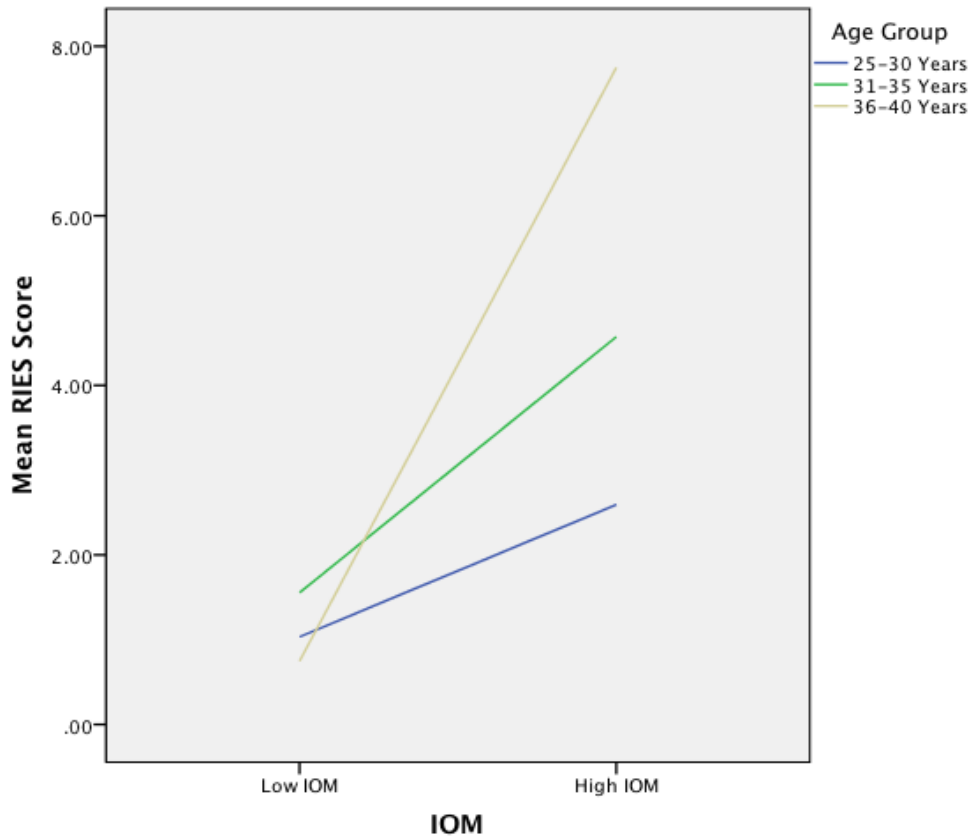


Figure 3. Plotted interaction between IOM and Age predicting IES-R. This graph shows the relationship between IOM and IES-R for each of three age groups.

For the dependent variable FSDS-F, when age was entered in the third step (after covariates and IOM) it was not found to be a significant predictor $\Delta F(5, 512) = .07, p = .79 (\Delta R^2 = .00)$. But when the interaction of IOM and age was added in the fourth step, it was found to be significant $\Delta F(6, 511) = 8.745, p = .003 (\Delta R^2 = .01)$, accounting for an additional 1% of the

variance in the dependent variable. The interaction of IOM and Age on FSDS-F is plotted in Figure 4. The plotted variables show that the relationship between higher IOM scores and higher FSDS-F scores is stronger in the highest age group.

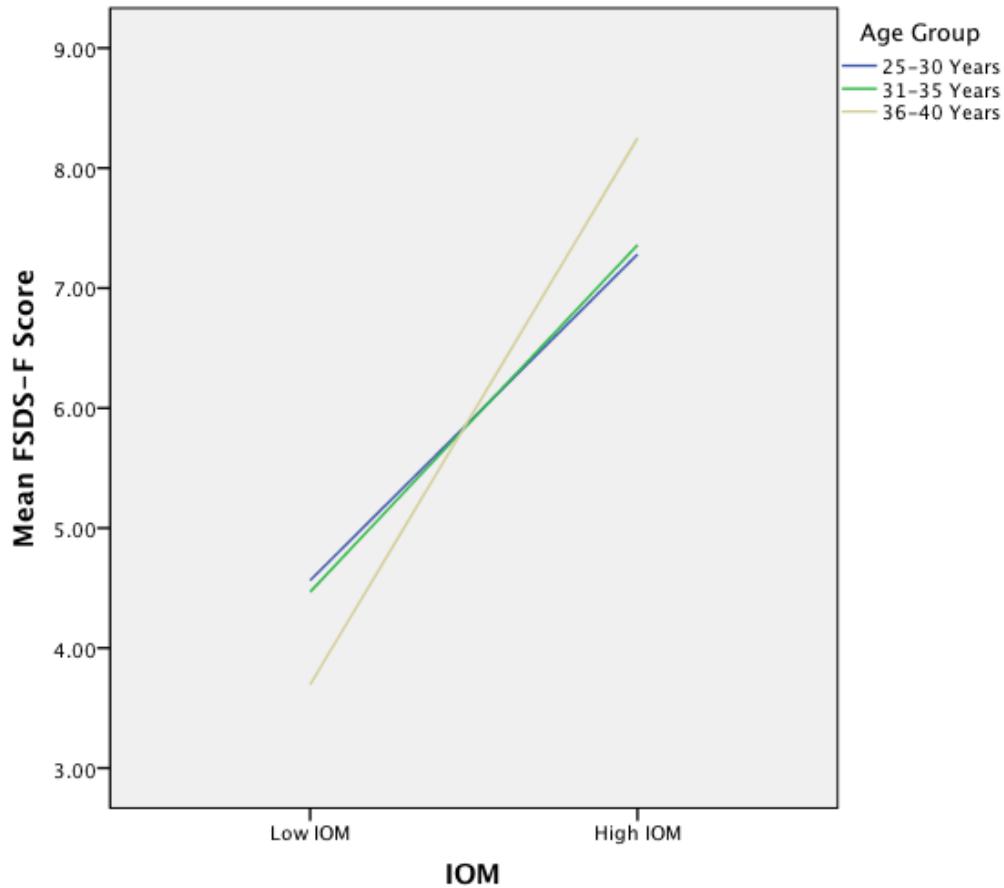


Figure 4. Plotted interaction between IOM and Age predicting FSDS-F. This graph shows the relationship between IOM and FSDS-F for each of three age groups.

Hypothesis 4. Fertility knowledge would account for a significant amount of the variance in participants' reports of fertility worry, measured by the IES-R, the FSDS, and the 3-item future fertility worry questionnaire. Specifically, it was predicted that individuals who demonstrated higher fertility knowledge would also report more fertility worry.

Analysis of Hypothesis 4. Three hierarchical multiple linear regression analyses were conducted to determine if fertility knowledge (FAS) predicted the amount of variance in fertility worry, one each using the REIS, the FSDS-F, and the 3-item future fertility worry questionnaire as the dependent variable. In step one, any covariates were entered into the models. In step two, FAS was centered around the mean entered into the models. Results for Hypothesis 4 are reported in Tables 14, 15 and 16 (see steps 1 and 2 in each of these tables).

For the dependent variable FFW, the covariate, relationship status, was found to be a significant predictor , $\Delta F(3, 515) = 3.58, p = .01$ ($\Delta R^2 = .02$) when entered in the first step. Fertility knowledge was not found to be a significant predictor of FFW, $\Delta F(4, 514) = .01, p = .92$ ($\Delta R^2 = .00$), accounting for no additional variance in the dependent variable.

Table 14

Hierarchical Multiple Linear Regression Model for the Prediction of Future Fertility Worry (FFW) from Fertility Knowledge, Age, and Interaction of Fertility Knowledge and Age

Step and variable	<i>df</i>	<i>R</i> ²	ΔR^2	ΔF	<i>B</i>	<i>SE B</i>	β	<i>t</i>
1. Relationship Status	(3, 515)	.02	.02	3.58*				
Single (Constant)					4.00	.22	--	18.50**
In relationship, not cohab.					.27	.38	.04	.72
In relationship, cohab.					.86	.33	.14	2.65*
Married					.85	.31	.14	2.79*
2. Fertility Knowledge (FAS)	(4, 514)	.02	.00	.01	-.01	.07	-.00	-.10
3. Age	(5, 513)	.04	.02	7.92*	.10	.04	.12	2.82*
4. Interaction of Age X FAS	(6, 512)	.04	.00	.08	.01	.02	.13	.28

Abbreviation "cohab." means "cohabitating."

* $p < .01$. ** $p < .001$.

For the dependent variable IES-R, the covariate, sexual orientation, was found to be a significant predictor, $\Delta F(3, 515) = 4.04$, $p = .007$ ($\Delta R^2 = .02$) when entered in the first step.

Fertility knowledge was not found to be a significant predictor of IES-R, $\Delta F(4, 514) = .18$, $p = .67$ ($\Delta R^2 = .00$), accounting for no additional variance in the dependent variable.

Table 15

Hierarchical Multiple Linear Regression Model for the Prediction of Future Fertility Worry (IES-R) from Fertility Knowledge, Age, and Interaction of Fertility Knowledge and Age

Step and variable	<i>df</i>	<i>R</i> ²	ΔR^2	ΔF	<i>B</i>	<i>SE B</i>	β	<i>t</i>
1. Sexual Orientation	(3, 515)	.02	.02	4.04*				
Straight (Constant)					2.11	.16	--	12.92**
Gay or Lesbian					1.34	.91	.06	1.47
Bisexual					1.57	.53	.13	2.95*
Other					-1.54	1.32	-.05	-1.17
2. Fertility Knowledge (FAS)	(4, 514)	.02	.00	.18	-.04	.09	-.02	-.43
3. Age	(5, 513)	.05	.03	13.43**	.16	.04	.16	3.67**
4. Interaction of Age X FAS	(6, 512)	.05	.00	.03	-.004	.02	-.08	-.18

* $p < .01$. ** $p < .001$.

For the dependent variable FSDS-F, the covariate, relationship status, was found to be a significant predictor, $\Delta F(3, 514) = 3.72, p = .01$ ($\Delta R^2 = .02$) when entered in the first step.

Fertility knowledge was not found to be a significant predictor of FSDS-F, $\Delta F(4, 513) = .02, p = .88$ ($\Delta R^2 = .00$), accounting for no additional variance in the dependent variable.

Table 16

Hierarchical Multiple Linear Regression Model for the Prediction of Future Fertility Worry (FSDS-F) from Fertility Knowledge, Age, and Interaction of Fertility Knowledge and Age

Step and variable	<i>df</i>	<i>R</i> ²	ΔR^2	ΔF	<i>B</i>	<i>SE</i> <i>B</i>	β	<i>t</i>
1. Relationship Status	(3, 514)	.02	.02	3.72*				
Single (Constant)					5.34	.23	--	23.22**
In relationship, not cohab.					1.01	.40	.12	2.51
In relationship, cohab.					1.00	.35	.15	2.87*
Married					.77	.33	.12	2.36
2. Fertility Knowledge (FAS)	(4, 513)	.02	.00	.02	.01	.07	.01	.15
3. Age	(5, 512)	.03	.01	5.87	-.09	.04	-.11	-2.42
4. Interaction of Age X FAS	(6, 511)	.04	.00	1.25	-.02	.02	-.50	-1.12

Abbreviation "cohab." means "cohabitating."

* $p < .01$. ** $p < .001$.

Hypothesis 5. The amount of variance in participants' reports of fertility worry, measured by the IES-R, the FSDS, and the 3-item future fertility worry questionnaire, accounted for by the FAS would vary based on participant age. Specifically, it was predicted that individuals who demonstrated higher fertility knowledge would report more fertility worry, and that the relationship would grow stronger as age increased.

Analysis of Hypothesis 5. To test this hypothesis, two additional steps were added to the regression models that were used to test Hypothesis 4. See Tables 14, 15 and 16, steps 3 and 4 in each of these tables. After entering any covariates in the first step, FAS in the second step, and age in the third step, the interaction of FAS and age was centered about the mean and entered in the fourth step.

For the dependent variable FFW, when age was entered in the third step (after covariates and FAS) it was found to be a significant predictor $\Delta F(5, 513) = 7.92, p = .005 (\Delta R^2 = .02)$. But when the interaction of FAS and age was added in the fourth step, it was not found to be significant $\Delta F(6, 512) = .08, p = .78 (\Delta R^2 = .00)$, accounting for no additional variance in the dependent variable.

For the dependent variable REIS, when age was entered in the third step (after covariates and FAS) it was found to be a significant predictor $\Delta F(5, 513) = 13.43, p = .007 (\Delta R^2 = .03)$. But when the interaction of FAS and age was added in the fourth step, it was not found to be significant $\Delta F(6, 512) = .03, p = .86 (\Delta R^2 = .00)$, accounting for no additional variance in the dependent variable.

For the dependent variable FSDS-F, when age was entered in the third step (after covariates and FAS) it was not found to be a significant predictor $\Delta F(5, 512) = 5.87, p = .02 (\Delta R^2 = .01)$. And when the interaction of FAS and age was added in the fourth step, it was also not found to be significant $\Delta F(6, 511) = 1.25, p = .27 (\Delta R^2 = .00)$, accounting for no additional variance in the dependent variable.

Hypothesis 6. Worry, measured by the IES-R, the FSDS, and the 3-item future fertility worry questionnaire would account for a significant amount of the variance in participants' reports of depressive symptoms, as measured by the CES-D. Specifically, it is predicted that individuals who report higher future fertility worry would report more depressive symptoms.

Analysis of Hypothesis 6. A hierarchical multiple linear regression analysis was conducted to determine if future fertility worry predicts the amount of variance in depressive symptoms. First, any covariates were entered into the models. Future fertility worry, using the three fertility worry measures as a block, was entered in the third step of the model. Results for

Hypothesis 6 are reported in Table 17. The covariate relationship status, entered in the first step, was found to be a significant predictor of depression symptoms $\Delta F(3, 511) = 7.18, p < .001$ ($\Delta R^2 = .04$). And the covariate education, entered in the second step, was found to be a significant predictor of depressive symptoms $\Delta F(5, 509) = 14.36, p < .001$ ($\Delta R^2 = .09$). Future fertility worry (3-measure block) was found to be a significant predictor of depressive symptoms $\Delta F(8, 506) = 14.21, p = .000$ ($\Delta R^2 = .07$), accounting for an additional 7% of variance in the dependent variable. Examination of the beta weights for each of the three future fertility worry measures indicates that only IES-R was significant ($\beta = .28, p < .001$), with higher IES-R scores indicating higher CES-D scores.

Table 17

Hierarchical Multiple Linear Regression Model for the Prediction of Depressive Symptoms from three Future Fertility Worry measures (FFW, IES-R, FSDS-F)

Step and variable	df	R ²	ΔR^2	ΔF	B	SE B	β	t
1. Relationship Status	(3, 511)	.04	.04	7.18**				
Single (Constant)					16.38	.77	--	21.28**
In relationship, not cohab.					-5.29	1.34	-.19	-3.95**
In relationship, cohab.					-2.88	1.16	-.13	-2.50
Married					-4.16	1.09	-.20	-3.82**
2. Education	(5, 509)	.09	.05	14.36**				
Less than college (Constant)					24.30	1.71	--	14.25**
College degree					-8.06	1.75	-.40	-4.6**
Advanced degree					-9.15	1.71	-.47	-5.36**
3. Future Fertility Worry	(8, 506)	.16	.07	14.21**				
FFW					-.26	.22	-.07	-1.20
IES-R					.78	.16	.28	5.03**
FSDS-F					.23	.17	.07	1.36

*p < .01. **p < .001.

Hypothesis 7. Worry, measured by the IES-R, the FSDS, and the 3-item future fertility worry questionnaire would account for a significant amount of the variance in participants' reports of anxiety symptoms, as measured by the OASIS. Specifically, it is predicted that individuals who report higher future fertility worry would report more anxiety symptoms.

Analysis of Hypothesis 7. A hierarchical multiple linear regression analysis was conducted to determine if future fertility worry predicts the amount of variance in anxiety symptoms. First, any covariates were entered into the models. Future fertility worry, using the three fertility worry measures as a block, was entered in the second step of the model. Results for Hypothesis 7 are reported in Table 18. The covariate, education, was found to be a significant predictor of depressive symptoms $\Delta F(2, 512) = .5.79, p = .0003 (\Delta R^2 = .02)$ when entered in the first step of the regression. Future fertility worry (3-measure block) was found to be a significant predictor of anxiety symptoms $\Delta F(5, 509) = 9.19, p < .001 (\Delta R^2 = .05)$, accounting for an additional 5% of variance in the dependent variable.

Table 18

Hierarchical Multiple Linear Regression Model for the Prediction of Anxiety Symptoms from three Future Fertility Worry measures (FFW, IES-R, FSDS-F)

Step and variable	<i>df</i>	<i>R</i> ²	ΔR^2	<i>F</i>	<i>B</i>	<i>SE B</i>	β	<i>t</i>
1. Education	(2, 512)	.02	.02	5.79*				
Less than college (Constant)					7.50	.61	--	12.31**
College					-2.17	.66	-.29	-3.28*
Advanced degree					-2.13	.65	-.30	-3.30*
2. Future Fertility Worry	(5, 509)	.07	.05	9.19**				
FFW					-.18	.08	-.14	-2.19
IES-R					.27	.06	.26	4.50**
FSDS-F					.09	.06	.08	1.46

p* < .01. *p* < .001.

Examination of the beta weights for each of the three future fertility worry measures indicates that only IES-R was significant ($\beta = .26$, *p* < .001), with higher IES-R scores indicating higher OASIS scores.

Qualitative results. Two qualitative questions were posed to participants at the end of the survey. Answers to those questions were coded for themes and the frequency of themes was observed. Out of 598 participants included in the study, 442 answered the first question and 180 answered the second question.

Answers to the first qualitative question, “Could you say more about the personal, work, or other life circumstances that are most important to your NOT trying to get pregnant now?”, are listed in Table 19. The most common themes were *want to be financially stable first*, *want to establish career, in school*, *want to be married first*, and *not in relationship*.

Table 19

Thematic responses to “Could you say more about the personal, work, or other life circumstances that are most important to your NOT trying to get pregnant now?”

Theme^a	N
Want to be financially stable first	139
Want to establish career	137
In school	108
Want to be married first	107
Not in relationship	92
Relationship too new	26
Don't want to change lifestyle	26
Unsure about wanting kids	23
Not prepared	21
Want time with partner	20
Want to travel	19
Health concerns	17
No time	16
Open to adoption	11
Want to buy a house	11
Don't want to be a single parent	9
Moving soon/just moved	8
Mental health concerns	6
Not a priority	6
LGBT concerns	6
Doubts about partner	6
Too young	6
Want time for self	5
Think I would be a bad parent	5
Scared of changes to my body	4
Childcare concerns	3
Worried about reaction at work	3
Just finished school	2
Want to lose weight	2
Concerned about passing on genetic condition	2
Partner doesn't want kids	2
Don't want to be defined by motherhood	2
Overpopulation/environmental factors	2
Concerned about how long I've been on hormonal birth control	1
Currently working too much	1
No perfect time	1
Open to being a single parent	1
Freezing eggs now	1
Worried about birth defects	1

^a*Language in this table paraphrases or summarizes participant comments.*

Many participants listed several factors that impacted their not wanting to get pregnant, for example:

School loans, still paying a lot after graduating 6 years ago. Just got engaged, getting married next year. Want to have time together as a married couple, go back to school for a Master's degree, save for a house, pay off student loan debt and have a stable financial base before having kids.

I am not currently involved in a relationship, and when I choose to become pregnant, I want it to be in a situation where I have the full and enthusiastic support of my partner.

Money! I could not in any way afford the treatments to get pregnant (I'm a lesbian), nor could I afford to raise a child right now. My partner and I are going to wait until we are finished with our Ph.D.'s to discuss/try.

Answers to the second qualitative question, “Is there anything else you would like to say?”, are listed in Appendix G. Answers to this question spanned a greater number of topics than those provided for the first qualitative question. Some of the most common themes were *this is an interesting/important study, I'm very interested in the results of this survey, adoption is a good option for me, and current health issues have made me more worried about my fertility.*

Here too, many participants discussed multiple personal thoughts and reflections on the survey, for example:

The pressure to become a parent once you're married is hard. Family inquire about it and encourage it and I know they are well-meaning, but it creates tension because they see are [sic] lives and roles as incomplete. We want kids, but we can't afford them now and we feel like we're disappointing people. There is also a pervasive perception among our friends and family who have children that because my husband and I are currently childless, that we must have an abundance of free time on our hands and we're not doing anything important. But we're focusing all our energy on building a stable life so that someday we CAN have kids, and that means we have extra jobs and extra work to do in the meantime. It's exhausting to try and justify our priorities to those people, and it creates a huge amount of stress.

Good luck with this survey. It's important to keep studying this area because there are a lot of myths propagated that probably do more harm than good. Thank you for your research into this area.

I am in a major life transition, finishing grad school, international relocation, career transition, looking for an apartment to move into with my boyfriend, etc. I believe my scores reflect an increased level of stress, worry and anxiety about the future, generally and specifically for family planning.

Discussion

The purpose of this study was to investigate the relationship between age, personal values around motherhood, and knowledge about fertility, and worry about future fertility in women, ages 25 to 40, who have never been pregnant, not experienced infertility, and not decided to never become pregnant. Additionally, this study aimed to examine the relationship between worry about future fertility and symptoms of anxiety and depression in the same population. Ancillary goals included establishing means for future fertility worry in the population and evaluation of measurement strategies. In this chapter, the results of the study will be summarized and compared to previous studies. The possible meanings of this study's findings will be explored along with limitations of the current study and suggestions for future research.

Summary of findings

Hypotheses 1 through 5 proposed that variance in the dependent variables, worry about future fertility as measured by three different scales, could be accounted for by the predictors age, views on the importance of motherhood (IOM), or fertility knowledge.

Age was found to predict future fertility worry as measured by FFW and IES-R, in both cases predicting 2% of the variance in the dependent variable, and with higher age predicting higher levels of worry. Age was not found to predict worry as measured by the FSDS-F. Despite not having previous studies to compare this finding to, it seems to run counter to pop culture messages which suggest women tend to experience substantial worry about their fertility as they age within the 25 to 40 year range. If that were the case, one would expect age to have accounted for more than 2% percent of the variance in future fertility worry. However, given that the

current study's sample included fewer participants at higher age levels, it is possible that the real magnitude of the influence of age on worry was underestimated.

Importance of Motherhood (IOM) was found to predict future fertility worry on all three measures (FFW, IES-R, FSDS-F), with higher scores on IOM predicting more worry.

Importance of Motherhood accounted for 20% of the variance in FFW, 12% of the variance in IES-R, and 31% of the variance in FSDS-F, in each case far more than what was predicted by age in the previous model. This finding is in line with what was found by Greil, Shreffler et al. (2011) in a study of women experiencing infertility, that IOM was the best predictor of distress among women experiencing infertility. Additionally, in the current study, the interaction of age and IOM also contributed significantly to the prediction of variance in the dependent variables, with IOM accounting for greater variance in worry as participant age increased. The interaction of age and IOM accounted for an additional 23% of the variance in FFW, 6% of the variance in IES-R, and 1% of the variance in FSDS-F. Importantly, relationships like the one between IOM and future fertility worry, which include two subjective measures, should be evaluated with the caution that "correlation is not causation." The non-experimental, cross-sectional design of the current study prevents causal interpretations of relationships. Though IOM significantly predicts future fertility worry, it is not known if women's experiences of worrying about their fertility change the way they value the importance of motherhood.

Fertility knowledge, as measured by the FAS, a 16-item *true/false* quiz about fertility, did not predict variance in any of the worry variables, nor did the interaction of age and FAS.

Hypotheses 6 and 7 proposed that variance in measures of distress, depression symptoms (CES-D) and anxiety symptoms (OASIS), would be accounted for by the level of worry assessed by the future fertility worry measures. The three future fertility measures were found to predict

7% of the variance in CES-D scores and 5% of the variance in OASIS scores. For both CES-D and OASIS, IES-R was the only significant individual predictor, with higher scores on the IES-R predicting higher scores on those measures of distress. Again here, it is important to note that this relationship is a correlation, and does not indicate causation. It is possible that greater experiences of depression and anxiety among women influence their future fertility worry.

Evaluation of means and adapted measures

In the absence of previous studies about the fertility worries of nulliparous women who have never been diagnosed with infertility, three measures of future fertility worry were developed for the current study through the adaptation of related measures.

The Future Fertility Worry (FFW) measure was based on a suggestion from McCaul and Goetz (2008) that very brief scales can be used to measure a particular worry domain reliably, as well as examples of such scales including those for worry about smoking-related medical conditions and worry about being diagnosed with cancer. The FFW was developed with this in mind, with three face-valid questions about the frequency and severity of future fertility worry. This measure was found to have good internal consistency reliability ($\alpha = .87$) and was found to have a small but meaningful correlation with the Penn State Worry Questionnaire ($r = .18$). That correlation suggests that FFW measures a phenomenon substantively different from, but related to, general worry. This helps to establish both construct and discriminant validity for the measure. Means on this measure were found to be in the low to medium areas of the possible range.

The current study's IES-R was based on the intrusion scale of the Impact of Event Scale--Revised (Weiss and Marmar, 1997) which was intended to measure stress reactions following traumatic events, but has also been used to assess specific areas of worry (McCaul & Goetz,

2008). The IES-R, as used in the current study, was modified to assess how distressed or bothered participants were by thoughts and feelings about potentially finding they were unable to become pregnant at a later date. This measure was found to have good internal consistency reliability ($\alpha = .82$) and was also found to have a small but meaningful correlation with the Penn State Worry Questionnaire ($r = .21$). Means on this measure were found to be in the very low end of the possible range.

The FSDS-F was based on the Fertility Specific Distress Scale which Jacob, McQuillan, and Griel (2006) used to assess emotional responses to infertility and fertility barriers with two samples of women, one with women experiencing infertility at the time of the study and one with women who had experienced infertility in the past. The current study moved that time orientation to the future, asking participants to imagine how distressed they thought they would be if faced with infertility. Like the other two future fertility measures used in the current study, this measure was also found to have good internal consistency reliability ($\alpha = .87$) and a small but meaningful correlation with the Penn State Worry Questionnaire ($r = .22$). Means on this measure were found to be in the low to medium end of the possible range.

Overall, the three measures of future fertility worry used in this study produced remarkably consistent results and appear to be functioning as designed.

Evaluation of open-ended question

Responses to the open-ended question “Could you say more about the personal, work, or other life circumstances that are most important to your NOT trying to get pregnant now?” at the end of the survey provided useful information about what participants saw as the barriers to their being ready to get pregnant. The most common responses (*Want to be financially stable first, Want to establish career, In school, Want to be married first, Not in relationship*), all represented

factors thought to be related to women's decisions to have children later in life. As discussed in the Literature Review, little research has been done to assess specifically why women are having children later, but the research that has been conducted has identified issues such as women's increased role in the workforce, continued occurrence of the majority of childcare responsibilities falling on women, lack of social support in the form of child care and maternity leave, and the likelihood that leaving the workforce for a period of time to raise a child will result in decreased wages over the long-term (Anderson, Binder, & Krause, 2002, Lesthaeghe & Neidert, 2006, Misra, Moller, & Budig, 2007; Slaughter, 2012). All of these known issues are reflected in the qualitative responses offered by the current study's participants.

Limitations

Despite success establishing significant results in the current study, there are several methodological limitations to the study.

First, the pool of participants recruited online lacked diversity on several dimensions, including race/ethnicity, sexual orientation, and highest level of education completed. Some of this lack of diversity may have been related to the nature of sample: a population of women ages 25 to 40 years of age who have never been pregnant but have not decided against ever becoming pregnant. Additionally, the online recruitment process using social media networks may have over-sampled women who have regular access to computers and who participate in social media, and women who were motivated to take a survey about fertility by their personal interest in the topic. The sample also lacked age diversity within the desired age range, with fewer women over 35 participating. This, too, is a function of the exclusion criteria: at higher ages within the sample range it was expected that fewer women would fit the criteria of never having been pregnant and not having decided they never wanted to be pregnant. Conversely, though the survey was

carefully advertised as an assessment of “thoughts and feelings about future fertility” and not, for example, a study on “baby panic,” the nature of the survey may have attracted participants with strong feelings about fertility which could have skewed results.

The structure of the survey, length, and interface problems may have prevented some women from completing the survey. With the majority of demographic questions appearing at the end of the survey, these basic data were not provided by participants who did not follow through to the very end of the survey. Additionally, because the survey software did not offer a way to directly address participants who did not meet exclusion criteria, some participants may have been confused about why the survey ended abruptly after the initial exclusion criteria questions. Every effort was made to explain why the survey ended for some participants, but the abrupt cut-off may have resulted in some participants attempting the survey from the beginning again, using the same information that did not meet criteria, and increased the number of participants who needed to be excluded from the analyses. This issue may account for some of the 325 participants excluded at this point in the study, but as identifying information was not collected from participants, there is no way to flag duplicate failed attempts at participation.

Another methodological concern that may have limited the study was the use of adapted measures to assess future fertility worry. As discussed above, no measures of future fertility worry existed in literature, so existing worry measures were adapted for this study. Overall, these measures appear to have sound psychometrics: good internal consistency reliability and both construct and discriminant validity. However, there is a need for additional psychometric evidence regarding these new measures.

A specific issue arose with the IES-R measure used in this study, which was changed to assess how often participants were “distressed or bothered” by thoughts about potentially not

being able to get pregnant when ready to try, rather than frequency of thoughts about a particular trauma. This alteration may have fundamentally changed the phenomenon being measured. In fact, the mean scores on this measure were noticeably lower than those on the other two future fertility worry measures (when comparing where means fell in the measures' possible ranges), perhaps meaning that the items on the measure failed to match experiences of the participants. However, originally, the IES-R was intended to measure reactions to severe trauma rather than normative worry (Weiss and Marmar, 1997). This may have translated into the IES-R in the current study assessing a more severe level of worry in participants than the other two future fertility worry measures, evidenced by the fact that only the IES-R predicted depression symptoms and anxiety symptoms. The IES-R likely measured something slightly different than other two fertility worry measures, potentially something more severe, notably a useful dimension to understand.

Another measurement limitation is related to the Fertility Awareness Survey (FAS) measured participant knowledge of fertility issues in a *true/false* fashion. Though this survey had been used in previous studies, the level of knowledge it measures has not been assessed. If the survey was “too easy” or “too hard” for the participant sample, it may not have accurately translated into an assessment of knowledge related to the fertility concerns at hand. Survey participants on average got about 63% correct on the *true/false* survey, but it is not known if the questions used represented precisely the type of knowledge that would transform a woman's thinking about fertility in a way that could cause her to worry more.

Finally, as the survey is not experimental in nature, there is no way to assess causation of phenomena studied. Rather, all findings represent correlations.

Implications

The implications of the current study fall into four main categories: general interest in the topic, rates of future fertility worry in the population, predictors of future fertility worry, and the impact of future fertility worry on anxiety and depression symptoms.

Notably, the survey topic appears to have been of great interest to the population being studied. With basic, free, social media tactics used to publicize and recruit for the study, over 1,000 people attempted to take the survey in a period of less than a month. Many participants, who provided comments in the two short open-ended questions at the end of the survey, noted that they were glad to have been asked about future fertility worry and felt it was an important topic. Keeping in mind that no previous research has been conducted on this specific topic, the response to the survey indicates a high level of interest among women in the intended population.

Looking at the mean scores on the three future fertility measures, we see that women in the study sample *do* experience worry about future fertility. This, on its own, is a contribution to the extant literature. Furthermore, we see that although women experience this worry, they are not experiencing it at exceptionally high levels, even in a population of women who chose to participate in a survey about it. This result can be explored in through two different viewpoints on women's future fertility. The first suggests, based on pop culture portrayals, that women who have never been pregnant, are "panicking" about their fertility. The means established in this study suggest that, though women are concerned, the level of concern is moderate. Second, knowing that women are waiting longer and longer to have children, one could assume that women are not worried enough about their fertility or do not know enough to be worried. Given the means in this study on both the FAS (average score of about 10 out of 16 on a fertility quiz)

and the future fertility worry measures, we know the women surveyed are informed about fertility and are concerned. The low-to-medium scores on the future fertility measures also may reflect the ambivalence some researchers have noted women experience in relation to the pros and cons of having children (Shelton & Johnson, 2006; Wager, 2000).

Knowing the relative level of worry among women is important for a number of reasons. First, attempts to characterize nulliparous women as obsessed with getting pregnant (e.g. “walking uterus,” “baby-daddy hunting,” “that’s her ovaries talking”) should be discarded as wrong and potentially offensive, especially given evidence that women are relatively well-informed about fertility and deal with a complex set of concerns on the topic. Second, health care providers who discuss, with their nulliparous patients, the potential risks of waiting to have children, should keep in mind that many women are concerned at a range of levels about the ramifications of waiting, even if they do not demonstrate immediate intentions to change behaviors. Finally, nulliparous women themselves should know they are not unusual if they experience worry about future fertility at a moderate level.

Looking at this study’s findings about what predicts future fertility worry, we see that the variance in future fertility worry is most closely related to Importance of Motherhood, predicting up to 31% of the variance. This fits with conclusions made by Greil, Shreffler et al. (2011) on studies of women *experiencing* infertility. In their study, many of the characteristics that differentiated more distressed women from less distressed women had to do with the meaning of infertility, and that greater intentionality to become pregnant seemed to be related to greater distress about not having a child. The current study matches this finding, but in a population not yet experiencing infertility, rather reflecting on the possibility of experiencing it. At the same time, we see that age of participant was only a minimal predictor of future fertility worry,

predicting up to 2% of the variance. This finding was, on its face, surprising, as conventional wisdom suggested that older nulliparous women would be more concerned about their fertility than younger nulliparous women. But when viewed in the context of Griel, Shreffler, et al.'s findings, and this study's finding of Importance of Motherhood as a strong predictor, we see that factors around the identity, intention, and value of motherhood logically provide better prediction of future fertility worry than age. That said, we do see an interaction between age and Importance of Motherhood in predicting worry beyond their individual contributions, indicating that as age increases, the effect of Importance of Motherhood is stronger. Knowing that IOM tends to influence future fertility worry more than age could be particularly useful to women who find themselves worried about their fertility, as well as the people who care about them. If women take a cue from popular culture and assess their worry about future fertility to be a result of their age, they may miss attributing their worry to the positive feelings they have about wanting to be a mother someday. Similarly, women who feel they should be more worried about their fertility than they are, based on their age, could be reassured that biological motherhood is not the same imperative for every woman and that their level of worry makes sense given their personal values.

Finally, looking at the prediction of depression symptoms and anxiety symptoms from future fertility worry, we see worry predicts between 5% and 7% of the variance. This supports the original theoretical conceptualization of future fertility worry as normative "background stressor" experienced by many women, rather than an acute or chronic stressor. Future fertility worry appears to contribute to symptoms of distress, but not at the level of chronic stressors like ongoing domestic violence or acute stressors like trauma. However, again, it should be noted that

causation has not been established by this study, and it is possible that experiences of depression and anxiety symptoms influence experiences of future fertility worry.

Reaching back to the theory underpinning this study, Control Theory, which suggests that people experience repetitive thought when their current circumstances do not match their ideas of where they think they should be (reference values) AND they are not able to easily remedy the discrepancy (Watkins, 2008), this study's findings combine to flesh-out an overall picture of what may be occurring with women who worry about their future fertility. High scores on the IOM scale indicate a woman's ideas about where she would like to be in her life, which are discrepant from her identity as nulliparous and between the ages of 25 and 40 years. From previous studies (e.g., Benzies et al., 2006, Montgomery et al., 2010; Wilson and Koo, 2006) and from responses to this study's open-ended question, we know that women's reasons for not feeling ready to become pregnant are complicated, over-lapping, and sometimes difficult to change. This suggests that worry about future fertility (repetitive thought) arises from the combination of a woman being out-of-sync with her reference value for where she thinks she should be, and unable to immediately change her circumstances, which follows discreetly from the premises of Control Theory. Furthermore, we see that for some women, future fertility worry (repetitive thought) is related to symptoms of distress (anxiety and depression symptoms), also predicted by Control Theory.

Control theory also includes descriptions of different types of repetitive thought (RT) in relation to reference values (Watkins, 2008). Repetitive thoughts may have positive or negative valence, based on content, affect, and situation. In the current study, statements provided by participants to the open-ended question primarily included thoughts with negative valence, like worries about not being financially able to provide for a child by a desired age. Repetitive

thought, conceptualized as a form of an “action” to resolve a discrepancy between perceived reality and a reference value, can be described as either constructive or unconstructive. For example, if a woman’s repetitive thought about her future fertility drives her to solve a potential problem, like getting a job to establish financial security, this would be considered constructive. Alternately, worry about finding a partner that carries a negative affect and does not drive an individual to take proactive steps, may be considered unconstructive. Finally, RT occurs at different levels of complexity, or *construal*, which may relate to the constructiveness of the thoughts. For example, some participants described concrete goals they wanted to achieve before becoming pregnant, such as traveling and finishing school, which could be considered low in complexity. Other participants (and sometimes the same participant within the same two to three sentence response), described higher complexity thoughts, like wanting to find an ideal, supportive partner with whom to have children. These three dimensions of RTs, valence, constructiveness, and construal, come together to influence how effective an individual’s RTs are to helping him or her resolve their conceptual discrepancies. From the comments offered by participants in the current study, we see a range of potential RTs related to future fertility, and evidence of their valence, constructiveness, and construal, in relation to distress and worry outcomes.

Control theory can be expanded to describe how people learn, over their life spans, what tactics are most useful for achieving goals (Heckhausen, 2002). This developmental approach defines two types of control: *primary control*, consisting of behaviors aimed at changing the outside world to better fit the needs and desires of the individual; and *secondary control*, which manages internal processes in an effort to focus and protect motivational resources needed for primary control. Additionally, Heckhausen suggests that individuals may hit a “developmental

deadline” for achieving certain goals, which, once hit, changes a person’s perspective on the goal. Considering that age did not predict worry about future fertility at the magnitude expected, it can be extrapolated that as women approach 40 years of age, some may “hit” a developmental deadline related to being pregnant which could actually lessen their focus on achieving that particular goal. If this were the case, one could imagine a woman essentially switching from a primary control strategy – line up resources to make becoming pregnant possible – to a secondary control strategy – shift thinking internally to lessen the personal imperative to become pregnant.

Future Directions

This study suggests a variety of future research directions. Most importantly, this study should be followed up by a qualitative assessment of the experiences of women 25 to 40 years of age who have never been pregnant but think they might like to have a baby someday. The current study successfully established basic information about how much women worry about their future fertility and what factors relate to it. But the nuance of how women experience this worry, what they think about it, and how it relates to other established factors like ambivalence and childlessness cannot be fully understood through survey methods.

A qualitative study would help remedy many of the limits of the current study and could explore issues in greater depth. For example, for simplicity, the study excluded women who had ever had a miscarriage or abortion because they likely knew more about their fertility than nulliparous women. However, it is likely that women who have been pregnant before do have similar worries about future fertility. Also, a qualitative study could intentionally include older women and lesbian, gay, bisexual, and transgender (LGBT) women to specifically examine the issues they face.

Future studies should further examine the future fertility worry measures used in this study to evaluate factor structure and to assess reliability and validity in a variety of populations. Given the favorable findings in the current study around the reliability and validity of these measures, it is likely they could have ongoing utility. In particular, a version might be developed for use by practitioners to assess both level of knowledge and level of worry in patient populations.

Future studies should also consider examining the questions posed in this study through a longitudinal framework. It would be useful to know more about how levels of worry and ideas about motherhood change in women over time, how associations between variables change over time, how women work through stated barriers to achieve pregnancy if desired, and how women reconcile decisions to have, or not have, biological children. Additionally, it would be interesting to follow up on women's projections of when they plan to become pregnant, and assess how their ideas about this also change over time.

As a first attempt at understanding the issue of future fertility worry, this study intentionally left out other relevant questions that arose during study development. For example, a social psychologist might be interested in how thought suppression functions in women who worry about their future fertility but possess few options for changing the factors that prevent them from feeling ready to become pregnant. Career issues are another aspect of the lives of nulliparous women that could be examined in relation to worries about fertility, as are relationship issues, political and social concerns, and existential questioning.

Conclusion

This study of future fertility worry among nulliparous women ages 25 to 40 years of age, showed that women worry about their fertility at a moderate level, values around motherhood are

the best predictor of future fertility worry (better than age), and future fertility worry predicts only a small amount of variance in symptoms of distress.

Overall, this study breaks new ground by examining an issue of importance to a large population of women, and by contributing rigorous research findings on issues long speculated about in popular culture.

References

- Adashi, E. Y., Cohen, J., Hamberger, L., Jones, H. W., Jr, De Kretser, D. M., Lunenfeld, B., Rosenwaks, Z., et al. (2000). Public perception on infertility and its treatment: an international survey. The Bertarelli Foundation Scientific Board. *Human Reproduction (Oxford, England)*, 15, 330.
- Aiken, L. S. & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park: Sage.
- Anderson, D. J., Binder, M., & Krause, K. (2002, March 10). The motherhood wage penalty: Which mothers pay it and why? *American Economic Review*, 22, 354–358. doi:10.1257/000282802320191606
- Balash, J. (2010). Ageing and infertility: an overview. *Gynecological Endocrinology*, 26(12), 855–860. doi:10.3109/09513590.2010.501889
- Balash, J. & Gratacós, E. (2011). Delayed childbearing: Effects on fertility and the outcome of pregnancy. *Fetal Diagnosis and Therapy*, 29, 263–273. doi:10.1159/000323142
- Balash, J. & Gratacós, E. (2012). Delayed childbearing. *Current Opinion in Obstetrics and Gynecology*, 24, 187–193. doi:10.1097/GCO.0b013e3283517908
- Bartlett, J. (1996). *Will you be mother: Women who choose to say no*. London: Virago Press.
- Benzies, K. M. (2008). Advanced maternal age: Are decisions about the timing of child-bearing a failure to understand the risks? *Canadian Medical Association Journal*, 178, 183–184. doi:10.1503/cmaj.071577
- Benzies, K., Tough, S., Tofflemire, K., Frick, C., Faber, A., & Newburn-Cook, C. (2006). Factors influencing women's decisions about timing of motherhood. *Journal of Obstetric, Gynecologic, Neonatal Nursing*, 35, 625–633. doi:10.1111/j.1552-6909.2006.00079.x
- Billari, F. C., Goisis, A., Liefbroer, A. C., Settersten, R. A., Aassve, A., Hagestad, G., & Speder, Z. (2011). Social age deadlines for the childbearing of women and men. *Human Reproduction*, 26, 616–622. doi:10.1093/humrep/deq360
- Blake, D., Smith, D., Bargiacchi, A., France, M., & Gudex, G. (1997). Fertility awareness in women attending a fertility clinic. *Australian and New Zealand Journal of Obstetrics and Gynaecology*, 37, 350–352. doi:10.1111/j.1479-828X.1997.tb02429.x
- Boncompagni, T. (2012, July 8). Are you as fertile as you look? *The New York Times*, 1–4.
- Borkovec, T. D., Ray, W. J., & Stober, J. (1998). Worry: A cognitive phenomenon intimately

linked to affective, physiological, and interpersonal behavioral processes. *Cognitive Therapy and Research*, 22, 561–576. doi:10.1023/A:1018790003416

Brooks, D. (2012, March 12). The fertility implosion. *The New York Times*, pp. 1–3. New York.

Brosschot, J. F., Gerin, W., & Thayer, J. F. (2006). The perseverative cognition hypothesis: A review of worry, prolonged stress-related physiological activation, and health. *Journal of Psychosomatic Research*, 60, 113–124. doi:10.1016/j.jpsychores.2005.06.074

Campbell-Sills, L., Norman, S. B., Craske, M. G., Sullivan, G., Lang, A. J., Chavira, D. A., Bystritsky, A., et al. (2009). Validation of a brief measure of anxiety-related severity and impairment: The Overall Anxiety Severity and Impairment Scale (OASIS). *Journal of Affective Disorders*, 112, 92–101. doi:10.1016/j.jad.2008.03.014

Clark, L. A. & Watson, D. (1991). Tripartite model of anxiety and depression: psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology*, 100, 316. doi:10.1037/0021-843X.100.3.316

Cleary-Goldman, J., Malone, F. D., Vidaver, J., Ball, R. H., Nyberg, D. A., Comstock, C. H., Saade, G. R., et al. (2005). Impact of maternal age on obstetric outcome. *Obstetrics & Gynecology*, 105, 983–990. doi:10.1097/01.AOG.0000158118.75532.51

Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112, 155. doi: 10.1037/0033-2909.112.1.155

Cooke, A., Mills, T. A., & Lavender, T. (2012). Advanced maternal age: Delayed childbearing is rarely a conscious choice: A qualitative study of women's views and experiences. *International Journal of Nursing Studies*, 49, 30–39. doi:10.1016/j.ijnurstu.2011.07.013

Daniluk, J. C., Koert, A. E., & Cheung, A. (2012). Childless women's knowledge of fertility and assisted human reproduction: identifying the gaps. *Fertility and Sterility*, 97, 420–426. doi:10.1016/j.fertnstert.2011.11.046

D'Angelo, D. V., Gilbert, B. C., Rochat, J. S., Santelli, J. S., & Herold, J. M. (2004). Differences between mistimed and unwanted pregnancies among women who have live births. *Perspectives on Sexual and Reproductive Health*, 36. doi:10.1363/3619204

Davey, G. C. L., Jubb, M., & Cameron, C. (1996). Catastrophic worrying as a function of changes in problem-solving confidence. *Cognitive Therapy and Research*, 20, 333–344. doi:10.1007/BF02228037

Dunson, D. B., Baird, D. D., & Colombo, B. (2004). Increased infertility with age in men and women. *Obstetrics & Gynecology* 103, 51–56. doi:10.1097/01.AOG.0000100153.24061.45

Dunson, D. B., Colombo, B., & Baird, D. D. (2002). Changes with age in the level and duration of fertility in the menstrual cycle. *Human Reproduction*, 17, 1399–1403.

doi:10.1093/humrep/17.5.1399

- Freeston, M. H., Ladouceur, R., Thibodeau, N., & Gagnon, F. (1992). Cognitive intrusions in a non-clinical population. *Behaviour Research and Therapy*, 30, 263–271. doi:10.1016/0005-7967(92)90072-O
- Eysenbach, G. & Wyatt, J. (2002). Using the internet for surveys and health research. *Journal of Medical Internet Research*, 4, e13. doi:10.2196/jmir.4.2.e13
- Fresco, D. M., Heimberg, R. G., Mennin, D. S., & Turk, C. L. (2002). Confirmatory factor analysis of the Penn State Worry Questionnaire. *Behaviour Research and Therapy*, 40, 313–323. doi:10.1016/S0005-7967(00)00113-3
- Friedman, H. S., & Silver, R. C. (Eds.). (2008). *Foundations of health psychology*. New York, NY: Oxford University Press.
- Gillespie, R. (2000). When no means no: Disbelief, disregard and deviance as discourses of voluntary childlessness. *Women's Studies International Forum*, 23, 223–234. doi:10.1016/S0277-5395(00)00076-5
- Gillespie, R. (2003). Childfree and feminine: Understanding the gender identity of voluntarily childless women. *Gender & Society*, 17, 122–136. doi:10.1177/0891243202238982
- Gramling, R., Anthony, D., Frierson, G., & Bowen, D. (2007). The cancer worry chart: a single-item screening measure of worry about developing breast cancer. *Psycho-Oncology*, 16, 593–597. doi:10.1002/pon.1128
- Greil, A. L., McQuillan, J., Lowry, M., & Shreffler, K. M. (2011). Infertility treatment and fertility-specific distress: A longitudinal analysis of a population-based sample of U.S. women. *Social Science & Medicine*, 73, 87–94. doi:10.1016/j.socscimed.2011.04.023
- Greil, A. L., Shreffler, K. M., Schmidt, L., & McQuillan, J. (2011). Variation in distress among women with infertility: evidence from a population-based sample. *Human Reproduction*, 26, 2101–2112. doi:10.1093/humrep/der148
- Greil, A. L., Slauson-Blevins, K., & McQuillan, J. (2010). The experience of infertility: A review of recent literature. *Sociology of Health & Illness*, 32, 140–162. doi:10.1111/j.1467-9566.2009.01213.x
- Gourounti, K., Anagnostopoulos, F., & Vaslamatzis, G. (2011). The relation of psychological stress to pregnancy outcome among women undergoing in-vitro fertilization and intracytoplasmic sperm injection. *Women & Health*, 51, 321–339. doi:10.1080/03630242.2011.574791
- Hazlett-Stevens, H. (2004). Factor structure of the Penn State Worry Questionnaire: Examination of a method factor. *Assessment*, 11, 361–370. doi:10.1177/1073191104269872

- Heckhausen, J. (2002). Developmental regulation of life-course transitional: A control theory approach. In L. Pulkkinen & A. Caspi (Eds.), *Paths to successful development: Personality in the life course* (pp. 257–280). Cambridge University Press.
- Hirshfeld-Cytron, J. I., Grobman, W. A., & Milad, M. P. (2012). Fertility preservation for social indications: a cost-based decision analysis. *Fertility and Sterility*, *97*, 665–670. doi:10.1016/j.fertnstert.2011.12.029
- Horowitz, M., Wilner, N., & Alvarez, W. (1979). Impact of Event Scale: A measure of subjective stress. *Psychosomatic Medicine*, *41*, 209–218.
- Jensen, J. D., Bernat, J. K., Davis, L. A., & Yale, R. (2010). Dispositional cancer worry: convergent, divergent, and predictive validity of existing scales. *Journal of Psychosocial Oncology*, *28*, 470–489. doi:10.1080/07347332.2010.498459
- Jacob, M. C., McQuillan, J., & Greil, A. L. (2006). Psychological distress by type of fertility barrier. *Human Reproduction*, *22*, 885–894. doi:10.1093/humrep/del452
- Lampi, E. (2011). What do friends and the media tell us? How different information channels affect women's risk perceptions of age-related female infertility. *Journal of Risk Research*, *14*, 365–380. doi:10.1080/13669877.2010.541560
- Lampic, C. (2005). Fertility awareness, intentions concerning childbearing, and attitudes towards parenthood among female and male academics. *Human Reproduction*, *21*, 558–564. doi:10.1093/humrep/dei367
- Leridon, H. (2004). Can assisted reproduction technology compensate for the natural decline in fertility with age? A model assessment. *Human Reproduction*, *19*, 1548–1553. doi:10.1093/humrep/deh304
- Lesthaeghe, R. J. & Neidert, L. (2006). The second demographic transition in the United States: Exception or textbook example? *Population and Development Review*, *32*, 669–698. doi:10.1111/j.1728-4457.2006.00146.x
- Luke, B. & Brown, M. B. (2007). Elevated risks of pregnancy complications and adverse outcomes with increasing maternal age. *Human Reproduction*, *22*, 1264–1272. doi:10.1093/humrep/del522
- Martin, J., Hamilton, B., Sutton, P., Ventura, S., Menacker, F., & Kirmeyer, S. (2011). Births: final data for 2006. Hyattsville, MD: US Department of Health and Human Services, CDC. *National Center for Health Statistics*, 1–72.
- Martin, L. J. (2010). Anticipating infertility: Egg freezing, genetic preservation, and risk. *Gender & Society*, *24*, 526–545. doi:10.1177/0891243210377172

- Martin, L. L. & Tesser, A. (1996). Some ruminative thoughts. In R. S. Wyer (Ed.), *Ruminative thoughts. Advances in social cognition* (Vol. 9, pp. 1–47). Hillsdale: Erlbaum.
- Mathews, T. J. & Hamilton, B. E. (2009). Delayed childbearing: More women are having their first child later in life. *NCHS Data Brief*, 1–8.
- Matthiesen, S. M. S., Frederiksen, Y., Ingerslev, H. J., & Zachariae, R. (2011). Stress, distress and outcome of assisted reproductive technology (ART): a meta-analysis. *Human Reproduction*, 26, 2763–2776. doi:10.1093/humrep/der246
- McCaul, K. D. & Goetz, P. W. (2008). Worry. (National Cancer Institute, Ed.) *Health Behavior Constructs: Theory, Measurement, & Research*. Retrieved October 5, 2012, from <http://dccps.cancer.gov/brp/constructs/worry/>
- McCaul, K. D., Mullens, A. B., Romanek, K. M., Erickson, S. C., & Gatheridge, B. J. (2007). The motivational effects of thinking and worrying about the effects of smoking cigarettes. *Cognition & Emotion*, 21, 1780–1798. doi:10.1080/02699930701442840
- McCaul, K. D., Schroeder, D. M., & Reid, P. A. (1996). Breast cancer worry and screening: some prospective data. *Health Psychology*, 15, 430. doi:10.1037/0278-6133.15.6.430
- McLaughlin, K. A., Borkovec, T. D., & Sibrava, N. J. (2007). The effects of worry and rumination on affect states and cognitive activity. *Behavior Therapy*, 38, 23–38. doi:10.1016/j.beth.2006.03.003
- McQuillan, J., Greil, A. L., Shreffler, K. M., & Tichenor, V. (2008). The importance of motherhood among women in the contemporary United States. *Gender & Society*, 22, 477–496. doi:10.1177/0891243208319359
- Menken, J., Trussell, J., & Larsen, U. (1986). Age and infertility. *Science*, 233, 1389–1394. doi:10.1126/science.3755843
- Meyer, S. M., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy*, 28, 487–495. doi:10.1016/0005-7967(90)90135-6
- Mirowsky, J. (2005). Age at first birth, health, and mortality. *Journal of Health and Social Behavior*, 46, 32–50. doi:10.1177/002214650504600104
- Misra, J., Moller, S., & Budig, M. J. (2007). Work family policies and poverty for partnered and single women in Europe and North America. *Gender & Society*, 21, 804–827. doi:10.1177/0891243207308445
- Montgomery, K. S., Green, T., Maher, B., Tipton, K., O'Bannon, C., Murphy, T., McCurry, T., et al. (2010). Women's desire for pregnancy. *Journal of Perinatal Education*, 19, 53–61. doi:10.1624/105812410X514404

- Mosher, W. D. & Bachrach, C. A. (1996). Understanding US fertility: continuity and change in the National Survey of Family Growth, 1988-1995. *Family Planning Perspectives*, 4–12. doi:10.2307/2135956
- Norman, S. B., Campbell-Sills, L., Hitchcock, C. A., Sullivan, S., Rochlin, A., Wilkins, K. C., & Stein, M. B. (2011). Psychometrics of a brief measure of anxiety to detect severity and impairment: The overall anxiety severity and impairment scale (OASIS). *Journal of Psychiatric Research*, 45, 262–268. doi:10.1016/j.jpsychires.2010.06.011
- Norman, S. B., Hami Cissell, S., Means-Christensen, A. J., & Stein, M. B. (2006). Development and validation of an Overall Anxiety Severity And Impairment Scale (OASIS). *Depression and Anxiety*, 23, 245–249. doi:10.1002/da.20182
- Orme, J. G., Reis, J., & Herz, E. J. (1986). Factorial and discriminant validity of the center for epidemiological studies depression (CES-D) scale. *Journal of Clinical Psychology*, 42, 28–33. doi:10.1097-4679(198601)42:1<28::AID-JCLP2270420104>3.0.CO;2-T
- Papageorgiou, C. & Wells, A. (2002). Positive beliefs about depressive rumination: Development and preliminary validation of a self-report scale. *Behavior Therapy*, 32, 13–26. doi:10.1016/S0005-7894(01)80041-1
- Pinquart, M., Stotzka, C., & Silbereisen, R. K. (2010). Ambivalence in decisions about childbearing. *Journal of Reproductive and Infant Psychology*, 28, 212–220. doi:10.1080/02646830903295034
- Radloff, L. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1, 385. doi:10.1177/014662167700100306
- Restauri, D. (2012, July 25). How millennial women and their eggs can have it all. *Forbes*, 1–4.
- Rowe-Finkbeiner, K. (2002, Summer). Oops, I forgot to have kids. *Bust*, 44–49.
- Russo, N. F. (1976). The motherhood mandate. *Journal of Social Issues*, 32, 143–153. doi:10.1111/j.1540-4560.1976.tb02603.x
- Shkedi-Rafid, S. & Hashiloni-Dolev, Y. (2011). Egg freezing for age-related fertility decline: Preventive medicine or a further medicalization of reproduction? Analyzing the new Israeli policy. *Fertility and Sterility*, 96, 291–294. doi:10.1016/j.fertnstert.2011.06.024
- Segerstrom, S. C., Tsao, J. C. I., Alden, L. E., & Craske, M. G. (2000). Worry and rumination: Repetitive thought as a concomitant and predictor of negative mood. *Cognitive Therapy and Research*, 24, 671–688. doi:10.1023/A:1005587311498
- Sevon, E. (2005). Timing Motherhood: Experiencing and narrating the choice to become a mother. *Feminism & Psychology*, 15, 461–482. doi:10.1177/0959-353505057619

- Shacham, S. (1983). A shortened version of the Profile of Mood States. *Journal of Personality Assessment*, 47, 305–306. doi:10.1207/s15327752jpa4703_14
- Shaver, P. R. (1990). Measures of Depression and Loneliness. In J. P. Robinson, P. R. Shaver, & L. S. Wrightsman (Eds.), *Measures of Personality and Social Psychological Attitudes*. (pp. 195–290). London: Academic Press.
- Shelton, N. & Johnson, S. (2006). “I think motherhood for me was a bit like a double-edged sword”: The narratives of older mothers. *Journal of Community & Applied Social Psychology*, 16, 316–330. doi:10.1002/casp.867
- Slaughter, A. M. (2012, July 16). Why Women Still Can’t Have It All. *The Atlantic Magazine*. Retrieved September 16, 2012, from <http://www.theatlantic.com/magazine/archive/2012/07/why-women-still-cant-have-it-all/309020/>
- Smith, S., Pfeifer, S. M., & Collins, J. A. (2003). Diagnosis and management of female infertility. *JAMA: The Journal of the American Medical Association*, 290, 1767–1770. doi:10.1001/jama.290.13.1767
- Stanford, J. B., Hobbs, R., Jameson, P., DeWitt, M. J., & Fischer, R. C. (2000). Defining dimensions of pregnancy intendedness. *Maternal and Child Health Journal*, 4, 183–189. doi:10.1023/A:1009575514205
- Sundin, E. C. & Horowitz, M. J. (2002). Impact of Event Scale: Psychometric properties. *The British Journal of Psychiatry*, 180, 205–209. doi:10.1192/bjp.180.3.205
- Tabachnick, B. G. & Fidell, L. S. (2007). *Using multivariate statistics (5th ed.)*. Boston, MA: Pearson Education.
- Thomas, J. L., Jones, G. N., Scarinci, I. C., Mehan, D. J., & Brantley, P. J. (2001). The utility of the CES-D as a depression screening measure among low-income women attending primary care clinics. *International Journal of Psychiatry in Medicine*, 31, 25–40. doi:10.2190/FUFR-PK9F-6U10-JXRK
- Ventura, S. J., Curtin, S. C., Abma, J. C., & Henshaw, S. K. (2012). Estimated pregnancy rates and rates of pregnancy outcomes for the United States, 1990–2008. *National Vital Statistics Reports*, 60, 1–22.
- Wager, M. (2000). Childless by choice? Ambivalence and the female identity. *Gender & Society*, 10, 389–395. doi:10.1177/0959353500010003010
- Watkins, E. R. (2008). Constructive and unconstructive repetitive thought. *Psychological Bulletin*, 134, 163–206. doi:10.1037/0033-2909.134.2.163

- Watkins, E., Moulds, M., & Mackintosh, B. (2005). Comparisons between rumination and worry in a non-clinical population. *Behaviour Research and Therapy*, 43, 1577–1585.
doi:10.1016/j.brat.2004.11.008
- Weiss, D. S., & Marmar, C. R. (1997). The Impact of event Scale—Revised. In J. P. Wilson & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 399-411). New York: Guilford Press.
- Weiss, D. S. (2004). The Impact of Event Scale—Revised. In J. P. Wilson & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 168-189). New York: Guilford Press.
- Weissman, M. M. (1977). Assessing depressive symptoms in five psychiatric populations: A validation study. *American Journal of Epidemiology*, 106, 203.
- Wilson, E. K. & Koo, H. P. (2006). The relationship context: Its effects on low- income women's desire for a baby. *Journal of Marriage and Family*, 68, 1326–1340.
doi:10.1111/j.1741-3737.2006.00331.x
- Wu, Z. & MacNeill, L. (2002). Education, work, and childbearing after age 30. *Journal of Comparative Family Studies*, 33, 191–214.
- World Health Organization. (1991). Infertility: A tabulation of available data on prevalence of primary and secondary infertility. *Programme on Maternal and Child Health and Family Planning, Division of Family Health*.

Appendix A.

Importance of Motherhood

	1 Strongly agree	2	3	4 Strongly disagree
Having children is important to my feeling complete as a woman	1	2	3	4
I always thought I would be a parent	1	2	3	4
I think my life will be more fulfilling with children	1	2	3	4
It is important for me to have children	1	2	3	4
	1 Very important	2	3	4 Not important
How important is raising children in your life?	1	2	3	4

Appendix B.

3-Item Future Fertility Worry Questionnaire

How often do you worry about whether you will be able to get pregnant when you're ready to try?	1 Never	2	3	4	5 Always
On a scale from 1 to 5, how would you rate how worried you are about whether you will be able to get pregnant when you are ready to try	1 Not at all	2	3	4	5 Extremely
Thinking about whether I'll be able to get pregnant when I'm ready to try makes me feel upset and frightened	1 Disagree	2	3	4	5 Strongly agree

Appendix C.

Impact of Event Scale – Revised, Intrusion Subscale

INSTRUCTIONS: For some women, concerns about being able to get pregnant when they are ready to try are very stressful. DURING THE PAST SEVEN DAYS, how were YOU distressed or bothered by thoughts and feelings about potentially finding you are unable to get pregnant at some point in the future?

	0 Not at all	1 A little bit	2 Moderately	3 Quite a bit	4 Extremely
*Any reminder brought back feelings about it.	0	1	2	3	4
I had trouble staying asleep.	0	1	2	3	4
*Other things kept making me think about it.	0	1	2	3	4
I felt irritable and angry.	0	1	2	3	4
I avoided letting myself get upset when I thought about it or was reminded of it.	0	1	2	3	4
*I thought about it when I didn't mean to.	0	1	2	3	4
I felt as if it hadn't happened or wasn't real.	0	1	2	3	4
I stayed away from reminders of it.	0	1	2	3	4
*Pictures about it popped into my mind.	0	1	2	3	4
I was jumpy and easily startled.	0	1	2	3	4
I was aware that I still had a lot of feelings about it, but I didn't deal with them.	0	1	2	3	4
My feelings about it were kind of numb.	0	1	2	3	4
I found myself acting or feeling like I was back at that time.	0	1	2	3	4
*I had trouble falling asleep or staying asleep because pictures or thoughts of it came to my mind.	0	1	2	3	4
*I had waves of strong feelings about it.	0	1	2	3	4
I tried to remove it from my memory.	0	1	2	3	4
I had trouble concentrating.	0	1	2	3	4

	0 Not at all	1 A little bit	2 Moderately	3 Quite a bit	4 Extremely
Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart.	0	1	2	3	4
*I had dreams about it.	0	1	2	3	4
I felt watchful and on-guard.	0	1	2	3	4
I tried not to talk about it.	0	1	2	3	4

Appendix D.

Fertility Specific Distress Scale -- Future

Imagine a time in the future when you are trying to get pregnant. Imagine you find you are unable to become pregnant because of a fertility problem of yours (not your partner's). Rate these statements based on how you **THINK** you would feel in this situation.

	Strongly disagree	Disagree	Agree	Strongly agree
I would feel cheated by life.	0	1	2	3
I would feel guilty about somehow causing the fertility problems.	0	1	2	3
I would feel seriously depressed about it.	0	1	2	3
I would feel like a failure as a woman.	0	1	2	3

Appendix E.

Penn State Worry Questionnaire

	0 Not at all typical of me	1	2	3	4 Very typical of me
If I do not have enough time to do everything, I do not worry about it.	0	1	2	3	4
My worries overwhelm me.	0	1	2	3	4
I do not tend to worry about things.	0	1	2	3	4
Many situations make me worry.	0	1	2	3	4
I know I should not worry about things, but I just cannot help it.	0	1	2	3	4
When I am under pressure, I worry a lot.	0	1	2	3	4
I am always worrying about something.	0	1	2	3	4
I find it easy to dismiss worrisome thoughts.	0	1	2	3	4
As soon as I finish one task, I start to worry about everything else I have to do.	0	1	2	3	4
I never worry about anything.	0	1	2	3	4
When there is nothing more I can do about a concern, I do not worry about it any more.	0	1	2	3	4
I have been a worrier all my life.	0	1	2	3	4
I notice that I have been worrying about things.	0	1	2	3	4
I worry all the time.	0	1	2	3	4
I worry about projects until they are all done.	0	1	2	3	4
Once I start worrying, I can't stop.	0	1	2	3	4

Appendix F.

Fertility Awareness Scale (FAS)

Please answer the following questions.

	No knowledge	Some knowledge	Fairly knowledgeable	Very knowledgeable
Overall, how would you rate your current knowledge of women's fertility?	0	1	2	3
Overall, how would you rate your current knowledge of Assisted Human Reproduction?	0	1	2	3

Fertility Quiz

Please answer the following true/false questions.

1. For women over 30, overall health and fitness level is a better indicator of fertility than age.
2. Taking birth control pills for more than 5 years negatively affects a woman's fertility.
3. A woman's eggs are as old as she is.
4. Prior to menopause, assisted reproductive technologies (e.g., in vitro fertilization) can help most women to have a baby using their own eggs.
5. The total cost of one cycle of in vitro fertilization (IVF) is under \$5,000.
6. There is a progressive decrease in a woman's ability to become pregnant after the age of 35.
7. The rates of miscarriage are significantly higher for women in their 40s than for women in their 30s, even for physically fit women in excellent health.
8. Most fertility clinics will not provide treatment to women over the age of 45.
9. Egg freezing before the age of 35 can significantly prolong a woman's fertility.
10. Sexually transmitted diseases (e.g. Chlamydia, Gonorrhea) significantly increase the risk of later infertility.
11. The age of her male partner is an important factor in a woman's chances of becoming pregnant.
12. The use of in vitro fertilization (IVF) poses health risks for a woman.
13. Children conceived through the use of assisted reproductive technologies, such as IVF, have more long-term health problems than children conceived without the use of these fertility treatments.
14. The majority of fertility conditions are caused by problems with the woman's fertility.
15. Most women have to go through IVF more than once to have a baby.
16. A woman's weight affects her chances of conceiving.

Appendix G.

Center for Epidemiologic Studies Depression Scale (CES-D)

For each of the following statements, please circle the number that best describes how often you felt or behaved this way – DURING THE PAST WEEK.

DURING THE PAST WEEK	0 Rarely or None of the Time (Less than 1 Day)	1 Some or a Little of the Time (1-2 Days)	2 Occasionally or a Moderate Amount of the Time (3-4 Days)	3 Most or All of the Time (5-7 Days)
I was bothered by things that usually don't bother me.	0	1	2	3
I did not feel like eating; my appetite was poor.	0	1	2	3
I felt that I could not shake off the blues even with help from my family or friends.	0	1	2	3
I felt that I was just as good as other people.	0	1	2	3
I felt depressed.	0	1	2	3
I felt that everything I did was an effort.	0	1	2	3
I felt hopeful about the future.	0	1	2	3
I thought my life had been a failure.	0	1	2	3
I felt fearful.	0	1	2	3
My sleep was restless.	0	1	2	3
I was happy.	0	1	2	3
I talked less than usual.	0	1	2	3

Appendix H.

Overall Anxiety Severity and Impairment Scale (OASIS)

The following items ask about anxiety and fear. For each item, circle the number for the answer that best describes your experience *over the past week*.

1. In the past week, how often have you felt anxious?

- 0 = *No anxiety* in the past week.
- 1 = *Infrequent anxiety*. Felt anxious a few times.
- 2 = *Occasional anxiety*. Felt anxious as much of the time as not. It was hard to relax.
- 3 = *Frequent anxiety*. Felt anxious most of the time. It was very difficult to relax.
- 4 = *Constant anxiety*. Felt anxious all of the time and never really relaxed.

2. In the past week, when you have felt anxious, how intense or severe was your anxiety?

- 0 = *Little or None*: Anxiety was absent or barely noticeable.
- 1 = *Mild*: Anxiety was at a low level. It was possible to relax when I tried. Physical symptoms were only slightly uncomfortable.
- 2 = *Moderate*: Anxiety was distressing at times. It was hard to relax or concentrate, but I could do it if I tried. Physical symptoms were uncomfortable.
- 3 = *Severe*: Anxiety was intense much of the time. It was very difficult to relax or focus on anything else. Physical symptoms were extremely uncomfortable.
- 4 = *Extreme*: Anxiety was overwhelming. It was impossible to relax at all. Physical symptoms were unbearable.

3. In the past week, how often did you avoid situations, places, objects, or activities because of anxiety or fear?

- 0 = *None*: I do not avoid places, situations, activities, or things because of fear.

- 1 = *Infrequent*: I avoid something once in a while, but will usually face the situation or confront the object. My lifestyle is not affected.
- 2 = *Occasional*: I have some fear of certain situations, places, or objects, but it is still manageable. My lifestyle has only changed in minor ways. I always or almost always avoid the things I fear when I'm alone, but can handle them if someone comes with me.
- 3 = *Frequent*: I have considerable fear and really try to avoid the things that frighten me. I have made significant changes in my life style to avoid the object, situation, activity, or place.
- 4 = *All the Time*: Avoiding objects, situations, activities, or places has taken over my life. My lifestyle has been extensively affected and I no longer do things that I used to enjoy.

4. In the past week, how much did your anxiety interfere with your ability to do the things you needed to do at work, at school, or at home?

- 0 = *None*: No interference at work/home/school from anxiety.
- 1 = *Mild*: My anxiety has caused some interference at work/home/school. Things are more difficult, but everything that needs to be done is still getting done.
- 2 = *Moderate*: My anxiety definitely interferes with tasks. Most things are still getting done, but few things are being done as well as in the past.
- 3 = *Severe*: My anxiety has really changed my ability to get things done. Some tasks are still being done, but many things are not. My performance has definitely suffered.
- 4 = *Extreme*: My anxiety has become incapacitating. I am unable to complete tasks and have had to leave school, have quit or been fired from my job, or have been unable to complete tasks at home and have faced consequences like bill collectors, eviction, etc.

5. In the past week, how much has anxiety interfered with your social life and relationships?

- 0 = *None*: My anxiety doesn't affect my relationships.
- 1 = *Mild*: My anxiety slightly interferes with my relationships. Some of my friendships and other relationships have suffered, but, overall, my social life is still fulfilling
- 2 = *Moderate*: I have experienced some interference with my social life, but I still have a few close relationships. I don't spend as much time with others as in the past, but I still socialize sometimes.

- 3 = *Severe*: My friendships and other relationships have suffered a lot because of anxiety. I do not enjoy social activities. I socialize very little.
- 4 = *Extreme*: My anxiety has completely disrupted my social activities. All of my relationships have suffered or ended. My family life is extremely strained.

Appendix I.

Screening Questionnaire

1. Do you identify as female?
 - a. Yes
 - b. No
2. How old are you?
3. Have you ever been pregnant? (Including pregnancies that did not result in a live birth.)
 - a. Yes
 - b. No
4. Are you currently trying to become pregnant?
 - a. Yes
 - b. No
5. Have you ever been diagnosed with a fertility problem?
 - a. Yes
 - b. No
6. “Was there ever a time when you regularly has sex without birth control for a year or more without getting pregnant?”
 - a. Yes
 - b. No
7. Have you made the decision that you do not want to ever become pregnant?
 - a. Yes
 - b. No

Appendix J.

Demographic Questionnaire

1. Regarding your ethnic background, which of the following do you consider yourself to be?

[Check all that apply.]

- a. American Indian or Alaska Native
- b. Asian
- c. Black or African American
- d. Hispanic or Latino
- e. Native Hawaiian or other Pacific Islander
- f. White
- g. Other (specify) : _____

2. What is the highest level of education you completed?

- a. Less than 12th grade
- b. High school
- c. Associate's degree
- d. Some 4-year college (no degree)
- e. Bachelor's degree
- f. Master's degree
- g. Professional or doctoral degree (e.g., Ph.D., M.D., J.D.)

3. What is your employment/student status? [Check all that apply.]

- a. Employed full-time
- b. Employed part-time

- c. Full-time student
 - d. Part-time student
 - e. Not employed and not a student
4. What is your relationship status?
- a. Single
 - b. In a relationship, not cohabitating
 - c. In a relationship, cohabitating
 - d. Married or in a domestic partnership
5. What is your sexual orientation?
- a. Straight
 - b. Gay or lesbian
 - c. Bisexual
 - d. Transgender
 - e. Other
6. Have you ever tried to get pregnant?
- a. Yes
 - b. No
7. When do you want to get pregnant?
- a. Within the next 5 years
 - b. 5 to 10 years from now
 - c. More than 10 years from now
 - d. Don't know
8. What is the ideal age for a women to get pregnant?

- a. Less than 25 years of age
 - b. 25 to 30 years of age
 - c. 30 to 35 years of age
 - d. 35 to 40 years of age
 - e. More than 40 years of age
9. When do you anticipate that you will start trying to get pregnant?
- a. Within the next 5 years
 - b. 5 to 10 years from now
 - c. More than 10 years from now
 - d. Don't know
10. Is it important your parents that you have children?
- a. Yes
 - b. No
11. Thinking about your family and friends, would you say that all, most, some, few or none of them have kids?"
- a. All
 - b. Most
 - c. Some
 - d. Few
 - e. None
12. Have your family or friends experienced infertility?
- a. Yes
 - b. No

13. Have your family or friends pursued fertility treatments to get pregnant?

a. Yes

b. No

Appendix K

Open-ended Questions

1. Could you say more about the personal, work, or other life circumstances that are most important to your NOT trying to get pregnant now?
2. Is there anything else you would like to say?

Appendix L.

Thematic responses to “Is there anything else you would like to say?”

Theme ^a	N
This is an interesting/important study.	18
I'm very interested in the results of this survey.	15
Thanks for the survey.	13
Adoption is a good option for me.	12
Good luck with your research.	10
Want answers to knowledge questions.	8
Great study!	6
Current health issues have made me more worried about my fertility.	4
I worry more about having an autistic or developmentally different child.	4
I answered the question about the “ideal” time to get pregnant, but I don't really believe there is a perfect time. Depends on life circumstances.	3
I do feel pressure from family and friends.	3
I don't feel strongly about having children.	3
My mother/grandmother had children later, which makes me less worried about my fertility.	3
High school health classes and media do not provide enough info about infertility.	3
Most of my fears about not having children have to do with not finding a partner.	2
I want to have children by a certain age.	2
Would never do IVF.	2
I am adopted, so I think I have a different perspective on the importance of biological children – adoptive relationships can be just as good.	2
I'm only recently open to the idea of having children at all.	2
Specific comment about wording of a question.	2
The recent Atlantic article about fertility/age myths eased my mind somewhat.	2
I'm not sure I'm cut out to be a parent.	1
I'm more concerned with getting pregnant when I don't want to.	1
Whole topic of pregnancy and birth is intimidating.	1
Depressing questions.	1
Wish you had more questions about adoption.	1
My job working with children fulfills a lot of my need to be a “parent”.	1
I don't feel a need to carry a child, but I do feel a need to be a parent.	1
I answer “not worried” to the fertility worry questions not because I don't think I'll have difficulty getting pregnant, but because at this point the thought of not being able to get pregnant doesn't worry me.	1
I believe that when I'm ready to have children, if I cannot, it will be ok.	1

(table continues)

Thematic responses to “Is there anything else you would like to say?”

I don't feel that being childless would take anything away from my womanhood.	1
I am afraid of giving birth.	1
Not being in a committed relationship deters me from wanting children.	1
I believe the reduction in fertility is more of a curve than a sharp downturn.	1
A few of your questions felt limited.	1
When you ask “have your friends experienced infertility?” should add answer option “I don't know” because there is a stigma to talking about it.	1
I don't know about my fertility, but should I have an unwanted pregnancy I would not hesitate to seek an abortion because I don't want to raise a child under bad circumstances.	1
Completing this survey brought forth issues that drive the few anxieties and depressive thoughts I do have.	1
I feel like a lot of my female friends have experienced fertility problems, so this issue is alarming to me.	1
I don't know if my parents really want me to have children.	1
If my sibling has children, I'm off the hook.	1
Re the “anxiety/fear questions”: these are two different things.	1
I worry more about my husband's infertility.	1
I was sexually active in my teens and used the withdrawal method, but never became pregnant. This makes me worry about my fertility.	1
I am worried that my partner and I don't make enough money to have children.	1
Pregnancy and having children are very different questions/experiences.	1
I have been actively discouraged to get pregnant by my doctoral program.	1
I want to adopt regardless of my fertility.	1
I'm not concerned about my “ticking biological clock” but a lot of people around me talk about this.	1
The prospect that I will get too old to have a baby before I find a partner is very sad.	1
The answers I gave on this survey were unusual for me, as I've been especially sad this week.	1
I have thoughts about selling my eggs or becoming a surrogate but that makes me worry about if I will be able to conceive when I'm ready to have my own children.	1
My mother recently passed away which has caused a higher level of anxiety than usual.	1
This issue is on my mind quite often, it is a major worry in my life.	1
I know that fertility declines after 35 but I am very healthy so I don't think it will be a problem for me.	1
I would have liked to answer questions in more detail.	1

(table continues)

Thematic responses to “Is there anything else you would like to say?”

This survey encouraged me to learn more about IVF and factors that influence fertility.	1
I have always felt “selfish” for not wanting children.	1
I wasn’t sure how to answer a lot of the fertility questions because I don’t think a lot of that research has been done.	1
This is a difficult topic	1
I wish more people felt comfortable being child-free.	1
My anxiety stems from other things.	1
I had an abortion when I was younger.	1
I’m not emotionally ready to have children.	1
I thought I was educated about fertility until I took this quiz.	1
At 37, I have to accept that I may not be able to get pregnant.	1
If I have not found a partner by my early 30s I will pursue getting pregnant on my own.	1
I want to have my first child by the time I’m 35.	1
This survey was difficult to complete on a mobile phone.	1
There are so many conflicting messages about fertility, it causes me anxiety.	1
I am worried about my fertility because my periods are irregular.	1
My anxiety comes from other people asking me when I’m going to have kids.	1
I feel that some of my answers will change after I turn 35.	1
Given how old I am, I feel like it wouldn’t be fair for me to have a child.	1
I had childhood cancer, so I worry about the chemo I had as a child and if that will prevent me from becoming pregnant.	1
I take (psychotropic medication) which probably affects my answers to anxiety questions.	1
I’m a modern woman.	1
I’m worried about the physical changes of pregnancy.	1
Birth is repulsive.	1
I would like to have children.	1
It would be ok if I can’t have children.	1
This topic is not discussed enough.	1
I think I worry about my fertility too much because I want to be pregnant and give birth so desperately.	1
I don’t think about having kids much now, but I will later.	1
I have a lot going on, so I think my scores will indicate an overall high level of stress.	1
I served as an egg donor and learned a lot about infertility that way.	1
I’m concerned about being on birth control for so long	1
I know a lot of people who have been through infertility, which makes me feel better about planning to have a child later, like I will have support for the process.	1

(table continues)

Thematic responses to “Is there anything else you would like to say?”

My (family member) had a pregnancy-related loss recently which has prompted me to think more about this issue.	1
I think there is too much pressure on women to have children, and it makes them make rushed or poor decisions about relationships and jobs.	1
I think women should know that most of the statistics that the media provides about fertility are wrong.	1
I hope my life settles down so I can have children some day.	1
Worries about birth defects in children born to older mothers will not dissuade me from trying.	1
The pressure to become pregnant once you are married is intense.	1
It was surprising to compare my anxiety levels regarding fertility to my overall anxiety.	1

^aLanguage in this table paraphrases or summarizes participant comments.

Vita

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