2013

Knowledge of Increased Risks Involved in Delaying Childbearing

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KNOWLEDGE OF INCREASED RISKS INVOLVED IN DELAYING CHILDBEARING

By

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A Thesis submitted to the

Department of Psychology

in partial fulfillment of the requirements for graduation with

Honors in the Major

Degree Awarded:

Spring 2014

The members of the Defense Committee approve the thesis of Lauren Propst defended on November 18, 2013.

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Abstract

There is a growing trend in the United States for men and women to delay childbearing until later in life, even though there are increased risks that are associated with delaying childbearing, including increasing rates of infertility and increasing pregnancy and childbirth complications. The purpose of this study was to determine the overall knowledge level of the increased risks involved in delaying childbearing, specifically relating to age-related fertility decline and age-related pregnancy and childbirth complications, and also to determine what factors are associated with differences in knowledge level about these risks in order to target populations with lower knowledge level for public health interventions in the future. Two samples were studied, including an undergraduate student sample from Florida State University (FSU) and a general population sample from Mechanical Turk. It was found that both samples had generally low knowledge levels about the increased risks involved in delaying childbearing, and there was an association found between higher level of education completed already and higher knowledge level. No conclusive association was found between age, gender, or having biological children and knowledge level. Future research should be done in this area to expand these results in order to be able to target specific populations for public health interventions.

There is a growing trend in the United States for both men and women to delay childbearing until later in life (Crosnoe & Kim, 2013; Martin, Hamilton, Ventura, Osterman, Wilson & Mathews, 2012). This increasing trend may be due to many reasons, such as the pursuit of higher education, the pursuit of career advancements, the pursuit of personal interests, not finding the right partner, not feeling emotionally ready, or the need for financial stability (O'Laughlin & Anderson, 2001; Peterson, Pirritano, Tucker & Lampic, 2012; Tough, Tofflemire, Benzies, Fraser-Lee & Newburn-Cook, 2007). Although it is becoming more common for men and women to have children later in life, current research suggests that there is a lack of knowledge about the increased risks that are associated with delaying childbearing, which include increasing rates of infertility and increasing pregnancy and childbirth complications (Peterson, Pirritano, Tucker & Lampic, 2012; Sandford, 2012; Tough et al., 2006).

Increasing Maternal and Paternal Ages

The number of births to parents older than 35 years of age has more than doubled in the past twenty years (Fisch et al., 2003), and the mean age of both maternity and paternity have steadily increased over the past few decades (Balasch, 2010; Crosnoe & Kim, 2013). In the United States between the years of 1991 and 2001, there was a 36% increase in the number of births per 1000 women 35-39 years of age and a 70% increase in the number of births per 1000 women 40-44 years of age (Balasch, 2010). In addition, the number of births to women over the age of 50 has risen by nearly 300% since 1997 (Martin et al., 2011). These numbers are expected to continue growing in the future, which is concerning due to the increased risk that is associated with increased maternal and paternal age (Crosnoe & Kim, 2013).

Increased Risk of Infertility

The choice to delay childbearing may prevent couples from having children as easily due to the age-related decline in fertility that women and men both experience (Lampic, Svanberg, Karlstrom & Tyden, 2006). In women, fertility starts to decline beginning in a woman's late 20s, and there is a marked decrease in fertility around the age of 35 (Lampic, Svanberg, Karlstrom & Tyden, 2006; Tough, Tofflemire, Benzies, Fraser-Lee & Newburn-Cook, 2007). Men also experience a slight drop in fertility around the age of 50 (Kidd, Eskenazi, & Wyrobek, 2001; Ng & Ho, 2007).

Studies have shown that most people want to have children during their lifetime, but by waiting until later in life, they could become involuntarily childless because of the increased rates of infertility that are associated with increased age (Peterson, Pirritano, Tucker & Lampic, 2012). Right now, 10-19% of couples in the United States are involuntarily childless (Peterson, Pirritano, Tucker & Lampic, 2012). Although there are many types of assisted reproductive technology, such as in vitro fertilization, these technologies are less effective with every one-year increase in age (Center for Disease Control and Prevention, 2011). The chance of a couple successfully becoming pregnant and having a live birth while undergoing in vitro fertilization is only 30-39% on average, with the success rate for women at the age of 40 only 19% and at the age of 44 only 4% (Center for Disease Control and Prevention, 2011).

Pregnancy and Childbirth Complications

In addition to increased difficulty in getting pregnant, there is also increased risk of pregnancy, childbirth, and medical complications associated with delaying childbearing (Peterson, Pirritano, Tucker & Lampic, 2012; Sandford, 2012; Tough et al., 2006).

Increased maternal age. As women age, especially over the age of 35, they are at higher risk of having a child with some type of congenital anomaly or chromosomal abnormality, including Down Syndrome, cleft lip, or other birth defects (Ng & Ho, 2007; Hollier, Leveno, Kelly, McIntire & Cunningham, 2000; Forrester & Merz, 2003). In 2010, mothers over the age of 35 were over four times more likely to have had a child with Down Syndrome than women ages 20-29, and the odds continue to increase with age (Martin, Hamilton, Ventura, Osterman, Wilson & Mathews, 2012). Congenital malformations, deformations, and chromosomal abnormalities can also lead to infant mortality, and they were the leading causes of infant mortality in 2006 (Heron, Hoyert, Murphy, Xu, Kochanek & Tajeda-Vera, 2009).

Mothers who delay childbearing are also at higher risk of having a low birth weight or premature baby, both of which are health risks for the baby. Approximately 10-19% of pregnancies in women at the age of 35 will result in a low birth weight baby (Tough et al., 2006). Disorders relating to low birth weight were the second-highest cause of infant mortality in 2006 (Heron, Hoyert, Murphy, Xu, Kochanek & Tajeda-Vera, 2009), and if the baby survives, low birth weight is associated with many issues, such as learning disabilities, blindness, and deafness (Hack, Klein & Taylor, 1995). Also, there is increased risk of having a miscarriage or stillbirth with increasing age; for example, 20-29% of all pregnancies of women at the age of 35 will result in miscarriage (Gilbert, Nesbitt & Danielsen, 1999).

In addition, mothers also have increasing proportions of pregnancy-related medical risk factors as they age, such as chance of pregnancy-associated hypertension, diabetes, and some obstetric complications such as having a breeched baby (Martin, Hamilton, Ventura, Osterman, Wilson & Mathews, 2012). Increasing maternal age also leads to an increased chance of having twins or triplets, which can cause delivery issues for the mother (Tough et al., 2006).

Increased paternal age. Although there is a slight decline in male fertility with age, specifically over the age of 50, there is no absolute age at which men cannot reproduce (Ng & Ho, 2007). However, that does not mean that it is completely safe for men to have children at any age, because fertility is not the only concern. The effects of increased paternal age on infant outcomes are often overlooked, but they still have a great impact (Reichman & Teitler, 2006).

As men age, they are at a higher risk of having a low birth weight baby, which, as mentioned before, can be harmful and even fatal to the infant (Hack, Klein & Taylor, 1995; Heron, Hoyert, Murphy, Xu, Kochanek & Tajeda-Vera, 2009). Also, as men age, they are at a higher risk of having a child with an autism spectrum disorder or schizophrenia (Reichenberg et al., 2006; Reichman & Teitler, 2006; Malaspina et al., 2001). Men over the age of 40 were found to be 5.75 times more likely to have children with an autism spectrum disorder than men under the age of 30 (Reichenberg et al., 2006). Additionally, studies have shown that if both a woman and a man are over the age of 35, they are at an even higher risk of having a child with a chromosomal abnormality, such as Down Syndrome, than if only the woman was over the age of 35 (Fisch, Hyun, Golden, Hensle, Olsson & Liberson, 2003).

Theoretical Perspective

The Information-Motivation-Behavioral Skills model (IMB model) is a theoretical model that guides thinking about complex health behaviors and can serve as a general model of health behavior change (World Health Organization, 2003; Fisher & Fisher, 2002). Figure 1 shows a flow chart representing how this model is structured (World Health Organization, 2003). The IMB model serves to demonstrate that information is a prerequisite for changing behavior when

working alongside motivation and/or behavior skills (World Health Organization, 2003; Fisher & Fisher, 2002). Information and motivation generally work through behavioral skills, which then can cause behavioral change (World Health Organization, 2003). If the behavior skill is familiar and uncomplicated, however, information or motivation alone may cause a behavioral change (World Health Organization, 2003).

The IMB model was originally established as a basis for understanding human immunodeficiency virus (HIV) risk and prevention, but it has also been successfully used for various types of reproductive health promotion education as well (Fisher & Fisher, 2002). A previous study, focused on the HIV medicine known as highly active antiretroviral therapy (HAART), determined that information relevant to adherence to HAART was a prerequisite of proper use of HAART (Fisher, Fisher, Amico, & Harman, 2006). However, if that information was inaccurate or the subject was lacking information on HAART, it reduced HAART adherence (Fisher, Fisher, Amico, & Harman, 2006). This may suggest that correctly informed individuals may have one behavioral outcome, while incorrectly informed or uninformed individuals may have a different behavioral outcome. These health-based interventions based on the IMB model have been found to be effective in producing behavioral change (World Health Organization, 2003).

The current concerns regarding the knowledge of increased risks involved in delaying childbearing can be associated with the information aspect of the IMB model. By determining the knowledge level currently present, a building step can be created to eventually determine if behavioral change is needed, and public health recommendations can then be made to determine what future steps are necessary to increase this knowledge level in order to increase positive behavioral change.

Past Research

Knowledge of increased risks in delaying childbearing. Little research could be found that has measured general and specific knowledge levels concerning the increased risks involved in delaying childbearing. In total, two significant studies were found that dealt directly with this issue. Together, these studies suggested that there is a generally low level of awareness of the increased risks involved in delaying childbearing. Specifically, in one study, Peterson and colleagues gave questionnaires to 138 female and 108 male undergraduate university students to assess fertility awareness and parenting attitudes of American undergraduate university students (Peterson, Pirritano, Tucker & Lampic, 2012). The results suggested that, although participants wanted to have their first and last child within the window of a woman's fertility, they demonstrated a lack of awareness by overestimating the age at women experience declines in fertility. The second study looked specifically at knowledge of age-related increases in pregnancy and childbirth complications (Tough et al., 2006). The sample was 1,044 women in urban areas of Canada who had just given birth to their first child, and it determined that many women are generally unaware of the potential consequences of delaying childbearing.

Although these two studies give an initial picture as to the knowledge of increasing risks with increasing maternal age, more research needs to be done. In particular, the previous two studies were both conducted in very specialized samples (especially Tough et al., 2006), and they did not include factors relating to paternal age. Moreover, only Peterson and colleagues (2012) asked specific questions concerning the relative knowledge about the decline in fertility with increasing age.

Factors that may influence knowledge level. Little research could be found that has assessed what factors are associated with differences in knowledge levels of the increased risks involved in delaying childbearing. In total, one significant study was found that dealt directly with this issue. This study by Tough et al. (2006) asked specific questions concerning relative knowledge of pregnancy and childbirth complications that tend to increase with age. This study found that characteristics associated with a lower knowledge level were an age of 35-39, less than post-graduate education, and not currently being enrolled as a student. However, this study consisted of participants in urban areas of Canada who had just given birth to their first child, so the results may only be valid for that specialized sample.

To look for additional factors that may influence knowledge level of the increased risks involved in delaying childbearing, research based on factors that influence general knowledge level were examined. Studies have shown that gender, race/ethnicity, and SES are associated with academic achievement (Sirin, 2005; St. Rose, 2009). Additionally, studies have shown that people who have had experience in a particular area have a significantly increased knowledge of that area compared to those who had less experience (Slyne, Phillips, & Parkes, 2012; Freed, Clark, Sorenson, Lohr, Cefalo, & Curtis, 1995). These findings can then be developed into the question of if gender, race, ethnicity, household income, highest education level completed, age, and experience might be associated with higher knowledge level of the increased risks involved in delaying childbearing. These factors may potentially affect knowledge level and will be explored in this study.

The Current Research

The purpose of this study was to determine the knowledge level that people have about the increased risks involved in delaying childbearing and to determine what factors are associated with knowledge about these risks. Little research currently exists exploring this important public health issue. The goal of this research was to determine what factors are associated with lower knowledge about these age-related risks in order to identify specific populations that may benefit from public health interventions.

Research questions. This study had two primary aims. *The first aim was to determine the overall knowledge level of the increased risks involved in delaying childbearing, specifically relating to age-related fertility decline and age-related pregnancy and childbirth complications. The second aim was to determine what factors are associated with differences in knowledge level about these risks.* The selection of the variables to explore as potential correlates to knowledge level were based on previous research by Tough et al (2006) and Peterson and colleagues (2012). These aims were explored using a sample of undergraduate students as well as in a sample of the general adult population. The sample of undergraduate students is a more understood method of data collection in a university setting, and the results can be compared with the previous research based on the undergraduate university student population, but it also has biases that make it not as representative of the general population. Gosling, Vazire, Srivastava, and John (2004) ran a study that examined 510 different studies published in the *Journal of Personality and Social Psychology* in 2002, and it determined that 85% of these studies had student samples. In these studies, 71% of participants were female while only 29% were male, 80% designated their race as White, and there was a mean age of 22.9 years, which are all significantly different from the general population (Gosling, Vazire, Srivastava, & John, 2004). In addition, most undergraduate students do not have children, and the results of the research may be impacted by that factor as

well. To accommodate for these biases, a sample of the general adult population was also taken through Mechanical Turk. Mechanical Turk is still a relatively new method of data collection, and participants were completely anonymous users on the Internet, so that could have potentially raised issues with the sample that were not known prior to data collection, such as if participants ignored the requirement that they need to speak English and live in the United States in order to participate in the study. Because of these reasons, both samples were included in this research, which hopefully lead to the most representative data. Trends common across both samples were examined, and differences between the samples were highlighted. In addition, there were 256 participants from the undergraduate student population and 263 participants from the Mechanical Turk population included in this study. A recent study by Schönbrodt and Perugini (2013) indicated that a sample size should approach 250 in order to get a stabilized correlation, so the sample size for each population in this study was over 250 to ensure that the sample size was large enough for stable estimates.

Hypotheses. Based on previous research, it was expected that there would be, on average, a relatively low level of knowledge about the risks involved in delaying childbearing. In addition, it was expected that participants with higher age, household income, education level, and exposure to certain reproductive or fertility issues would have a higher level of knowledge of these risks than those who have a lower age, education level, household income, and level of exposure to certain reproductive or fertility issues. Additionally, it was hypothesized that females would have a higher knowledge level than males, participants who identify their race as White would have a higher knowledge level than participants who identify their race as a race other than White, participants who identify their ethnicity as non-Hispanic/Latino would have a higher knowledge level than participants who identify their ethnicity as Hispanic/Latino, participants

with biological children would have a higher knowledge level than participants who do not have biological children, and the perception of knowledge level would be higher for those with a higher knowledge level and lower for those with a lower knowledge level. Because previous work has focused on specialized samples representing narrow populations and because of the relatively new nature of data collection using Mechanical Turk, no hypotheses concerning potential sample differences were made.

Methods

Participants

FSU participants. This study used 256 undergraduate students at the Florida State University (FSU) that were enrolled in Introductory Psychology or an upper-level psychology course that allowed research participation for extra credit, and all participants were required to be at least 18 years old. The population included 70 male (27.3%) and 186 female (72.7%) participants with a mean age of 19.13 (SD = 2.75). When reporting ethnicity, 22.7% (n = 58) identified as being Hispanic/Latino, while 75.8% (n = 194) identified as being non-Hispanic/Latino. Additionally, 81.6% (n = 209) identified their race as White, 11.3% (n = 29) as Black or African American, 3.9% (n = 10) as Mixed race, 1.6% (n = 4) as Asian, 0.8% (n = 1) as American Indian or Alaska Native, and 0.8% (n = 1) as Native Hawaiian or Other Pacific Islander. Only 1.2% (n = 3) reported having biological children, while 98.8% (n = 253) reported that they do not have biological children. The current household income median was found to be $70,000 – $89,000 while the mode was less than $10,000. Most participants' highest level of education completed already was graduating high school or high school equivalent (n = 119, 46.5%) or some college (n = 116, 45.3%). Most participants reported the highest level of

education they are planning on completing during their lifetime to be a graduate, law, or medical degree (*n* = 207, 80.9%). There were 167 participants who were currently single (65.2%) and 85 in a committed relationship but not married or engaged (33.2%). Also, 95.3% reported their sexual orientation as straight (*n* = 244). All participants were currently in college, and 62.5% were in their first year (n=160), while 19.5% were in their third year (*n* = 50). The median college GPA range was 3.00 – 3.49, and the mode was 3.50 – 4.00. Widespread selections of primary majors were selected, but the most popular major was Psychology (17.2%). Of secondary majors, minors, or other academic tracks, the most popular choices were both Psychology and pre-med or pre-vet track (*n* = 36, 14.1%). Table 1 includes additional details for these demographic variables.

Mechanical Turk participants. This study also used 263 participants from Mechanical Turk (www.mturk.com) as a representative of the general population, and these participants were required to be at least 18 years old and English-speaking United States residents. For more information on Mechanical Turk and its users, see Appendix A. The population included 118 male (44.9%) and 140 female (53.2%) participants (5 participants did not report) with a mean age of 35.18 (*SD* = 12.66). When reporting ethnicity, 4.6% (*n* = 12) identified as being Hispanic/Latino, while 92.8% (*n* = 244) identified as being non-Hispanic/Latino. Additionally, 78.3% (*n* = 206) identified their race as White, 7.6% (*n* = 20) as Asian, 6.8% (*n* = 18) as Black or African American, 3.8% (*n* = 10) as Mixed race, and 0.8% (*n* = 2) as Native Hawaiian or Other Pacific Islander. English was identified as the primary language for 95.8% of participants (*n* = 252), 1.1% (*n* = 3) identified their primary language as Spanish, and 1.1% (*n* = 3) identified their primary language as Other. All participants who gave a recorded response (*n* = 258, 98.1%) identified their primary residence as the United States, and 28.1% (*n* = 74) described the area

they currently live in as urban or a large city, 56.3% (n = 148) as suburban or small city, and 13.7% (n = 36) as rural. Also, 39.9% (n = 105) reported having biological children, while 58.2% (n = 153) reported that they do not have biological children. The current household income median was found to be $30,000 – $49,000 while the mode was $50,000 – $69,000. Most participants' highest level of education completed already was some college (n = 80, 30.4%) or graduating from a 4-year college (n = 75, 28.5%). Most participants reported the highest level of education they are planning on completing during their lifetime to be a 4-year college degree (n = 102, 38.8%) or a graduate, law, or medical degree (n = 67, 25.5%). There were 91 participants who were currently single (34.6%), 91 who were married (34.6%), and 49 in a committed relationship but not married or engaged (18.6%). Also, 90.1% reported their sexual orientation as straight (n = 237). Widespread selections of primary occupations were selected, but the most popular occupation was being a student (n = 51, 19.4%). Table 1 includes additional details for these demographic variables.

Measures

All participants were asked to complete a questionnaire online (hosted by Qualtrics), which is included in Appendix H. There were two different questionnaires given – one to FSU participants and another to Mechanical Turk participants – but with minor differences. The questionnaire was comprised of five main subject areas:

Demographic information. Questions in this section asked about the participant's age, gender, household income, education background, ethnicity, race, and sexual orientation. The Mechanical Turk questionnaire included questions about the participant's primary language, primary residence, and occupation, while the Florida State University Psychology Department

questionnaire did not include those questions and instead included questions about the participant's year in school and primary field of study.

Reproductive history and plans. Questions in this section asked about the participant's reproductive history, including if the participant has any biological children already, and the participant's reproductive plans, including if they would consider having children in the future. Also, there were questions that asked about the participant's desired number of children, the ages at which the participant wants to have children, how important having children is to them, and obstacles that may prevent them from having children at an earlier age. Refer to Appendix H for the specific questions asked.

Family history. Questions in this section asked about any infertility or reproductive issues, miscarriages or stillbirths, and chromosomal abnormalities or congenital abnormalities that the participant, their partner, or their family (parents and siblings) has had. Also, there were questions about if the participant or their partner have ever seen a fertility specialist for reproductive assistance or seen a genetic counselor for reproductive counseling or prenatal genetic screening.

Age-related fertility issues. First, participants were asked about how educated they think they are about topics relating to how age affects a person's fertility (on a five-point Likert scale ranging from "not at all educated" to "extremely educated"), and how much information they have received about topics relating to how age affects a person's fertility from family, friends, doctor/gynecologist, school, or media/news (on a five-point Likert scale ranging from "none" to "all or almost all"). Next, there were eight either true or false statements about how age affects fertility, and the participant responded based on how true or untrue they thought the statement

was on a five-point Likert scale ranging from “definitely untrue” to “definitely true”. Next, there were eight multiple-choice questions that asked about specific age ranges and percentages for questions about how age affects fertility. Correct answers for all questions were based on current literature, specifically from studies by Tough et al. (2006), Peterson, Pirritano, Tucker, and Lampic (2012), and Balasch (2010). Refer to Appendix H for the specific questions asked.

Age-related pregnancy and childbirth issues. First, participants were asked about how educated they think they are about topics relating to how age affects the likelihood of certain pregnancy and childbirth issues (on a five-point Likert scale ranging from “not at all educated” to “extremely educated”), and how much information they have received about topics relating to how age affects the likelihood of certain pregnancy and childbirth issues from family, friends, doctor/gynecologist, school, or media/news (on a five-point Likert scale ranging from “none” to “all or almost all”). Next, there were eight either true or false statements about how age affects the likelihood of certain pregnancy and childbirth issues, and the participant responded based on how true or untrue they thought the statement was on a five-point Likert scale ranging from “definitely untrue” to “definitely true”. Next, there were eight multiple-choice questions that asked about specific age ranges and percentages for questions about how age affects the likelihood of certain pregnancy and childbirth issues. Correct answers for all questions were based on current literature, specifically from studies by Peterson, Pirritano, Tucker, and Lampic (2012), Center for Disease Control and Prevention (2011), Hook (1981), Reichenberg et al. (2006), Reichman and Teitler (2006), and Malaspina et al. (2001). Refer to Appendix H for the specific questions asked.

Procedure

FSU participants. Undergraduate students at Florida State University in the Psychology Department signed up through an online system (Sona) run through the Psychology Department (see Appendix B for the recruiting advertisement). There was a link to the questionnaire (hosted by Qualtrics) on the sign up page. Since this was an online-only study, the participant could complete the study online at any time and from any location. The first page of the questionnaire was the consent form (see Appendix D), and the participant had to give their consent electronically in order to move on to the rest of the questionnaire. After giving consent, the participant then completed the questionnaire. Once it was complete, they were shown a debriefing page (see Appendix F) and were granted 0.5 credits for Introductory Psychology or upper-level courses that allowed it. The questionnaire took approximately 15 minutes to complete.

Mechanical Turk participants. Mechanical Turk participants could access the HIT for this study online (www.mturk.com) at any time and from any location within the United States. A copy of what the HIT looked like is in Appendix C, including eligibility requirements to complete the HIT. There was a link to the questionnaire (hosted by Qualtrics) inside the HIT that they followed in order to complete the questionnaire. The first page of the questionnaire was the consent form (see Appendix E), and the participant had to give their consent electronically in order to move on to the rest of the questionnaire. Once it was complete, they were shown a debriefing page (see Appendix F) and a unique Response ID code. Participants had to copy and paste this Response ID code into the HIT submission before fully submitting the HIT, and compensation of $0.50 was given once the Response ID had been verified as one of the responses received in Qualtrics. The questionnaire took approximately 15 minutes to complete.

Results

Aim 1: Overall Levels of Factual Knowledge

Overall levels of factual knowledge of age-related fertility and pregnancy/childbirth issues were examined by descriptive statistics of the continuous variables and frequencies for the multiple-choice variables. In order to test for potential significant differences between the FSU sample and the Mechanical Turk (MTurk) sample, an independent sample t-test was performed on the continuous variables and a chi-square analysis was performed on the multiple-choice variables. Additionally, for each independent sample t-test performed, Levene's test for equality of variance was also performed. Equal variances may be assumed unless otherwise noted. Due to the repeated nature of the testing of possible group differences within each content section as well as each question type, a Bonferroni correction was applied. Because there were eight questions – and therefore eight statistical tests – per set, the adjusted p-value for significance testing of group differences was set at $p < .006$ (.05/8 = .006).

Knowledge of age-related decline in fertility: true versus untrue statements. Table 3 presents the descriptive statistics for the continuous measures relating to the age-related decline in fertility. Both samples showed a similar overall knowledge level of the age-related decline in fertility. Interestingly, both samples demonstrated mostly correct knowledge for the first item – that "fertility decreases with age for women," – which is arguably the most common knowledge item in this task ($M_{FSU} = 4.48$, $M_{MTurk} = 4.47$, correct answer = 5.00). However, except for the first item, participants in both samples demonstrated that they were not completely sure of the correct answers for the other seven items, indicated by mean scores that were toward the middle of the scale. Nonetheless, participants in both samples typically responded closer to the correct answer than the incorrect answer, even if just slightly, except for items 3 and 8. For item 3, slightly more participants believed that women are not likely to experience a decrease in fertility

before the age of 30, and for item 8, significantly more participants believed that women are most fertile before the age of 20; however, these were both incorrect choices. Turning toward differences between the samples, independent samples t-tests determined that none of the items had mean values that were significantly different between the FSU sample and Mechanical Turk sample (see Table 3).

Knowledge of age-related increase in pregnancy and childbirth complications: true versus untrue statements. Table 4 presents the descriptive statistics for the continuous measures relating to the age-related increase in pregnancy and childbirth complications. Both samples demonstrated mostly correct knowledge for the first item – that "the chance of having pregnancy or childbirth complications increases with age," – which is arguably the most common knowledge item in this task (M_{FSU} = 4.36, M_{MTurk} = 4.47, correct answer = 5.00). Additionally, items 3 and 8 for both samples had mean scores close to the middle of the scale, indicating that the participants were not completely sure of the correct answers for these; however, the rest of the items were farther away from the middle of the scale, indicating a particular overall belief of correctness for these statements. For items 1, 2, 4, and 5, there were general trends toward the correct answer for both samples. For item 6, there was a trend for most people to respond as believing that the chance of having a low birth weight baby does not depend on the father's age, which is untrue (M_{FSU} = 3.37, M_{MTurk} = 3.53, correct answer = 1.00).

There were significant differences in response patterns between the two samples (see Table 4). Independent samples t-tests indicated that there was a significant difference between the mean responses for the FSU sample and Mechanical Turk sample for item 2 ($t(498) = -3.075$, $p = .002$). This item had a mean that was closer to the correct value for the Mechanical Turk sample (M = 4.16, SD = 1.032), while the FSU sample had a mean farther away from the correct

value (M = 3.86, SD = 1.190). This implies that the Mechanical Turk population was significantly more knowledgeable about item 2. Additionally, Levene's test for equality of variance suggested that there were unequal variances for item 2 (F = 6.441, p = .011), causing the degrees of freedom to adjust from 505 to 498. For the rest of the items, however, independent sample t-tests indicated that there were no significant differences in knowledge between the two samples.

Knowledge of age-related decline in fertility: multiple-choice questions. Table 5 presents the frequencies for the multiple-choice questions relating to the age-related decline in fertility. Interestingly, the only item that the majority of participants selected the correct answer for was item 1 (FSU = 55%, MTurk = 46.4% correct), which asked about the age at which women are most fertile. The other items had fairly low percentages of correct answers, especially items 2 (FSU = 9.4%, MTurk = 14.4% correct), item 4 (FSU = 11.7%, MTurk = 10.3% correct), and item 6 (FSU = 14.5%, MTurk = 15.6% correct). Additionally, for items 2, 3, 7, and 8, there were greater proportions of answers at higher age ranges or percentages than the correct values. For item 2, the age at which there is a slight decrease in a woman's ability to become pregnant, and item 3, the age at which there is a marked decrease in a woman's ability to become pregnant, the age was overestimated for both samples, as indicated by a greater proportion of responses that were higher than the correct response. For item 7, the percentage of couples in the United States who are involuntarily childless, and item 8, the chance that a couple has of getting a child through treatment with in vitro fertilization (IVF), both samples reported higher percentages than the correct percentage. Additionally, for item 4, which asks about the age at which there is a marked decrease in male fertility, the most popular answer choice was "never – male fertility does not decrease with age," which was incorrect, and this choice contained one-fourth of the

total responses for the FSU sample and one-fifth of the total responses for the Mechanical Turk sample. Additionally, the "I don't know" response was common for items 4, 7, and 8 for both samples, and it was also common mostly just for the FSU student sample for items 5 and 6 as well. The FSU student sample typically responded with "I don't know" more often than the Mechanical Turk population.

The extent to which there were significant differences between the two samples in being correct versus incorrect on a given item was examined using chi-square analyses. Results indicated that there was a significant difference in the amount of correct responses between the FSU sample and Mechanical Turk sample for item 7 ($\chi^2(1) = 21.593$, $p = .000$) and item 8 ($\chi^2(1) = 9.655$, $p = .002$). For these two items, results suggested that a greater proportion of Mechanical Turk participants (28.5% and 20.2% respectively) selected the correct answer than the FSU participants (12.9% and 10.9% respectively).

Knowledge of age-related increase in pregnancy and childbirth complications: multiple-choice questions. Table 6 presents the frequencies for the multiple choice questions relating to the age-related increase in pregnancy and childbirth complications. Interestingly, almost all of these items had a very low percentage of participants who selected the correct answer, with less than 10% of correct answers in each sample for items 1, 2, 3, 4, and 5. Item 6, which asked about what percentage of pregnancies in women at the age of 35 will result in miscarriage, was the question answered correctly most often, with around one-fifth of the participants getting the correct answer. Additionally, for item 5, which asked about how much more likely men over the age of 40 are to have a child with an autism spectrum disorder compared to men under the age of 30, one of the choices was "equally likely," which was incorrect – this answer was selected by one-fourth of the participants for each sample. Also, for

items 1, 2, 3, 4, and 5, there were typically responses given for lower values. For example, item 1, which asked about the chance that a woman 15-24 years old will have of giving birth to a child with Down Syndrome, the correct answer was a greater chance than the perceived chances designated by the majority of the responses.

Examining differences between the samples, item 8 was the only item that indicated a significant difference in the total amount of correct responses. The chi-square analysis difference test indicated that more Mechanical Turk participants answered item 8 correctly than FSU student participants ($\chi^2(1) = 8.060$, $p = .005$). Although there were no other significant differences between the samples, there were interesting general trends. Overall, half of the items had a higher percentage of Mechanical Turk participants getting the correct answer, while the other half had a higher percentage of FSU students getting the correct answer. This seemingly random pattern suggests that both samples were unsure of the correct answers for these questions. Additionally, the "I don't know" response was typically selected by one-fourth of the FSU students and one-tenth of the Mechanical Turk population, suggesting that the FSU student sample was more unsure of the correct answers than the Mechanical Turk population. The only exception is for item 5, which had one-fourth of both samples select "I don't know" as their answer.

Aim 2: Determining What Factors are Associated with Differences in Knowledge Levels

To determine what factors are associated with differences in knowledge levels about age-related fertility and pregnancy/childbirth issues, three statistical tests were performed: independent sample t-test, one-way ANOVA, and Pearson correlation, depending on the nature of the independent variable. In total, 9 independent variables were tested as potential factors

related to knowledge levels, specifically age, current household income levels, highest level of education completed already, exposure to relevant issues, gender, race, ethnicity, having biological children, and perception of knowledge. For each independent variable, analyses were performed separately for each sample, separately for the fertility issues section and pregnancy/childbirth issues section, and separately for the true versus untrue variables and multiple-choice variables within those sections. As these were planned analyses, no correction for multiple testing was used.

Rather than using each item in each section as a dependent variable, data was collapsed to create continuous knowledge variables by content section and variable type in order to reduce the total amount of analyses. For the true versus untrue variables within each content section, which ranged from 1 as "definitely untrue" to 5 as "definitely true," the untrue statements were reverse coded, making 5 always the correct answer. Then, the sum total of each of these sections were then added up, making the total number of possible points per section to be 40, and higher scores were more correct than lower scores. Therefore, each participant received a score out of 40 for the true versus untrue questions for the fertility issues section and another score out of 40 for the pregnancy/childbirth section. Similarly, data was collapsed by content section for the multiple-choice variables. For these questions, the correct answer was coded as "1" and incorrect answers were coded as "0." The sum total of each of these sections were then added up, making the total number of possible points per section 8, and higher scores indicated more correct answers. Therefore, for the multiple-choice questions, each participant received a score out of 8 for the fertility issues section and another score out of 8 for the pregnancy/childbirth issues section.

Age. As age is a continuous variable, a Pearson correlation was performed to examine the association between age and knowledge level. For the fertility issues section, a significant

positive correlation was found between age and knowledge level for the true versus untrue variables for the FSU sample (r = .170, p = .006) but the relation for the Mechanical Turk sample was not significant (r = .057, p = .364). Similarly, there was also a significant positive correlation between age and knowledge level for the multiple-choice variables for the FSU sample (r = .167, p = .008) but not the Mechanical Turk sample (r = .040, p = .525). For the pregnancy and childbirth issues, however, no significant relation was found between age and knowledge level for the true versus untrue variables for the FSU sample (r = .041, p = .511) or the Mechanical Turk sample (r = .079, p = .214). For the multiple-choice variables, a significant positive correlation was found between age and knowledge level for the FSU sample (r = .149, p = .017) but not for the Mechanical Turk sample (r = -.045, p = .479). Overall, the Mechanical Turk sample did not show any significant correlation between age and knowledge level, while the FSU sample did show significant correlations between increased age and knowledge level for three out of the four sections.

Current household income. As current household income was measured using an interval scale, a Pearson correlation was performed to examine the association between current household income and knowledge level. For the fertility issues section, no significant relation was found between current household income and knowledge level for either the true versus untrue variables or for the multiple-choice variables for the FSU sample (r = .024, p = .723; r = .071, p = .289) or the Mechanical Turk sample (r = .093, p = .148; r = .020, p = .755). For the pregnancy and childbirth issues section, there was no significant relation between current household income and knowledge level for the true versus untrue variables for the FSU sample (r = -.040, p = .552), but a significant positive correlation between current household income and knowledge level was found for the Mechanical Turk sample (r = .206, p = .001). This indicates

that higher current household income may be associated with higher knowledge level of pregnancy and childbirth issues for the true versus untrue variables for the Mechanical Turk sample. For the multiple-choice variables, however, no significant relation between current household income and knowledge level was observed for the FSU sample (r = -.012, p = .853) or the Mechanical Turk sample (r = -.040, p = .531). Overall, the FSU sample did not show any significant correlations between current household income and knowledge level, while the Mechanical Turk sample showed a significant positive correlation between current household income and knowledge level for one out of the four sections.

Highest level of education completed. As education level is a categorical variable with more than two levels of the independent variable, a one-way ANOVA was performed to examine the relation between the highest level of education completed already and knowledge level. In addition, a Tukey post-hoc test was performed to determine which levels of the independent variable were significant. For the FSU sample, only one participant responded as having "completed graduate or professional school," which is insufficient to perform a Tukey post-hoc test. For this reason, this participant was omitted from this one-way ANOVA test and Tukey post-hoc test. For the fertility issues section, a significant relation was found between highest level of education completed for the true versus untrue statements for both the FSU sample (F(3, 251) = 3.396, p = .019) and the Mechanical Turk sample (F(6, 246) = 2.313, p = .034). For the Tukey post-hoc test for the FSU sample, no significance was found, suggesting that there were no significant differences between scores for each level. However, since the overall one-way ANOVA test yielded significant results, this test may suggest a linear pattern to the data rather than significant differences between levels. The difference between individual levels was not found to be significant, possibly due to correction for multiple testing; however, the overall trend

of education level compared to knowledge level was significant. On the other hand, for the Tukey post-hoc test for the Mechanical Turk sample, a relation was suggested between education levels completed and knowledge level for the true versus untrue variables for participants between levels. The knowledge level was significantly lower in the true versus untrue variables for participants who had graduated from high school or a high school equivalent (M = 26.17, SD = 3.27) compared to those who had completed graduate or professional school (M = 29.21, SD = 3.36, p = .014). These values suggest that higher education levels may be associated with greater mean score for the true versus untrue variables in the Mechanical Turk sample. For the multiple-choice variables, there was no significant relation found between highest level of education completed and knowledge level for the FSU sample (F(3, 251) = .782, p = .505). However, significant relations were found between highest level of education completed and knowledge level for the Mechanical Turk sample (F(6, 245) = 3.648, p = .002). For the Tukey post-hoc test for the Mechanical Turk sample, a relation was suggested between education level completed and knowledge level for the multiple choice variables. The knowledge level was significantly lower in the multiple-choice variables for participants who had graduated from high school or a high school equivalent (M = 1.31, SD = 1.09) than for those who had graduated from a 4-year college (M = 2.18, SD = 1.33, p = .019) or attended graduate or professional school without graduating (M = 2.36, SD = 1.61, p = .013). These values suggest that higher education level may be associated with greater proportion of correct scores for the multiple-choice variables in the Mechanical Turk sample.

On the other hand, for the pregnancy and childbirth issues section, no significant relation was found between highest level of education completed and knowledge level for the true versus untrue statements for the FSU sample (F(3, 251) = 1.108, p = .347), but a significant relation

was found for the Mechanical Turk sample ($F(6, 244) = 5.382$, $p = .000$). For the Tukey post-hoc test, the Mechanical Turk sample revealed a relation between education levels completed and knowledge level. For example, the knowledge level was suggested to be significantly lower in the true versus untrue variables for participants who had graduated from high school or a high school equivalent ($M = 25.83$, $SD = 3.12$) compared to those who had completed some college ($M = 28.06$, $SD = 3.44$, $p = .015$), graduated from a 4-year college ($M = 28.11$, $SD = 3.75$, $p = .013$), or completed graduate or professional school ($M = 30.74$, $SD = 3.54$, $p = .000$). Additionally, those who had completed some college ($M = 28.06$, $SD = 3.44$) had significantly lower knowledge level than those who had completed graduate or professional school ($M = 30.74$, $SD = 3.54$, $p = .043$). Also, those who had graduated from a 2-year college ($M = 27.16$, $SD = 3.09$) had a significantly lower knowledge level than those who had completed graduate or professional school ($M = 30.74$, $SD = 3.54$, $p = .013$). These values all suggest that higher education levels may be associated with higher scores for the true versus untrue variables. Additionally, for the multiple-choice variables, a significant relation was found between highest level of education completed and knowledge level for the FSU sample ($F(3, 251) = 4.345$, $p = .005$), but no significant relation was found between highest level of education completed and knowledge level for the Mechanical Turk sample ($F(6, 244) = .734$, $p = .622$). For the FSU sample, the knowledge level was suggested to be significantly lower in the true versus untrue variables for participants who had graduated from high school or a high school equivalent ($M = .546$, $SD = .661$) compared to those who had completed some college already ($M = .828$, $SD = .847$, $p = .028$). Overall, two out of the four sections for the FSU sample and three out of the four sections for the Mechanical Turk sample indicated significant relations between highest level of

education completed and knowledge level, and both samples suggested through Tukey post-hoc tests that higher education levels may be associated with higher knowledge level.

Exposure. Exposure to relevant fertility issues or relevant pregnancy and childbirth issues were scored using a variety of items from the questionnaire. To determine if participants demonstrated exposure to relevant fertility issues, the participant would have to select "yes" as the answer for one of the following: if the participant or their partner have used any type of assisted reproductive technology (such as IVF), if the participant or their partner has been diagnosed with infertility or any other reproductive issue, if anyone in the participant's family (parents and siblings) has been diagnosed with infertility or any other reproductive issue, or if the participant or their partner has seen a fertility specialist for reproductive assistance. If one or more of the statements were true, the participant was assigned a score of "1," while if none of the statements were true, the participant was assigned a score of "0." Similarly, to determine if participants demonstrated exposure to relevant pregnancy and childbirth issues, the participant would have to select "yes" as the answer for one of the following: if the participant or their partner have ever had a miscarriage or a stillbirth, if anyone in the participant's family (parents or siblings) have ever had a miscarriage or a stillbirth, if the participant or their partner has ever seen a genetic counselor for reproductive counseling or prenatal genetic screening, or if anyone in the participant's family (including the participant, parents, and siblings) have any type of chromosomal abnormality or congenital anomaly. If one or more of the statements was true, the participant was assigned a score of "1," while if none of the statement were true, the participant was assigned a score of "0."

Because the condition of having exposure to relevant fertility issues or pregnancy and childbirth issues is a categorical variable, an independent sample t-test was performed to

examine the relation between exposure and knowledge level. For each test relating to exposure, Levene's test for equality of variance suggested that there were no significant differences between the variances for each sample, so equal variances may be assumed. The condition of exposure to fertility issues was tested against the true versus untrue variables and multiple-choice variables of the fertility issues section. No significant relation was found for the true versus untrue variables for the FSU sample ($t(254) = .512$, $p = .609$). However, a significant relation was found for the true versus untrue variables for the Mechanical Turk sample ($t(251) = -2.691$, $p = .008$), where those with exposure to relevant fertility issues ($M = 3.549$, $SD = .427$) are associated with higher knowledge levels than those without exposure ($M = 3.345$, $SD = .404$). For the multiple-choice variables, however, no significant relation was found between exposure and knowledge level for the FSU sample ($t(254) = -.001$, $p = .999$) or the Mechanical Turk sample ($t(250) = .865$, $p = .388$). Additionally, the condition of exposure to pregnancy and childbirth issues was tested against the true versus untrue variables and multiple-choice variables for the pregnancy and childbirth issues section. A significant relation was found for the true versus untrue variables for the FSU sample ($t(254) = -2.098$, $p = .037$), where those with exposure to relevant pregnancy and childbirth issues ($M = 3.513$, $SD = .439$) are associated with higher knowledge levels than those without exposure ($M = 3.385$, $SD = .477$). However, no significant relation was found for the true versus untrue variables for the Mechanical Turk sample ($t(249) = -1.710$, $p = .088$). Additionally, no significant relation was found for the multiple-choice variables for the FSU sample ($t(254) = -.623$, $p = .534$) or for the Mechanical Turk sample ($t(249) = .476$, $p = .634$). Overall, a significant relation was found for one out of the four sections for the FSU sample, which associates exposure to relevant pregnancy and childbirth issues with higher knowledge level for the pregnancy and childbirth issues section. Additionally,

a significant relation was found for one out of the four sections for the Mechanical Turk sample, which associates exposure to relevant fertility issues with higher knowledge level for the fertility issues section.

Gender. As gender is a categorical variable, an independent sample t-test was performed to examine the relation between gender and knowledge level. For each test relating to gender, Levene's test for equality of variance suggested that there were no significant differences between the variances for each sample, so equal variances may be assumed. For the fertility issues section, the FSU sample did not show a significant relation between men and women for total knowledge level for the true versus untrue variables ($t(254) = .223$, $p = .824$). On the other hand, there was a significant difference in the total knowledge level between men and women for the true versus untrue variables for the Mechanical Turk sample ($t(250) = -2.669$, $p = .008$). The pattern indicated that women ($M = 27.478$, $SD = 3.483$) had significantly more correct answers than men ($M = 26.377$, $SD = 2.964$). However, for the multiple-choice variables, there was no significant relation found between gender and knowledge level for the FSU sample ($t(254) = -1.881$, $p = .061$) or the Mechanical Turk sample ($t(249) = -1.812$, $p = .071$). On the other hand, for the pregnancy and childbirth issues section, there was a significant relation found for the true versus untrue variables between gender and knowledge level for both the FSU sample ($t(254) = -4.067$, $p = .000$) and the Mechanical Turk sample ($t(248) = -4.612$, $p = .000$). For both, the results indicated that women ($M_{FSU} = 28.000$, $SD_{FSU} = 3.636$; $M_{MTurk} = 28.717$, $SD_{MTurk} = 3.233$) had significantly more correct answers than men ($M_{FSU} = 25.929$, $SD_{FSU} = 3.621$; $M_{MTurk} = 26.670$, $SD_{MTurk} = 3.786$). For the multiple-choice variables, however, there was no significant relation found between gender and knowledge level for the FSU sample ($t(254) = -.494$, $p = .622$) or the Mechanical Turk sample ($t(248) = .763$, $p = .446$). Overall, the Mechanical Turk

sample had two out of the four sections show significantly higher knowledge levels in women than in men, while only one of the four sections for the FSU sample showed significantly higher knowledge levels in women than in men.

Race. As race is a categorical variable with more than two levels of the independent variable, a one-way ANOVA was performed to examine the association between race and knowledge level. In addition, a Tukey post-hoc test was performed to determine which levels of the independent variable were significant. For the fertility issues section, no significant relations were found between race and knowledge level for the true versus untrue variables for the FSU sample ($F(3, 248) = .537$, $p = .657$) or for the Mechanical Turk sample ($F(4, 246) = 1.451$, $p = .218$). However, there was a significant relation found between race and knowledge level for the multiple-choice variables for the FSU sample ($F(3, 248) = 3.093$, $p = .028$), while no significant relation was found for the Mechanical Turk sample ($F(4, 245) = .585$, $p = .674$). For the Tukey post-hoc test for the FSU sample, no significance was found, suggesting that there were no significant differences between scores for each level. However, since the overall one-way ANOVA test yielded significant results, this test may suggest a linear pattern to the data rather than significant differences between levels. The difference between individual levels was not found to be significant, possibly due to correction for multiple testing; however, the overall trend of race compared to knowledge level was significant. For the pregnancy and childbirth issues section, no significant relations were found between race and knowledge level for the true versus untrue variables or the multiple-choice variables for the FSU sample ($F(3, 248) = .639$, $p = .590$; $F(3, 248) = 1.269$, $p = .286$) or for the Mechanical Turk sample ($F(4, 244) = .121$, $p = .975$; $F(4, 244) = .224$, $p = .925$). Overall, only one out of four sections had significant relations between

race and knowledge level for the FSU sample, and no association was found between race and knowledge level for the Mechanical Turk sample.

Ethnicity. As ethnicity is a categorical variable with only 2 levels (Hispanic/Latino and non-Hispanic/Latino), an independent sample t-test was performed to examine the relation between ethnicity and knowledge level. For each test relating to ethnicity, Levene's test for equality of variance suggested that there were no significant differences between the variances for each sample, so equal variances may be assumed. For the fertility issues section, no significant relation was found between the true versus untrue variables or the multiple-choice variables for the FSU sample ($t(250) = -1.318$, $p = .189$; $t(250) = -1.208$, $p = .228$) or for the Mechanical Turk sample ($t(249) = -.935$, $p = .351$; $t(249) = -1.115$, $p = .266$). For the pregnancy and childbirth issues section, however, a significant relation was found for the true versus untrue variables for the FSU sample ($t(250) = -2.170$, $p = .031$), where the non-Hispanic/Latino population was associated with higher knowledge levels ($M = 27.722$, $SD = 3.778$) than the Hispanic/Latino population ($M = 26.517$, $SD = 3.460$). There was no significant relation found for the true versus untrue variables for the Mechanical Turk sample ($t(249) = 1.224$, $p = .222$). In addition, there was no significant relation between ethnicity and knowledge level for the multiple-choice variables for the FSU sample ($t(250) = -.887$, $p = .351$) or for the Mechanical Turk sample ($t(247) = 1.132$, $p = .259$). Overall, one out of four sections for the FSU sample had significant results, indicating that the non-Hispanic/Latino population may have a greater knowledge level for the pregnancy and childbirth issues section for the true versus untrue variables than the Hispanic/Latino population. No significant results were found for the Mechanical Turk, suggesting no significant relations between ethnicity and knowledge level.

Biological children. As the condition of having biological children or not having biological children is a categorical variable, an independent sample t-test was performed to examine the relation between having biological children and knowledge level. For each test relating to the condition of having biological children, Levene's test for equality of variance suggested that there were no significant differences between the variances of the samples, so equal variances may be assumed. For the fertility issues section, no significant relation was found between the condition of having biological children and knowledge level for both the true versus untrue variables and multiple-choice variables for the FSU sample ($t(254) = -.647$, $p = .609$; $t(254) = 1.651$, $p = .100$) or for the Mechanical Turk sample ($t(251) = .615$, $p = .539$; $t(250) = .349$, $p = 727$). Additionally, for the pregnancy and childbirth issues section, no significant relation was found between the condition of having biological children and knowledge level for both the true versus untrue variables and the multiple-choice variables for the FSU sample ($t(254) = -.512$, $p = 609$; $t(254) = 1.386$, $p = .167$) or for the Mechanical Turk sample ($t(248) = 1.532$, $p = .127$; $t(249) = 1.068$, $p = .287$). Overall, no significant relation was found between the condition of having biological children and knowledge level for any of the fertility issues sections or pregnancy and childbirth issues sections for both the FSU sample and the Mechanical Turk sample, indicating that the condition of having biological children does not influence knowledge level.

Perceived knowledge level. Perception of knowledge level was assessed by requesting the participants to select a value representing how educated they believe they are about topics relating to how age affects a person's fertility and also how educated they believe they are about topics relating to how age affects the likelihood of certain pregnancy and childbirth issues, ranked from 1 as "not at all educated" to 5 as "extremely educated." Since this perception of

knowledge level exists as a continuous variable, a Pearson correlation was performed to examine the association between perception of knowledge level and actual knowledge level. For the fertility issues section, no significant correlations were found for either the true versus untrue variables or the multiple-choice variables for the FSU sample ($r = .113$, $p = .071$; $r = .019$, $p = .766$) or for the Mechanical Turk sample ($r = .121$, $p = .055$; $r = .031$, $p = .628$). These tests indicated that there is no significant correlation between the perception of knowledge level and actual knowledge level. On the other hand, for the pregnancy and childbirth issues section, there were significant positive correlations for the true versus untrue variables for the FSU sample ($r = .129$, $p = .039$) and for the Mechanical Turk sample ($r = .165$, $p = .009$). This suggests that with higher perceived knowledge, more correct scores were obtained. On the other hand, the multiple-choice variables did not result in significant correlations for the FSU sample ($r = .059$, $p = .348$) or for the Mechanical Turk sample ($r = .015$, $p = .811$). Overall, one out of four tests for the FSU sample and one out of four tests for the Mechanical Turk sample gave significant positive correlations, which may suggest that increasing perceived knowledge is related to increasing actual knowledge level for the true versus untrue variables for the pregnancy and childbirth issues section.

Discussion

In the United States, there is a growing trend for both men and women to delay childbearing until later in life (Crosnoe & Kim, 2013; Martin, Hamilton, Ventura, Osterman, Wilson & Mathews, 2012). Additionally, current research suggests that there is a lack of knowledge about the increased risks associated with delaying childbearing, specifically related to increased rates of infertility and other pregnancy and childbirth complications (Peterson, Pirritano, Tucker & Lampic, 2012; Sandford, 2012; Tough et al., 2006). The first aim of this

study was to determine the overall knowledge level that people have of the increased risks involved in delaying childbearing, specifically relating to age-related fertility decline and age-related pregnancy and childbirth complications. The second aim of this study was to determine what factors are associated with differences in knowledge level about these risks. The goal of this research was to determine what factors are associated with lower knowledge about these age-related risks in order to identify specific populations that may benefit from public health interventions. Based on previous research, it was hypothesized that there would be, on average, a relatively low level of knowledge about the risks involved in delaying childbearing. In addition, it was expected that participants with a higher age, household income, education level, and exposure to certain reproductive or fertility issues would have a higher level of knowledge of these risks than those who have a lower age, education level, household income, and level of exposure to certain reproductive or fertility issues. Additionally, it was hypothesized that females would have a higher knowledge level than males, participants who identify their race as White would have a higher knowledge level than participants who identify their race as a race other than White, participants who identify their ethnicity as non-Hispanic/Latino would have a higher knowledge level than participants who identify their ethnicity as Hispanic/Latino, participants with biological children would have a higher knowledge level than participants who do not have biological children, and the perception of knowledge level would be higher for those with a higher knowledge level and lower for those with a lower knowledge level.

To test these hypotheses, two samples were used, including an undergraduate student sample from the Florida State University psychology department and a general population sample from Mechanical Turk. The sample of undergraduate students is a more understood method of data collection in a university setting, and the results can be compared with previous

research based on this population; however, it also has biases that make it not as representative of the general population (Gosling, Vazire, Srivastava, & John, 2004). Because of this, an additional sample of the general adult population was taken through Mechanical Turk, which allowed this study's questionnaire to reach all parts of the United States through the Internet to capture a more representative population (for more information on Mechanical Turk, see Appendix A). Additionally, for each sample, two different categories of knowledge level were tested (fertility issues and pregnancy and childbirth issues), with two different sets of variables within each category (true versus untrue variables and multiple-choice variables).

Aim 1: Overall Levels of Factual Knowledge

The hypothesis that the overall levels of factual knowledge of age-related fertility and pregnancy/childbirth issues would be relatively low was, for the most part, supported. The overall knowledge levels were constructed in two different ways using two different sets of variables. The true versus untrue variables demonstrated knowledge on a continuous scale, showing general trends of knowledge level. On the other hand, the multiple-choice variables demonstrated knowledge in a more concrete fashion, showing the proportion of participants that knew the correct answer.

True versus untrue variables. For the true versus untrue variables in the fertility issues section, both the FSU sample and Mechanical Turk sample seemed to generally understand that "fertility decreases with age for women." Except for this item, however, both samples seemed to demonstrate that they were unsure of the correct answers for the other seven items, indicated by mean scores that were closest to the "neither true nor untrue" option. However, even though the mean scores were close to the "neither true nor untrue" option, participants slightly leaned

toward correct responses for six items and incorrect responses for two items. The responses indicated that participants more often incorrectly believed that the statement "women are likely to experience a decrease in fertility before the age of 30" was untrue, when it actually was true, and they incorrectly believed that the statement that "women are most fertile before the age of 20" was true, when it was actually untrue. These findings may suggest that people believe that a person's fertility window is wider than what it actually is, since they believed that women are most fertile before the age of 20 but are not likely to experience a decrease in fertility before the age of 30. Overall, however, the results suggested that people were mostly unsure of what the correct answers for these items were.

For the pregnancy and childbirth issues section, both the FSU sample and Mechanical Turk sample seemed to generally understand that "the chance of having pregnancy or childbirth complications increases with age," but this was the only item that had a mean score close to the correct response. For the item stating that "as women age, the chance of having twins or triplets decreases," which is untrue, and for the item stating that "as men age, the chance of having a child with an autism spectrum disorder or schizophrenia increases," which is true, the mean scores were closer to the "neither true nor untrue" option, suggesting that the participants were unsure of the correct answer for these. For the other six items, however, the mean scores were farther away from the middle of the scale, indicating a particular overall belief of correctness for these statements. For the item stating that "the chance of having a low birth weight baby does not depend on the father's age," more participants believed this was true, when it was actually untrue. These findings may suggest that people do not fully understand the influence that the father plays in having children. Additionally, it was determined that for the item stating that "as women age, the chance of having a child with Down Syndrome increases," which was true, there

was a significant difference between responses of the FSU sample and the Mechanical Turk sample, with the Mechanical Turk sample having a higher proportion of participants selecting that the item was true. This may suggest that the Mechanical Turk sample may be more knowledgeable about this topic, which may be due to the higher mean age of the Mechanical Turk sample compared to the FSU sample.

Multiple-choice variables. For the multiple-choice variables in the fertility issues section, the only item that the majority (around half) of participants selected the correct answer for was the item that asked about the age at which women are most fertile. The other seven items had fairly low percentages of correct answers for the items, indicating a low level of knowledge about these topics. Additionally, for the item asking about the age at which there is a marked decrease in male fertility, the most popular answer choice, selected by one-fourth of the FSU participants and one-fifth of the Mechanical Turk participants, was "never – male fertility does not decrease with age," which was incorrect. This may suggest that people are unfamiliar with the concept of male fertility decreasing with age. Also, for the item asking about at what age there is a marked decrease in a woman's ability to become pregnant, the most common choice was 40-44, which was selected by one-third of participants, suggesting a belief that fertility is decreased later than it actually is. Additionally, the FSU sample typically responded with "I don't know" for each item more often than the Mechanical Turk sample, suggesting that the FSU sample was more unsure of the correct answer than the Mechanical Turk sample. Similarly, both the item asking about how many couples in the United States are involuntarily childless and the item asking about what the chance is of a woman getting pregnant after undergoing treatment with in vitro fertilization (IVF) had significantly different responses between the FSU sample and the Mechanical Turk sample, with the Mechanical Turk sample selecting the correct answer

more frequently for both items. This, also, suggests that the Mechanical Turk sample may be more knowledgeable about these topics than the FSU sample.

For the pregnancy and childbirth issues section, almost all of the items had a very low percentage of participants who selected the correct answer, with less than 10% of participants in the FSU sample and Mechanical Turk sample selecting the correct answer for five of the eight items. This may suggest a low knowledge level for these topics. The item that asked about what percentage of pregnancies in women at the age of 35 will result in a miscarriage was the item that had the most correct responses, but only one-fifth of participants selected the correct answer for this, suggesting that the correct answer was still unknown to most participants. For the item that asked about how much more likely men over the age of 40 are to have a child with an autism spectrum disorder compared to men under the age of 30, the most common response, which was selected by one-fourth of participants, was "equally likely," which was untrue. This may suggest that people are unsure about the relation between the ages of men and the chance of having a child with an autism spectrum disorder. For all four of the items asking about the chance that a woman of a particular age will have a child with Down Syndrome or any chromosomal abnormality, smaller chances were selected more frequently than the correct chance or greater chances. For example, the most common response to the item asking about that the chance that a woman 15-24 years old will give birth to a child with any type of chromosomal abnormality was 1 in 2,000, when the correct answer was 1 in 500. The responses for all four of these items suggest that the participants believed that there is a lower chance of having a child with Down Syndrome or any chromosomal abnormality than there actually is. Also, for the item asking about what percentage of pregnancies in women at the age of 35 will result in a low birth weight baby, there was a significant difference in responses between the FSU sample and Mechanical

Turk sample, with the Mechanical Turk sample having a higher proportion of correct responses. This suggests that the Mechanical Turk sample was more knowledgeable about this item. Similarly, the "I don't know" response was typically selected by one-fourth of the FSU participants and one-tenth of the Mechanical Turk participants, suggesting that the FSU sample was more unsure of the correct answers than the Mechanical Turk sample. The only exception is for the item asking about how much more likely men over the age of 40 are to have a child with an autism spectrum disorder compared to men under the age of 30, for which both samples had one-fourth of the participants select "I don't know" as their answer. This suggests that both samples were unsure of the correct answer.

Overall trends. Overall, the results from this study demonstrate that knowledge levels for age-related fertility issues and age-related pregnancy and childbirth issues were relatively low, which supports the hypothesis that the overall levels of factual knowledge of age-related fertility and pregnancy/childbirth issues would be relatively low. The true versus untrue variables mostly demonstrated that the participants were unsure of the correct answer, while one of the fertility issues items and one of the pregnancy and childbirth issues items had a relatively high level of correct responses, and two of the fertility issues items and one of the pregnancy and childbirth issues item demonstrated incorrect trends in knowledge. There was not much of a difference between the FSU sample and Mechanical Turk sample for the true versus untrue variables. For the multiple-choice variables, however, the Mechanical Turk sample demonstrated more correct knowledge than the FSU sample, demonstrated by several items with greater proportions of correct answers and selecting the "I don't know" option less frequently. However, the overall responses showed a low level of knowledge, suggested by the low proportion of correct responses for each item in both sections. So, overall, for all sections, there was typically a

low level of knowledge and a high level of uncertainty of the correct answer, which supported the hypothesis.

Previous research. The findings from this study are consistent with previous research in this area. A study by Sandford (2012) determined that only 30% of participants were able to correctly answer more than 50% of the questions presented, which all focused on pregnancy and childbirth complications. This study had a small sample size ($N = 27$), however, so the results may be limited. Similarly, a study by Tough et al. (2006) determined that only 37% of respondents scored greater than 50% on items relating to maternal age risks, which all focused on pregnancy and childbirth complications. This study, which had a large sample size ($N = 1,044$), only had participants who were women in urban areas of Canada who had just delivered their first child, which is a very specific sample that may not be as representative of the general population (Tough et al., 2006). Another study by Peterson, Pirritano, Tucker, and Lampic (2012), which studied the knowledge of age-related decline in fertility, suggested that participants demonstrated a lack of awareness of fertility windows by overestimating the age at which women experience declines in fertility, which is consistent with the present study. The sample size ($N = 246$) was similar to the sample size for the present study for the FSU sample ($N = 256$), and both samples consisted of undergraduate students as participants, making this study a good comparison. Although all three of these studies did confirm parts of the current research, there is limited research in this area, so some areas cannot be compared to past research, including factors related to parental age. Additionally, the samples in past research have been limited by size or by specific populations being studied. However, the present research utilized a more representative sample through the use of the Mechanical Turk sample, allowing the past research to be supported or expanded further.

Aim 2: Determining What Factors are Associated with Differences in Knowledge Levels

Because a remarkably low level of knowledge of the increased risks involved in delaying childbearing was observed, it is important to find out what factors may be associated with this low knowledge level. It was hypothesized that participants with a higher age, household income, education level, and exposure to certain reproductive or fertility issues would have a higher level of knowledge of these risks than those who have a lower age, education level, household income, and level of exposure to certain reproductive or fertility issues. Additionally, it was hypothesized that females would have a higher knowledge level than males, participants who identify their race as White would have a higher knowledge level than participants who identify their race as a race other than White, participants who identify their ethnicity as non-Hispanic/Latino would have a higher knowledge level than participants who identify their ethnicity as Hispanic/Latino, participants with biological children would have a higher knowledge level than participants who do not have biological children, and the perception of knowledge level would be higher for those with a higher knowledge level and lower for those with a lower knowledge level. These hypotheses were, for the most part, not supported. The only factor that had a conclusive association was the association between highest level of education completed already and higher knowledge level. These analyses were constructed using two different sets of variables for both the fertility issues section and the pregnancy and childbirth issues section. The true versus untrue variables and multiple-choice variables within each section were compared with the hypothesized factors that could influence knowledge level of the increased risks involved in delaying childbearing.

Age. For the FSU sample, the hypothesis that higher age would contribute to a higher overall knowledge level was somewhat supported. For three out of four sections, there was a

positive correlation between age and knowledge level for the FSU sample, suggesting that there is a relation between higher age and higher knowledge level. However, for the Mechanical Turk sample, there was no correlation between age and knowledge level, which does not support the hypothesis. This was a surprising result. Since the Mechanical Turk sample was more representative of the general population and had a greater variance for age than the FSU sample, it was expected that this sample would show a relation of knowledge to age, but that was not found. For the FSU sample, however, which had a greater proportion of younger participants than the Mechanical Turk sample, there was a significant correlation between age and knowledge level for three out of four sections. This could be due to various factors, such as if students at higher ages have had more fertility, pregnancy, or childbirth education-related experiences than the students at lower ages, which were in the age range to have started college soon after high school. The mean age of mothers for their first childbirth in 2011 was 25.6, which is after the average student would finish their undergraduate degree (Martin, Hamilton, Ventura, Osterman, & Mathews, 2013). This may suggest that the older students may have had a greater chance of being exposed to conditions relating to fertility, pregnancy, and childbirth, since the older students in this sample were past the mean age of first childbirth. Overall, however, the results between the FSU sample and Mechanical Turk sample are conflicting, so more research needs to be done to determine the reasoning for these opposing results before conclusive associations can be made.

Current household income. Overall, the hypothesis that higher current household income levels would be associated with higher knowledge levels was not supported. Although one out of the four sections for the Mechanical Turk sample did have significant results, suggesting that increasing current household income level is associated with greater knowledge

of age-related pregnancy and childbirth issues, only having one out of four sections with a significant result does not indicate a strong relation. Additionally, the FSU sample found no significant results for current household income level compared to knowledge level. Overall, it can be implied that current household income level is not associated with knowledge level for the age-related decrease in fertility or age-related increase in pregnancy and childbirth complications.

Highest level of education completed. The hypothesis that participants with a higher level of education completed already would be associated with higher knowledge levels was reasonably supported. Two out of four sections for the FSU sample and three out of four sections for the Mechanical Turk sample indicated a relation between higher level of education completed already and higher knowledge level. Therefore, it can be implied that higher level of education may be related to knowledge level. Studies have shown that there is a relation between higher education level and higher knowledge level for general topics; therefore, this trend in higher education level and higher specific knowledge level may be due to the literal education component, where people will learn about the age-related risks in delaying childbearing in their coursework, or it may be due to the personal differences between those who have a higher level of education than those who have a lower level of education (Heron & Sligo, 2005). Overall, it can be determined that there may be a conclusive association between higher education level and higher knowledge level.

Exposure. The hypothesis that exposure to relevant fertility or pregnancy/childbirth issues would be associated with higher knowledge levels was relatively unsupported. One out of four sections for the FSU sample determined that exposure to relevant pregnancy and childbirth issues was associated with higher knowledge level for the pregnancy and childbirth issues

section. Additionally, one out of four sections for the Mechanical Turk sample determined that exposure to relevant fertility issues was associated with higher knowledge for the fertility issues section. However, because these results are significant for a small proportion and in different categories, the results indicate no conclusive association between exposure and knowledge level, if there is any association at all. Because this condition of exposure was measured from types of relevant direct exposure (such as from personal experience or experiences by their partner, their parents, or their siblings), these conflicting results may have occurred if participants did not receive most of their knowledge from direct exposure, but instead, from other sources that were not assessed (such as from friends, media, etc.). Overall, no conclusive association is found between exposure and knowledge level.

Gender. Overall, there was not a consistent relation between gender and knowledge level. Two out of four sections showed a significant relation between gender and knowledge level for the Mechanical Turk section, and only one out of four sections showed a significant relationship between gender and knowledge level for the FSU sample. However, each of these significant relations were only for the fertility issues sections, suggesting that there may be a relation between gender and knowledge level for fertility issues. For each of these, there were significantly higher knowledge levels in women than in men, suggesting that women are more knowledgeable about the age-related decline in fertility. This could be due to a number of reasons, such as the fact that women have monthly menstrual cycles that regulate their fertility, so they may be more aware of their fertility than males, who do not have monthly menstrual cycles to regulate their fertility. However, no relation is suggested for gender and knowledge level for the pregnancy and childbirth issues sections, which may be because pregnancy may

involve both partners more equally. Overall, fertility knowledge may be associated with age, but pregnancy and childbirth knowledge does not show an association with age.

Race. No strong association between race and knowledge level was found. Although one out of four sections had significant relations between race and knowledge level for the FSU sample, no significant differences were found between individual levels, and there is not enough indication to assume a relation between race and knowledge level. For the Mechanical Turk sample, no relation between race and knowledge level was found. Overall, there seems to be no association between race and knowledge of the age-related risks in delaying childbearing.

Ethnicity. No strong association with ethnicity and knowledge level was found. One out of four sections for the FSU sample had significant results, suggesting that the non-Hispanic/Latino population may have a greater knowledge level for the pregnancy and childbirth issues section than the Hispanic/Latino population; however, only one section is not a strong enough indication of an association. For the Mechanical Turk sample, no association was found between ethnicity and knowledge level. Overall, there seems to be no association between ethnicity and knowledge of the age-related risks in delaying childbearing.

Biological children. No association between having biological children and knowledge level was found for the FSU sample or the Mechanical Turk sample. This was a surprising result, since it was expected that if one has experienced pregnancy/childbirth then that person might be more knowledgeable about the issues related to it. However, this was not supported. Only 1.2% of the FSU sample reported having biological children, which is a very small proportion as compared to the rest of the sample, indicating that there were likely not enough individuals with previous experience with biological children to support these analyses. However, the Mechanical

Turk sample had 59.3% of their participants report having biological children, so this reasoning does not apply to the Mechanical Turk sample. For the Mechanical Turk sample, it is possible that the participants who responded as having biological children did not experience many complications with fertility, pregnancy, or childbirth, leading to knowledge levels similar to those who do not have biological children. Less than 6% of all participants in the Mechanical Turk sample reported having to use assistive reproductive technology in their previous pregnancy, themselves or their partner being diagnosed with infertility, having seen a fertility specialist for reproductive assistance, or having seen a genetic counselor for reproductive counseling or prenatal genetic screening, and 15.3% of participants reported themselves or their partner ever having a miscarriage. These are all low amounts, which could support the reasoning that those who have biological children may not have experienced complications that could have increased their knowledge. Overall, however, there seems to be no association between having biological children and knowledge level.

Perceived knowledge level. Only one out of four sections for the FSU sample and one out of four sections for the Mechanical Turk sample showed significant relations between the perceived knowledge level and actual knowledge level of the participants. However, both of these significant results were in the pregnancy and childbirth issues section. This suggests that there may be a slight relation between perceived knowledge level and actual knowledge level for the pregnancy and childbirth issues section, implying that those who perceived a higher knowledge level were associated with getting more correct answers. However, this association, if any, is not conclusive since the other sections did not support it.

Overall trends. The hypothesis that participants with a higher age, household income, education level, and exposure to certain reproductive or fertility issues would have a higher level

of knowledge of these risks than those who have a lower age, education level, household income, and level of exposure to certain reproductive or fertility issues was partially supported and partially unsupported. The hypothesis that higher education level would be associated with a higher knowledge level was supported consistently between the FSU sample and the Mechanical Turk sample. However, the hypothesis that age would be associated with a higher knowledge level was supported by the FSU sample but was not supported by the Mechanical Turk sample, leading to an inconclusive association. Additionally, current household income and exposure to relevant reproductive or fertility issues both seemed to have little to no relation to knowledge level, which did not support the hypotheses. All of the conditions except for age had similar proportions of significant associations between the variables and knowledge level for the FSU sample and the Mechanical Turk sample.

Additionally, it was hypothesized that females would have a higher knowledge level than males, participants who identify their race as White would have a higher knowledge level than participants who identify their race as a race other than White, participants who identify their ethnicity as non-Hispanic/Latino would have a higher knowledge level than participants who identify their ethnicity as Hispanic/Latino, participants with biological children would have a higher knowledge level than participants who do not have biological children, and the perception of knowledge level would be higher for those with a higher knowledge level and lower for those with a lower knowledge level. These hypotheses were, for the most part, not supported. It was found that there might be a relation between gender and knowledge level for the fertility issues sections but not for the pregnancy and childbirth issues sections. Race, ethnicity, having biological children, and perceived knowledge level all seemed to have little to no relation to knowledge level.

Most of the proposed hypotheses were not supported in this study, which could be due to a number of reasons. Based on the low overall knowledge level determined for the first aim of this study, it is possible that most populations have a low knowledge level in general about the increasing risks involved in delaying childbearing. This could help explain why only a few factors had an effect on knowledge level, which could be because only a few factors actually have the possibility of influencing knowledge level, since the knowledge level is so low to begin with. This also could suggest that it is rare to find someone with a high knowledge level, meaning that most of the participants in this study would not have had the characteristics of someone with a higher knowledge level.

Previous research. Little research has been done to compare overall knowledge levels of age-related fertility or pregnancy/childbirth issues to other demographic information. A study by Sandford (2012) determined that there was no association between education level and "reasonable knowledge" (more than 50% of the questions answered correctly); however, this study had a limited sample size ($N = 27$), and therefore the results might be limited. Another study, however, by Tough et al. (2006) found that characteristics associated with a lower knowledge level were an age of 35-39, less than post-graduate education, and not currently being enrolled as a student; however, this study had a specific sample of women in urban areas of Canada who had just delivered their first child, making this not as relatable to the general population. The present research found no association between age and knowledge level; however, specific intervals such as 35-39 were not tested, so this cannot be compared adequately. The present research does confirm the association between education level and knowledge level, however. Although these studies confirm parts of the current research, there is limited research in this area, so some areas cannot be compared to past research, including

factors related to the age-related decline in fertility and factors related to paternal age. Additionally, the samples in the past research have been limited by size or by specific populations being studied. However, the present research utilized a more representative sample through the use of the Mechanical Turk sample, allowing the past research to be supported or expanded further.

Limitations and Future Research

As with any research study, limitations existed within the study that may have influenced the results. Although two samples were used – one from an undergraduate student population and one from Mechanical Turk to simulate a general population – it may be possible that neither population could have adequately represented the United States population. Because the FSU sample consisted of only undergraduate students enrolled in a Psychology course, this sample is not very representative of the general population; however, it was still included in the study to compare with previous research done by Peterson and colleagues (2012) which also studied an undergraduate sample. The Mechanical Turk sample has been studied and determined to be representative of the United States internet-using population; however, this is not precisely representative of the United States, since the whole population does not use the internet (Ross, Irani, Silberman, Zaldivar, & Tomlinson, 2010). However, this sample is still believed to be more representative than the FSU sample. Although efforts were made to ensure representative and comparative samples, a better sample representing the entire United States population could have been selected if the research could have been carried out over a longer time period and if different methods of survey distribution were chosen.

Additionally, it is possible that there were weaknesses in the study design, specifically with the questionnaire constructed. It may be possible that the questions asked to not fully measure the participants' knowledge levels of the increased risks involved in delaying childbearing. If the questions asked did not fully measure the proper knowledge level, the results could potentially be skewed. Also, extraneous variables may have been present in the study, such as factors relating to the fact that all participants were able to complete the questionnaire at any time and in any location, which could have potentially led to distractions during the questionnaire or cheating by looking up the answers to the fertility or pregnancy/childbirth questions in the study.

Based on the limitations of the present study, one way to most effectively expand on this research in the future would be to include a sample more representative of the childbearing-age population, since this is the population that is most affected by the decision to delay childbearing. Using this sample would more reliably indicate the overall knowledge level of the affected population, which would therefore lead to more effective public health interventions for this population. Additionally, the questionnaire could be reconstructed to include more or different questions, to ensure that it assesses knowledge level properly. This is an important factor, because the questions need to be able to reliably determine knowledge level in order to give reliable results. These two factors, which were the main limiting factors in the present research, should be assessed before conducting future research.

Additionally, although this study did find some relations between demographic variables and knowledge level of the increased risks in delaying childbearing, future research should be done to include more variables to test. There is a notably low level of knowledge in this area, but more research should be done to pinpoint the factors that may be associated with lower

knowledge level in order to target these populations for public health interventions in the future. The Information-Motivation-Behavioral Skills model (IBM model) can be involved in this aspect, as well. Because a low knowledge level was found in this study, a building step can now be created to promote public health recommendations aimed to increase this knowledge level in order to increase positive behavioral change. Based on this study, those with lower levels of education completed already and those of a younger age should be targeted for these public health interventions. However, more research needs to be done to determine additional populations to target. Similarly, little research currently exists on the topic of determining the knowledge level people have of increasing risks in delaying childbearing, so more research in this area in general would be beneficial.

Conclusions

This study had an overall goal of determining the knowledge level that people have of the increased risks involved in delaying childbearing, including what factors are associated with differences in knowledge level about these risks. The hypotheses were partially supported and partially unsupported, suggesting that there is an overall low knowledge level, but only the highest education level completed already was found to be associated with knowledge level, and all other variables were found to have no significant association with knowledge level. Future research is needed to make more conclusions. The overall goal of this research was to be a helpful guide for future public health interventions in order to target specific populations to increase their knowledge level about these topics.

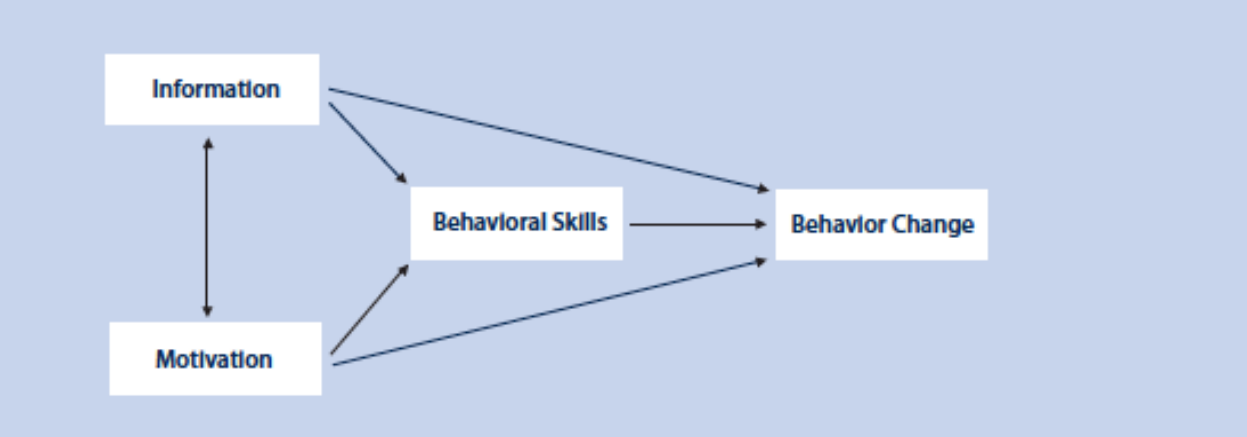

Figure 1. Information-Motivation-Behavioral Skills Model

Table 1

Additional Demographic Information for the FSU Sample

Variables	*n*	%
Current Household Income		
Less than $10,000	35	15.8
$10,000 – $19,000	14	6.3
$20,000 – $29,000	14	6.3
$30,000 – $49,000	30	13.5
$50,000 – $69,000	17	7.7
$70,000 – $89,000	24	10.8
$90,000 – $109,000	16	7.2
$110,000 – $129,000	19	8.6
$130,000 – $149,000	5	2.3
$150,000 – $169,000	8	3.6
$170,000 – $189,000	7	3.2
$190,000 – $209,000	5	2.3
$210,000 or more	28	12.6
Highest Level of Education Completed Already		
Some high school (without graduating high school or equivalent)	0	0
Graduated high school or high school equivalent	119	46.5
Some college	116	45.3
Graduated from 2-year college	16	6.3
Graduated from 4-year college	4	1.6
Attended graduate or professional school without graduating	0	0
Completed graduate or professional school	1	.4
Highest Level of Education Planning on Completing During Lifetime		
Some high school (without graduating or equivalent)	0	0
Graduating high school or high school equivalent	1	.4
Some college	1	.4
2-year college degree	0	0
Technical school degree	0	0
4-year college degree	47	18.4
Graduate/Law/Medical degree	207	80.9
Current Relationship Status		
Single	167	65.2
Committed Relationship (not engaged or married)	85	33.2
Engaged	1	.4
Married	2	.8
Divorced	0	0
Separated	0	0
Widowed	0	0

Variables	*n*	%
Sexual Orientation		
Straight (heterosexual)	244	95.3
Gay/Lesbian (homosexual)	5	2.0
Bisexual	5	2.0
Year in College		
1st year	160	62.5
2nd year	19	7.4
3rd year	50	19.5
4th year	21	8.2
5th year or more	6	2.3
College GPA (if established)		
Less than 2.00	2	.8
2.00 – 2.49	7	2.7
2.50 – 2.99	23	9.0
3.00 – 3.49	40	15.6
3.50 – 4.00	46	18.0
Area of Primary Major		
Undecided	20	7.8
Arts and Sciences – Psychology	44	17.2
Arts and Sciences – Biological Sciences	33	12.9
Arts and Sciences – Chemistry and Biochemistry	3	1.2
Arts and Sciences – Other	10	3.9
Business	24	9.4
Communication and Information	20	7.8
Criminology and Criminal Justice	10	3.9
Education	7	2.7
Engineering	4	1.6
Film	0	0
Human Sciences – Family and Child Sciences	9	3.5
Human Sciences – Other	40	15.6
Music	7	2.7
Nursing	11	4.3
Social Sciences and Public Policy	7	2.7
Social Work	2	.8
Visual Arts, Theatre, and Dance	5	2.0

Variables	*n*	%
Area(s) of Secondary Major(s), Minor(s), or Other Academic Tracks [a]		
Arts and Sciences – Psychology	36	14.1
Arts and Sciences – Biological Sciences	14	5.5
Arts and Sciences – Chemistry and Biochemistry	24	9.4
Arts and Sciences – Other	20	7.8
Business	28	10.9
Communication and Information	9	3.5
Criminology and Criminal Justice	14	5.5
Education	5	2.0
Engineering	4	1.6
Film	3	1.2
Human Sciences – Family and Child Sciences	13	5.1
Human Sciences – Other	7	2.7
Music	2	.8
Nursing	1	.4
Social Sciences and Public Policy	3	1.2
Social Work	4	1.6
Visual Arts, Theatre, and Dance	2	.8
Pre-med or pre-vet track	36	14.1
Pre-law track	7	2.7

Note. [a] Could select more than one answer

Table 2

Additional Demographic Information for the Mechanical Turk Sample

Variables	*n*	%
Current Household Income		
Less than $10,000	24	9.1
$10,000 – $19,000	28	10.6
$20,000 – $29,000	45	17.1
$30,000 – $49,000	45	17.1
$50,000 – $69,000	53	20.2
$70,000 – $89,000	26	9.9
$90,000 – $109,000	16	6.1
$110,000 – $129,000	13	4.9
$130,000 – $149,000	1	0.4
$150,000 – $169,000	0	0
$170,000 – $189,000	0	0
$190,000 – $209,000	0	0
$210,000 or more	0	0
Highest Level of Education Completed Already		
Some high school (without graduating high school or equivalent)	2	0.8
Graduated high school or high school equivalent	44	16.7
Some college	80	30.4
Graduated from 2-year college	27	10.3
Graduated from 4-year college	75	28.5
Attended graduate or professional school without graduating	12	4.6
Completed graduate or professional school	19	7.2
Highest Level of Education Planning on Completing During Lifetime		
Some high school (without graduating or equivalent)	1	0.4
Graduating high school or high school equivalent	22	8.4
Some college	32	12.2
2-year college degree	16	6.1
Technical school degree	10	3.8
4-year college degree	102	38.8
Graduate/Law/Medical degree	67	25.5
Current Relationship Status		
Single	91	34.6
Committed Relationship (not engaged or married)	49	18.6
Engaged	7	2.7
Married	91	34.6
Divorced	16	6.1
Separated	2	0.8
Widowed	1	0.4

Variables	*n*	%
Sexual Orientation		
Straight (heterosexual)	237	90.1
Gay/Lesbian (homosexual)	5	1.9
Bisexual	12	4.6
Primary Occupation		
Self-employed	6	2.3
Homemaker	31	11.8
Student	51	19.4
Unemployed	22	8.4
Retired	5	1.9
Day laborer; janitor; house cleaner; farm worker; food counter sales; food preparation worker; busboy	15	5.7
Garbage collector; short-order cook; cab driver; shoe sales; assembly line workers; masons; baggage porter	2	0.8
Painter; skilled construction trade; sales clerk; truck driver; cook; sales counter or general office clerk	22	8.4
Automobile mechanic; typist; locksmith; farmer; carpenter; receptionist; construction laborer; hairdresser	11	4.2
Machinist; musician; bookkeeper; secretary; insurance sales; cabinet maker; personnel specialist; welder	16	6.1
Supervisor; librarian; aircraft mechanic; artist or artisan; electrician; administrator; military; enlister personnel; buyer	29	11.0
Nurse; skilled technician; medical technician; counselor; manager; police or fire personnel; financial manager; physical, occupational, or speech therapist	27	10.3
Mechanical, nuclear, or electrical engineer; educational administrator; veterinarian; military officer; elementary, high school, or special education teacher	11	4.2
Physician; attorney; professor; chemical or aerospace engineer; judge; CEO; senior manager; public official; psychologist; pharmacist; accountant	10	3.8

Table 3

Knowledge of Age-Related Decline in Fertility – True vs. Untrue Statements

Statements	FSU Sample [a]			Mechanical Turk Sample [b]			Independent Samples t-test [c]	
	Mean	SD	Skew	Mean	SD	Skew	*t*	*p*
1. Fertility decreases with age for women *(true)*	4.48	.782	-2.378	4.47	.759	-2.028	.147	.883
2. Age does not affect fertility in men *(untrue)*	2.73	1.314	.268	2.74	1.252	.268	-.041	.967
3. Women are likely to experience a decrease in fertility before the age of 30 *(true)*	2.82	1.185	.147	2.91	1.113	.103	-.948	.344
4. Women typically have a marked decrease in fertility at a later age than men *(untrue)*	2.39	1.333	.708	2.38	1.333	.638	.061	.951
5. In vitro fertilization (IVF) results in a successful pregnancy more than half of the time *(untrue)*	2.96	1.041	-.250	2.91	1.031	-.153	.479	.632
6. The chance of a woman becoming pregnant from in vitro fertilization (IVF) remains constant regardless of what the woman's age is *(untrue)*	2.16	.941	.765	2.25	.945	.603	-1.063	.288
7. A couple is considered infertile if they have been actively trying to become pregnant for one full year but have not become pregnant yet *(true)*	2.98	1.227	1.137	3.17	1.146	-.377	-1.725	.085
8. Women are most fertile before the age of 20 *(untrue)*	3.43	1.107	-.353	3.30	1.101	-.195	1.280	.201

Note. Min = 1 (untrue); Max = 5 (true)
[a] N = 256, [b] N = 253
[c] df = 507
[*] Significant at $p < .006$

Table 4

Knowledge of Age-Related Increase in Pregnancy and Childbirth Complications – True vs. Untrue Statements

Statements	FSU Sample [a]			Mechanical Turk Sample [b]			Independent Samples t-test [c]	
	Mean	SD	Skew	Mean	SD	Skew	*t*	*p*
1. The chance of having pregnancy or childbirth complications increases with age *(true)*	4.36	.905	-1.661	4.47	.739	-1.738	-1.615	.107
2. As women age, the chance of having a child with Down Syndrome increases *(true)*	3.86	1.190	-.782	4.16	1.032	-1.124	-3.071	.002*
3. As women age, the chance of having twins or triplets decreases *(untrue)*	3.05	1.067	-.238	3.09	1.071	-.145	-.430	.667
4. The chance of having a premature baby is decreased with age *(untrue)*	2.27	.962	.645	2.28	.944	.729	-.204	.839
5. As women age, the chance of having a low birth weight baby increases *(true)*	3.51	.982	-.446	3.71	.889	-.804	-2.371	.018
6. The chance of having a low birth weight baby does not depend on the father's age *(untrue)*	3.37	1.025	-.133	3.53	.956	-.416	-1.849	.065
7. In women over the age of 45, more than half of all pregnancies will result in a miscarriage *(true)*	2.52	.966	-.501	3.41	.931	-.324	1.389	.165
8. As men age, the chance of having a child with an autism spectrum disorder or schizophrenia increases *(true)*	2.87	1.046	-.009	2.96	1.065	.120	-.950	.342

Note. Min = 1 (untrue); Max = 5 (true)
[a] $N = 256$, [b] $N = 251$
[c] $df = 505$
* Significant at $p < .006$

Table 5

Knowledge of Age-Related Decline in Fertility – Multiple-Choice Questions

Questions	FSU Sample [a]		Mechanical Turk Sample [b]		χ^2 test [c]	
	n	%	*n*	%	χ^2	*p*
1. At what age are women most fertile?						
15-19	62	24.2	66	25.1		
20-24**	141	55.1	122	46.4	2.260	.133
25-29	41	16.0	48	18.3		
30-34	5	2.0	6	2.3		
35-39	1	.4	1	.4		
40-44	1	.4	1	.4		
45-49	0	0	0	0		
50-54	0	0	0	0		
55 or older	0	0	0	0		
I don't know	5	2.0	8	3.0		
2. At what age is there a slight decrease in a woman's ability to become pregnant?						
15-19	0	0	0	0		
20-24	3	1.2	4	1.5		
25-29**	24	9.4	38	14.4	3.856	.050
30-34	78	30.5	104	39.5		
35-39	83	32.4	63	24.0		
40-44	46	18.0	27	10.3		
45-49	10	3.9	9	3.4		
50-54	1	.4	2	.8		
55 or older	2	.8	0	0		
I don't know	9	3.5	5	1.9		
3. At what age is there a marked decrease in a woman's ability to become pregnant?						
15-19	0	0	1	.4		
20-24	1	.4	1	.4		
25-29	2	.8	1	.4		
30-34	28	10.9	21	8.0		
35-39**	67	26.2	82	31.2	2.484	.115
40-44	85	33.2	90	34.2		
45-49	30	11.7	36	13.7		
50-54	26	10.2	12	4.6		
55 or older	11	4.3	5	1.9		
I don't know	6	2.3	3	1.1		

Questions	FSU Sample [a]		Mechanical Turk Sample [b]		χ^2 test [c]	
	n	%	*n*	%	χ^2	*p*
4. At what age is there a marked decrease in male fertility?						
15-19	0	0	0	0		
20-24	0	0	1	.4		
25-29	1	.4	3	1.1		
30-34	5	2.0	8	3.0		
35-39	13	5.1	14	5.3		
40-44	45	17.6	35	13.3		
45-49	39	15.2	34	12.9		
50-54**	30	11.7	27	10.3	.129	.720
55 or older	30	11.7	49	18.6		
Never – male fertility does not decrease with age	66	25.8	57	21.7		
I don't know	27	10.5	24	9.1		
5. A woman and a man regularly have unprotected intercourse during a period of 1 year. What is the chance that the woman will become pregnant if she is 25-30 years old?						
0-9%	0	0	0	0		
10-19%	1	.4	2	.8		
20-29%	6	2.3	10	3.8		
30-39%	18	7.0	17	6.5		
40-49%	17	6.6	20	7.6		
50-59%	21	8.2	28	10.6		
60-69%	34	13.3	25	9.5		
70-79%**	62	24.2	47	17.9	2.336	.126
80-89%	44	17.2	53	20.2		
90-100%	19	7.4	43	16.3		
I don't know	34	13.3	7	2.7		

Questions	FSU Sample [a]		Mechanical Turk Sample [b]		χ^2 test [c]	
	n	%	*n*	%	χ^2	*p*
6. A woman and a man regularly have unprotected intercourse during a period of 1 year. What is the chance that the woman will become pregnant if she is 35-40 years old?						
0-9%	3	1.2	3	1.1		
10-19%	8	3.1	14	5.3		
20-29%	31	12.1	38	14.4		
30-39%	37	14.5	39	14.8		
40-49%	48	18.8	33	12.5		
50-59%**	37	14.5	41	15.6	.322	.570
60-69%	31	12.1	28	10.6		
70-79%	21	8.2	24	9.1		
80-89%	8	3.1	16	6.1		
90-100%	1	.4	8	3.0		
I don't know	31	12.1	8	3.0		
7. How many couples in the United States are involuntarily childless?						
0-9%	4	1.6	11	4.2		
10-19%**	33	12.9	75	28.5	21.593	.000*
20-29%	46	18.0	75	28.5		
30-39%	55	21.5	40	15.2		
40-49%	29	11.3	10	3.8		
50-59%	18	7.0	8	3.0		
60-69%	18	7.0	6	2.3		
70-79%	2	.8	1	.4		
80-89%	2	.8	1	.4		
90-100%	0	0	0	0		
I don't know	49	19.1	25	9.5		

Questions	FSU Sample [a]		Mechanical Turk Sample [b]		χ^2 test [c]	
	n	%	*n*	%	χ^2	*p*
8. If a couple undergoes treatment with in vitro fertilization (IVF), what is their chance, on average, of getting a child?						
0-9%	1	.4	1	.4		
10-19%	7	2.7	8	3.0		
20-29%	21	8.2	30	11.4		
30-39%**	28	10.9	53	20.2	9.655	.002[*]
40-49%	41	16.0	28	10.6		
50-59%	52	20.3	47	17.9		
60-69%	30	11.7	22	8.4		
70-79%	16	6.3	26	9.9		
80-89%	13	5.1	14	5.3		
90-100%	2	.8	2	.8		
I don't know	45	17.6	21	8.0		

Note. **Correct answer based on current literature – see Measures

[a] $N = 256$, [b] $N = 252$

[c] $df = 1$

[*] Significant at $p < .006$

Table 6

Knowledge of Age-Related Increase in Pregnancy and Childbirth Complications – Multiple-Choice Questions

Questions	FSU Sample [a]		Mechanical Turk Sample [b]		χ^2 test [c]	
	n	%	*n*	%	χ^2	*p*
1. What is the chance that a woman 15-24 years old will give birth to a child with Down Syndrome?						
1 in 2,000	49	19.1	108	41.1		
1 in 1,600	32	12.5	36	13.7		
1 in 1,300**	15	5.9	21	8.0	1.180	.277
1 in 1,000	40	15.6	34	12.9		
1 in 500	21	8.2	12	4.6		
1 in 350	11	4.3	4	1.5		
1 in 200	9	3.5	3	1.1		
1 in 100	8	3.1	1	.4		
1 in 50	2	.8	1	.4		
1 in 20	1	.4	0	0		
I don't know	68	26.6	32	12.2		
2. What is the chance that a woman at the age of 35 will give birth to a child with Down Syndrome?						
1 in 2,000	4	1.6	10	3.8		
1 in 1,600	7	2.7	31	11.8		
1 in 1,300	15	5.9	25	9.5		
1 in 1,000	51	19.9	66	25.1		
1 in 500	48	18.8	50	19.0		
1 in 350**	13	5.1	12	4.6	.027	.869
1 in 200	28	10.9	16	6.1		
1 in 100	12	4.7	11	4.2		
1 in 50	8	3.1	0	0		
1 in 20	4	1.6	4	1.5		
I don't know	66	25.8	27	10.3		

Questions	FSU Sample [a]		Mechanical Turk Sample [b]		χ^2 test [c]	
	n	%	*n*	%	χ^2	*p*
3. What is the chance that a woman 15-24 years old will give birth to a child with any type of chromosomal abnormality?						
1 in 2,000	33	12.9	86	32.7		
1 in 1,600	28	10.9	41	15.6		
1 in 1,300	25	9.8	26	9.9		
1 in 1,000	31	12.1	24	9.1		
1 in 500**	21	8.2	21	8.0	.003	.958
1 in 350	14	5.5	8	3.0		
1 in 200	13	5.1	7	2.7		
1 in 100	12	4.7	4	1.5		
1 in 50	4	1.6	2	.8		
1 in 20	2	.8	1	.4		
I don't know	73	28.5	32	12.2		
4. What is the chance that a woman at the age of 45 will give birth to a child with any type of chromosomal abnormality?						
1 in 2,000	9	3.5	10	3.8		
1 in 1,600	4	1.6	12	4.6		
1 in 1,300	13	5.1	10	3.8		
1 in 1,000	23	9.0	42	16.0		
1 in 500	31	12.1	56	21.3		
1 in 350	25	9.8	23	8.7		
1 in 200	29	11.3	18	6.8		
1 in 100	27	10.5	28	10.6		
1 in 50	19	7.4	15	5.7		
1 in 20**	13	5.1	8	3.0	1.161	.281
I don't know	63	24.6	30	11.4		

Questions	FSU Sample [a]		Mechanical Turk Sample [b]		χ^2 test [c]	
	n	%	*n*	%	χ^2	*p*
5. How much more likely are men over the age of 40 to have a child with an autism spectrum disorder compared to men under the age of 30?						
Less likely	3	1.2	8	3.0		
Equally likely	61	23.8	69	26.2		
1-2 times more likely	40	15.6	56	21.3		
3-4 times more likely	51	19.9	32	12.2		
5-6 times more likely**	21	8.2	14	5.3	1.388	.239
7-8 times more likely	7	2.7	6	2.3		
9-10 times more likely	2	.8	3	1.1		
Over 10 times more likely	3	1.2	3	1.1		
I don't know	68	26.6	61	23.2		
6. What percentage of pregnancies in women at the age of 35 will result in a miscarriage?						
0-9%	10	3.9	18	6.8		
10-19%	24	9.4	50	19.0		
20-29%**	51	19.9	58	22.1	.762	.383
30-39%	57	22.3	51	19.4		
40-49%	26	10.2	17	6.5		
50-59%	15	5.9	13	4.9		
60-69%	9	3.5	8	3.0		
70-79%	2	.8	4	1.5		
80-89%	2	.8	2	.8		
90-100%	1	.4	0	0		
I don't know	59	23.0	30	11.4		
7. What percentage of pregnancies in women at the age of 40 will require a cesarean section (C-section) for delivery?						
0-9%	1	.4	3	1.1		
10-19%	6	2.3	17	6.5		
20-29%	9	2.5	30	11.4		
30-39%	24	9.4	32	12.2		
40-49%**	34	13.3	37	14.1	.207	.649
50-59%	40	15.6	40	15.2		
60-69%	43	16.8	24	9.1		
70-79%	28	10.9	23	8.7		
80-89%	12	4.7	12	4.6		
90-100%	3	1.2	0	0		
I don't know	56	21.9	34	12.9		

Questions	FSU Sample [a]		Mechanical Turk Sample [b]		χ^2 test [c]	
	n	%	*n*	%	χ^2	*p*
8. What percentage of pregnancies in women at the age of 35 will result in a low birth weight baby?						
0-9%	3	1.2	10	3.8		
10-19%**	14	5.5	32	12.2	8.060	.005[*]
20-29%	37	14.5	68	25.9		
30-39%	47	18.4	41	15.6		
40-49%	29	11.3	27	10.3		
50-59%	26	10.2	18	6.8		
60-69%	19	7.4	10	3.8		
70-79%	7	2.7	3	1.1		
80-89%	0	0	1	.4		
90-100%	0	0	0	0		
I don't know	74	28.9	42	16.0		

Note. **Correct answer based on current literature – see Measures

[a] $N = 256$, [b] $N = 252$

[c] $df = 1$

[*] Significant at $p < .006$

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Appendix A
Mechanical Turk and its Users

What is Mechanical Turk?

Mechanical Turk is an online crowdsourcing system run through Amazon since 2005 where tasks known as HITs (Human Intelligence Tasks) are available for thousands of anonymous Mechanical Turk users to complete in return for payment at www.mturk.com. Requesters (those who put up the HITs they desire for others to complete) can specify the amount they will pay the workers (those who complete the HITs), which can range from $0.01 for simple tasks to several dollars for more time-consuming tasks. The workers can choose which HITs they want to complete, and the requesters can limit which workers can complete their task (such as limiting to workers who are in the United States). There are over 200,000 registered workers and an average of 50,000 – 100,000 HITs available to work on at any given time.

Why use Mechanical Turk for research?

Mechanical Turk has become increasingly popular in research. Its population is more diverse than an undergraduate student population, and it is a quick and easy way to gather data for research studies. In addition, the average hourly wage for Mechanical Turk users is currently $2 per hour, meaning a 15-minute long study would typically cost the requester only 50 cents per participant.

Who are the Mechanical Turk users?

In a study from 2010 by Ross and colleagues that analyzed the demographics of 573 Mechanical Turk workers, it was determined that 57% of the workers were from the United States, 32% from India, and the remaining 11% from other countries. 55% were female and 45% were male, and the average age was 31 years old. Most (66%) of the workers had a college or advanced degree, and the median annual income was $20,000 – $30,000. Most (46%) of the responders reported using Mechanical Turk for 1–5 hours per week on average as a part-time activity. The Mechanical Turk worker population includes people that are slightly younger, people that are more highly educated, and more females than the general United States population. The study concluded that the Mechanical Turk population may be representative of the United States Internet-using population, but is not precisely representative of the United States population as a whole.

Source:

Ross, J., Irani, I., Silberman, M.S., Zaldivar, A., and Tomlinson, B. (2010). “Who are the crowdworkers?: Shifting demographics in amazon mechanical turk”. *CHI Extended Abstracts 2010*, 2863-2872. Retrieved from: http://sites.uci.edu/andrewzaldivar/files/2012/05/SocialCode-2009-01.pdf

Appendix B
Research Advertisement for Florida State University Participants

Study Information

Study Name: Delaying Childbearing

Abstract: 15-minute online study examining your knowledge of the increased risks involved in delaying childbearing

Description: The purpose of this study is to determine the knowledge level that people have about the increased risks involved in delaying childbearing, including what factors lead to an increased or decreased knowledge about these risks. You will be asked to complete a brief 15-minute questionnaire that asks you about basic demographic information, your reproductive history and reproductive plans, your personal and family history of infertility and other reproductive issues, and factual questions that will assess your knowledge of age-related fertility, pregnancy, and childbirth issues.

Web Study: This is an online study. Participants are not given the study URL until after they sign up.

Eligibility Requirements: Must be 18 or older to participate.

Prescreen Restrictions: No Restrictions

Duration: 30 minutes

Credits: 0.5 Credits

(via http://fsu.sona-systems.com)

Appendix C
Research Advertisement for Mechanical Turk Participants

Interesting 15-minute survey

Description: Answer an interesting 15-minute survey that assesses your knowledge level about certain topics.

HIT Expiration Date: July 6, 2013

Time Allotted: 60 minutes

Reward: $0.50

HITs Available: 1

Keywords: survey, questionnaire, university, research, study, interesting, 15, minutes, knowledge

Qualifications Required:
Total approved HITs is not less than 100
HIT approval rate (%) is not less than 97
Location is US

Interesting 15-minute survey

Answer an interesting 15-minute survey aimed to determine the knowledge level that people have about the increased risks involved in delaying childbearing, including what factors lead to an increased or decreased knowledge about these risks.

You MUST be an English-speaking US resident over the age of 18 in order to participate.

Please open the survey link in a new window to complete the survey. Once the survey is complete, a unique Response ID code will be assigned to you. You MUST enter this Response ID into the space below in order to receive payment.

Survey link: https://fsu.qualtrics.com/SE/?SID=SV_eQj79lYxgDx2bGt

Response ID code: _____

Please write down any questions, comments, or issues that you may have had with this survey: _____

(via http://www.mturk.com)

Appendix D
Informed Consent for Florida State University Participants

You are invited to be in a research study that aims to determine the knowledge that people have about increased risks involved in delaying childbearing. This study is being conducted by Lauren Propst in the Florida State University Psychology Department, under supervision of Dr. Sara Hart, who is a faculty member of the Florida State University Psychology Department and Florida Center for Reading Research.

Background information:

With an increasing trend in the United States for people to delay childbearing until later in life, we are interested in determining the knowledge level that people have about the increased risks involved in delaying childbearing. In addition, we hope to understand what factors lead to an increased or decreased knowledge about these risks in order to identify characteristics of individuals who have less knowledge of these issues. This research will help us understand who to target for intervention efforts in the future.

Procedures:

You must be at least 18 years of age in order to participate. If you agree to be in this study, you will be asked to complete the rest of this online questionnaire. This questionnaire asks about various aspects of your life, including questions about basic demographic information, your reproductive history and reproductive plans, your personal and family history of infertility and other reproductive issues, and factual questions that will assess your knowledge about age-related fertility, pregnancy, and childbirth issues. The questionnaire should take approximately 15 minutes to complete.

Risks and benefits of being in this study:

This research presents no physical risks. Some participants might experience minor psychological discomfort when answering some questions, but **you are free skip any questions if you feel uncomfortable answering them**. Although we encourage you to complete each question, we understand that some items might be left unanswered if you do not feel comfortable.

There is no direct benefit of this research to the participant. We believe that the knowledge that we expect to gain in this study will be used to better understand what populations are in need of education in areas regarding the risks involved in delaying childbearing, which we believe will be beneficial to society by reducing the number of people put at risk. If you choose to participate in this study, you will be helping us try to achieve this goal.

Compensation:

The total time commitment for this study is approximately 15 minutes. If the survey is completed, **you will receive 0.5 research credits** for Introductory Psychology or extra credit in upper-level Psychology courses that allow it.

Confidentiality:

The records of this study will be kept private and confidential to the extent permitted by law. **No identifying information will be taken from you during this questionnaire, and your responses will be anonymous.** In any sort of report we might publish, we will not include any information that could make it possible to identify a participant. No individual responses will be reported in any presentations or publications that come from this study. Only group findings will be reported. Research records will be stored on password-protected computers and only the principal researchers will have access to these records.

Voluntary nature of the study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Florida State University. If you decide to participate, you are free to skip any questions or discontinue participation without affecting this relationship.

Contacts and questions:

If you have any questions about the study, please contact the researcher Lauren Propst via email at LNP10@my.fsu.edu or phone at (850) 645-0514 before beginning this questionnaire. If you would like to speak to the faculty advisor Dr. Sara Hart, please contact her via email at hart@psy.fsu.edu or phone at (850) 644-9693.

If you have any questions about your rights as a participant in this research or if you feel you have been placed at risk, you are encouraged to contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Office of the Vice President for Research, at (850) 644-8633.

IRB approval #2013.10541

Please print this page for your records.

Statement of consent:

- I have read the above information and I consent to participate in this study.
- I have read the above information and I **DO NOT** consent to participate in this study.

Appendix E
Informed Consent for Mechanical Turk Participants

You are invited to be in a research study that aims to determine the knowledge that people have about increased risks involved in delaying childbearing. This study is being conducted by Lauren Propst in the Florida State University Psychology Department, under supervision of Dr. Sara Hart, who is a faculty member of the Florida State University Psychology Department and Florida Center for Reading Research.

Background information:

With an increasing trend in the United States for people to delay childbearing until later in life, we are interested in determining the knowledge level that people have about the increased risks involved in delaying childbearing. In addition, we hope to understand what factors lead to an increased or decreased knowledge about these risks in order to identify characteristics of individuals who have less knowledge of these issues. This research will help us understand who to target for intervention efforts in the future.

Procedures:

You must be at least 18 years of age, English-speaking, and a resident of the United States in order to participate. If you agree to be in this study, you will be asked to complete the rest of this online questionnaire. This questionnaire asks about various aspects of your life, including questions about basic demographic information, your reproductive history and reproductive plans, your personal and family history of infertility and other reproductive issues, and factual questions that will assess your knowledge about age-related fertility, pregnancy, and childbirth issues. The questionnaire should take approximately 15 minutes to complete.

Risks and benefits of being in this study:

This research presents no physical risks. Some participants might experience minor psychological discomfort when answering some questions, but **you are free skip any questions if you feel uncomfortable answering them**. Although we encourage you to complete each question, we understand that some items might be left unanswered if you do not feel comfortable.

There is no direct benefit of this research to the participant. We believe that the knowledge that we expect to gain in this study will be used to better understand what populations are in need of education in areas regarding the risks involved in delaying childbearing, which we believe will be beneficial to society by reducing the number of people put at risk. If you choose to participate in this study, you will be helping us try to achieve this goal.

Compensation:

If the survey is completed successfully, you will receive $0.50 once your HIT is submitted with your survey Response ID included. To successfully complete the questionnaire, you must complete it until the final page, where you will be given a unique Response ID code. This code is required for payment, and you must enter the code into the HIT before it is submitted. If you do not make it to the end of the questionnaire, you will not receive payment. However, please keep in mind that you are free to skip any questions that you do not feel comfortable answering. Payment will be disbursed no later than 72 hours after submitting your HIT.

Confidentiality:

The records of this study will be kept private and confidential to the extent permitted by law. **No identifying information will be taken from you during this questionnaire, and your responses will be anonymous.** In any sort of report we might publish, we will not include any information that could make it possible to identify a participant. No individual responses will be reported in any presentations or publications that come from this study. Only group findings will be reported. Research records will be stored on password-protected computers and only the principal researchers will have access to these records.

Voluntary nature of the study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Florida State University. If you decide to participate, you are free to skip any questions or discontinue participation without affecting this relationship.

Contacts and questions:

If you have any questions about the study, please contact the researcher Lauren Propst via email at LNP10@my.fsu.edu or phone at (850) 645-0514 before beginning this questionnaire. If you would like to speak to the faculty advisor Dr. Sara Hart, please contact her via email at hart@psy.fsu.edu or phone at (850) 644-9693.

If you have any questions about your rights as a participant in this research or if you feel you have been placed at risk, you are encouraged to contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Office of the Vice President for Research, at (850) 644-8633.

IRB approval #2013.10541

Please print this page for your records.

Statement of consent:

- I have read the above information and I consent to participate in this study.
- I have read the above information and I **DO NOT** consent to participate in this study.

Appendix F
Debriefing

This study is concerned with understanding the knowledge level that people have about increased risks involved in delaying childbearing. These risks primarily include an age-related decline in fertility and increased chances of pregnancy and childbirth complications that can affect both the mother and the child. Previous studies have found that there is a lack of knowledge about these risks, even though increasing amounts of people are deciding to delay childbearing. The goal of this study is to determine what factors cause an increased or decreased knowledge level about the increased risks involved in delaying childbearing.

Hypotheses and main questions:

We expect to find that people overall have a low knowledge level about the increased risks involved in delaying childbearing. In addition, we expect to find that certain traits, such as higher socioeconomic status, higher education level, more reproductive history, exposure to infertility or other reproductive issues, and being female, will be correlated with higher levels of knowledge about these risks.

Why is this an important study?

There is a growing trend in the United States for people to delay childbearing until later in life, including an increasing proportion of women having children after the age of 35. This increasing trend may be due to many reasons, such as the pursuit of higher education, career advancements, or financial stability. Although it is becoming more common for women and men to have children later in life, there seems to be a lack of knowledge about the increased risks that are associated with delaying childbearing. Little research currently exists in this area, and it is an important public health issue that seems to be overlooked by many. We believe the knowledge that we expect to gain in this study will be used to better understand what populations are in need of education in areas regarding the risks involved in delaying childbearing, which we believe will be beneficial to society by reducing the number of people put at risk.

Contact Information:

If you would like to receive a report of this research when it is completed or if you have any questions about this study, please contact Lauren Propst at LNP10@my.fsu.edu or (850) 645-0514.

If you have concerns about your rights as a participant in this experiment, please contact the FSU IRB Secretary at (850) 644-8633.

Thank you again for your participation.

Appendix G
IRB Approval Letter

Office of the Vice President for Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 06/05/2013

To: Lauren Propst <lnp10@my.fsu.edu>

Address: 1107 W Call St

Dept.: PSYCHOLOGY DEPARTMENT

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
Knowledge of Risks Involved in Delaying Childbearing

The application that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Expedited per 45 CFR § 46.110(7) and has been approved by an expedited review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 06/04/2014 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Sara Hart <hart@psy.fsu.edu>, Advisor
HSC No. 2013.10541

Appendix H
Questionnaire

[CONSENT FORM HERE]

1) Statement of consent:
   - I have read the above information and I consent to participate in this study.
   - I have read the above information and I DO NOT consent to participate in this study.

   If "I have read the above information and I DO NOT consent to participate in this study" is selected, END SURVEY.

2) What is your age?

   _____

   If age is less than 18, END SURVEY.

3) What is your gender?
   - Male
   - Female
   - I would prefer to not answer

4) What is your current household income?
   - Less than $10,000
   - $10,000 - $19,000
   - $20,000 - $29,000
   - $30,000 - $49,000
   - $50,000 - $69,000
   - $70,000 - $89,000
   - $90,000 - $109,000
   - $110,000 - $129,000
   - $130,000 - $149,000
   - $150,000 - $169,000
   - $170,000 - $189,000
   - $190,000 - $209,000
   - $210,000 or more
   - I would prefer to not answer

5) What is the highest level of education that you have completed already?
   - Some high school (without graduating high school or equivalent)
   - Graduated high school or high school equivalent
   - Some college
   - Graduated from 2-year college
   - Graduated from 4-year college
   - Attended graduate or professional school without graduating
   - Completed graduate or professional school

- Other (please specify) _____
- I would prefer to not answer

6) What is the highest level of education that you plan on completing in your lifetime?
   - Some high school (without graduating high school or equivalent)
   - Graduating high school or high school equivalent
   - Some college
   - 2-year college degree
   - Technical school degree
   - 4-year college degree
   - Graduate/Law/Medical degree
   - Other (please specify) _____
   - I would prefer to not answer

7) What is the highest level of education that your primary caregivers have received? If you have only had one caregiver, select "Not Applicable" as your answer in the "Primary Caregiver #2" column.

   Primary Caregiver #1
   - Some high school (without graduating high school or equivalent)
   - Graduated high school or high school equivalent
   - Some college
   - Graduated from 2-year college
   - Graduated from 4 year college
   - Attended graduate or professional school without graduating
   - Completed graduate or professional school
   - Not sure
   - Not applicable
   - I would prefer to not answer

   Primary Caregiver #2
   - Some high school (without graduating high school or equivalent)
   - Graduated high school or high school equivalent
   - Some college
   - Graduated from 2-year college
   - Graduated from 4 year college
   - Attended graduate or professional school without graduating
   - Completed graduate or professional school
   - Not sure
   - Not applicable
   - I would prefer to not answer

8) What is the relationship to you of the individual you marked as "Primary Caregiver #1" in the previous question?
   - Biological mother
   - Biological father
   - Adoptive or foster mother
   - Adoptive or foster father

- Stepmother
- Stepfather
- Other relative (such as a grandparent, aunt, uncle, etc.)
- Other (please describe) _____
- I would prefer to not answer

9) What is the relationship to you of the individual you marked as "Primary Caregiver #2"?
   - Biological mother
   - Biological father
   - Adoptive or foster mother
   - Adoptive or foster father
   - Stepmother
   - Stepfather
   - Other relative (such as a grandparent, aunt, uncle, etc.)
   - Other (please describe) _____
   - Not applicable
   - I would prefer to not answer

10) What is your ethnicity?
   - Hispanic/Latino
   - Non-Hispanic/Latino
   - I would prefer to not answer

11) What is your race?
   - American Indian or Alaska Native
   - Asian
   - Native Hawaiian or Other Pacific Islander
   - Black or African American
   - White
   - Other (please specify) _____
   - Mixed (more than one of the above)
   - I would prefer to not answer

12) What is your current relationship status?
   - Single
   - Committed relationship (not engaged or married)
   - Engaged
   - Married
   - Divorced
   - Separated
   - Widowed
   - Other (please specify) _____
   - I would prefer to not answer

13) How would you describe your sexual orientation?
   - Straight (heterosexual)

- Gay/lesbian (homosexual)
- Bisexual
- Not sure
- I would prefer to not answer

ONLY Mechanical Turk Participants answer #14–#21

14) What is your primary language?
- English
- Spanish
- Other (please specify) _____

15) What country is your primary residence?
- United States
- Other (please specify) _____

16) How long have you been living there?
- All my life
- Less than 5 years
- 5-9 years
- 10-19 years
- 20-29 years
- 30-39 years
- More than 40 years

17) Where were you born?
- United States
- Other (please specify) _____

18) Which of the following best describes the area that you currently live in?
- Urban or large city
- Suburban or small city
- Rural

19) Which of the following categories best describes your primary occupation?
- Homemaker
- Student
- Unemployed
- Retired
- Day laborer; janitor; house cleaner; farm worker; food counter sales; food preparation worker; busboy
- Garbage collector; short-order cook; cab driver; shoe sales; assembly line workers; masons; baggage porter
- Painter; skilled construction trade; sales clerk; truck driver; cook; sales counter or general office clerk

- Automobile mechanic; typist; locksmith; farmer; carpenter; receptionist; construction laborer; hairdresser
- Machinist; musician; bookkeeper; secretary; insurance sales; cabinet maker; personnel specialist; welder
- Supervisor; librarian; aircraft mechanic; artist or artisan; electrician; administrator; military; enlister personnel; buyer
- Nurse; skilled technician; medical technician; counselor; manager; police or fire personnel; financial manager; physical, occupational, or speech therapist
- Mechanical, nuclear, or electrical engineer; educational administrator; veterinarian; military officer; elementary, high school, or special education teacher
- Physician; attorney; professor; chemical or aerospace engineer; judge; CEO; senior manager; public official; psychologist; pharmacist; accountant
- Other (please specify) _____

If "Student" is NOT selected, SKIP TO #28.

20) If your primary occupation is being a student, are you studying primarily in a health-related track? (Note: health-related tracks include areas such as biological sciences, chemical sciences, psychology, family and child sciences, nursing, medicine, or other similar areas)
    - Yes
    - No
    - Not sure (please describe your major area of study) _____
    - I am not a student

21) Have you ever taken a course that discussed age-related pregnancy issues or age-related fertility issues?
    - Yes
    - No
    - Not sure
    - I am not a student

ONLY Florida State University students answer #22–#27.

22) What year of college are you in?
    - 1st year
    - 2nd year
    - 3rd year
    - 4th year
    - 5th year or more

23) What is your college GPA?
    - Less than 2.00
    - 2.00-2.49
    - 2.50-2.99

- 3.00-3.49
- 3.50-4.00
- This is my first semester and I do not have a college GPA yet

24) In what area is your primary major?
- Arts and Sciences – Psychology
- Arts and Sciences – Biological Sciences
- Arts and Sciences – Chemistry and Biochemistry
- Arts and Sciences – Other
- Business
- Communication and Information
- Criminology and Criminal Justice
- Education
- Engineering
- Film
- Human Sciences – Family and Child Sciences
- Human Sciences – Other
- Music
- Nursing
- Social Sciences and Public Policy
- Social Work
- Visual Arts, Theatre, and Dance
- Other (please specify) _____

25) In what areas are your secondary major(s), minor(s), and/or other academic tracks? Select all that apply.
- Arts and Sciences – Psychology
- Arts and Sciences – Biological Sciences
- Arts and Sciences – Chemistry and Biochemistry
- Arts and Sciences – Other
- Business
- Communication and Information
- Criminology and Criminal Justice
- Education
- Engineering
- Film
- Human Sciences – Family and Child Sciences
- Human Sciences – Other
- Music
- Nursing
- Social Sciences and Public Policy
- Social Work
- Visual Arts, Theatre, and Dance
- Pre-med or pre-vet track
- Pre-law track
- Other (please specify) _____

- Not applicable

26) Have you ever taken a course that discussed age-related fertility issues?
    - Yes
    - No
    - Not sure

27) Have you ever taken a course that discussed age-related pregnancy or childbirth issues?
    - Yes
    - No
    - Not sure

---

28) Do you have any biological children? (Note: biological children refers to blood-related children that were NOT adopted)
    - Yes
    - No

If "No" is selected, SKIP TO #43.
If "Yes" is selected, DO NOT ASK #43–#54.

---

29) How many biological children do you have?
    - 1
    - 2
    - 3
    - 4
    - 5 or more

If "1" is selected, DO NOT ASK #32 and #33.

30) What age were you when your first (oldest) child was born?
    - 17 or younger
    - 18-24
    - 25-29
    - 30-34
    - 35-39
    - 40-44
    - 45-49
    - 50-54
    - 55 or older

31) What age was your partner when your first (oldest) child was born? (Note: partner refers to the biological father or mother of your child)
    - 17 or younger
    - 18-24
    - 25-29
    - 30-34

- 35-39
- 40-44
- 45-49
- 50-54
- 55 or older
- Not sure

32) What age were you when your last (youngest) child was born?
- 17 or younger
- 18-24
- 25-29
- 30-34
- 35-39
- 40-44
- 45-49
- 50-54
- 55 or older
- I only have one child

33) What age was your partner when your last (youngest) child was born? (Note: partner refers to the biological father or mother of your child)
- 17 or younger
- 18-24
- 25-29
- 30-34
- 35-39
- 40-44
- 45-49
- 50-54
- 55 or older
- I only have one child
- Not sure

34) Would you consider having more children in the future?
- Yes
- No
- Maybe

If "No" is selected, SKIP TO #40.

35) How many biological children in total do you plan on having?
- 1
- 2
- 3
- 4
- 5 or more

36) At what age would you want to be when having your last child?
- o 18-24
- o 25-29
- o 30-34
- o 35-39
- o 40-44
- o 45-49
- o 50-54
- o 55 or older

37) At what age would you want your partner to be when having your last child? (Note: partner refers to the biological father or mother of your child)
- o 17 or younger
- o 18-24
- o 25-29
- o 30-34
- o 35-39
- o 40-44
- o 45-49
- o 50-54
- o 55 or older

38) How important is it for you to have more children?

Not at all Important	Very Unimportant	Somewhat Unimportant	Neither Important nor Unimportant	Somewhat Important	Very Important	Extremely Important
○	○	○	○	○	○	○

39) Below are some possible options of what people can do if they find out they can not have any more biological children. Please select the option that best describes how likely you think you would be to try each of these methods if you found out that you could not have any more biological children due to infertility or other pregnancy complications.

	Very Unlikely	Unlikely	Somewhat Unlikely	Undecided	Somewhat Likely	Likely	Very Likely
Use assisted reproductive technology such as in vitro fertilization (IVF)	○	○	○	○	○	○	○
Adopt children	○	○	○	○	○	○	○
Choose to not have more children	○	○	○	○	○	○	○

40) Were your past pregnancies planned?
- o Yes
- o No
- o Some
- o Not sure

41) Did you or your partner use any type of assisted reproductive technology (such as in vitro fertilization) for any of these pregnancies?
   - o Yes
   - o No
   - o Some
   - o Not sure

42) Below are some potential obstacles that could have prevented you from having children at an earlier age. Please select the option that best describes the degree to which each potential obstacle prevented you from having children at an earlier age.

	Not at all	Slightly	Somewhat	A Lot	Very Much
Career aspirations	o	o	o	o	o
Educational goals	o	o	o	o	o
Personal interests	o	o	o	o	o
Not finding the right partner	o	o	o	o	o
Not feeling emotionally ready	o	o	o	o	o
Financial concerns	o	o	o	o	o
Infertility or other reproductive issues	o	o	o	o	o

---

43) Would you ever consider having biological children?
   - o Yes
   - o No
   - o Maybe

If "Yes" or "Maybe" is selected, SKIP TO #45.
If "No" is selected, answer #44 ONLY and then SKIP TO #55.

44) Are you planning on adopting children?
   - o Yes
   - o No
   - o Maybe

45) How many biological children do you plan on having?
   - o 1
   - o 2
   - o 3
   - o 4
   - o 5 or more

46) Are you (or your partner) currently pregnant or trying to become pregnant?
   - o Yes
   - o No

47) At what age do you plan on having your first child?
   - o 18-24
   - o 25-29

- 30-34
- 35-39
- 40-44
- 45-49
- 50-54
- 55 or older

48) At what age would you want your future partner to be when having your first child? (Note: partner refers to the biological father or mother of your child)
- 17 or younger
- 18-24
- 25-29
- 30-34
- 35-39
- 40-44
- 45-49
- 50-54
- 55 or older

49) At what age do you plan on having your last child?
- 18-24
- 25-29
- 30-34
- 35-39
- 40-44
- 45-49
- 50-54
- 55 or older
- I only plan on having one child

50) At what age would you want your future partner to be when having your last child? (Note: partner refers to the biological father or mother of your child)
- 17 or younger
- 18-24
- 25-29
- 30-34
- 35-39
- 40-44
- 45-49
- 50-54
- 55 or older
- I only plan on having one child

51) How confident are you that you will have the number of children you want at the ages you want?

Very Unconfident	Unconfident	Somewhat Unconfident	Neither Confident	Somewhat Confident	Confident	Very Confident

			nor Unconfident			
○	○	○	○	○	○	○

52) Below are some potential obstacles that may prevent you from having the number of children you want at the ages you want. Please select the option that best describes the degree to which you believe that each potential obstacle may prevent you personally from having the number of children you want at the ages you want.

	Not at all	Slightly	Somewhat	A Lot	Very Much
Career aspirations	○	○	○	○	○
Educational goals	○	○	○	○	○
Personal interests	○	○	○	○	○
Not finding the right partner	○	○	○	○	○
Not feeling emotionally ready	○	○	○	○	○
Financial concerns	○	○	○	○	○
Infertility or other reproductive issues	○	○	○	○	○

53) How important is it for you to have children?

Not at all Important	Very Unimportant	Somewhat Unimportant	Neither Important nor Unimportant	Somewhat Important	Very Important	Extremely Important
○	○	○	○	○	○	○

54) Below are some possible options of what people can do if they find out they can not have any biological children. Please select the option that best describes how likely you think you would be to try each of these methods if you found out that you could not have any biological children due to infertility or other pregnancy complications.

	Very Unlikely	Unlikely	Somewhat Unlikely	Undecided	Somewhat Likely	Likely	Very Likely
Use assisted reproductive technology such as in vitro fertilization (IVF)	○	○	○	○	○	○	○
Adopt children	○	○	○	○	○	○	○
Choose to not have more children	○	○	○	○	○	○	○

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55) Have you or your partner ever been diagnosed with infertility or any other reproductive issue?

- o Yes
- o No
- o I don't know
- o I would prefer to not answer

56) Has anyone in your family (parents or siblings) been diagnosed with infertility or any other reproductive issue?

- Yes
- No
- I don't know
- I would prefer to not answer

57) Have you or your partner ever had a miscarriage or stillbirth?
- Yes
- No
- I don't know
- I would prefer to not answer

58) Has anyone in your family (parents and siblings) ever had a miscarriage or stillbirth?
- Yes
- No
- I don't know
- I would prefer to not answer

59) Have you or your partner ever seen a fertility specialist for reproductive assistance?
- Yes
- No
- I don't know
- I would prefer to not answer

60) Have you or your partner ever seen a genetic counselor for reproductive counseling or prenatal genetic screening?
- Yes
- No
- I don't know
- I would prefer to not answer

61) Does anyone in your family (including yourself, parents, and siblings) have any type of chromosomal abnormality (including Down Syndrome) or any type of congenital anomaly (including cleft clip or other birth defects)?
- Yes
- No
- I don't know
- I would prefer to not answer

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62) How educated do you think you are about topics relating to how age affects a person's fertility?

Not at all educated	Slightly educated	Somewhat educated	Quite a bit educated	Extremely educated
○	○	○	○	○

63) Below is a list of possible sources that could have given you information on topics relating to how age affects a person's fertility. Please select the option that best describes

how much you have learned about topics relating to how age affects a person's fertility from each of these sources.

	None	Very Little	Some	A Lot	All or Almost All
Family	○	○	○	○	○
Friends	○	○	○	○	○
Doctor or gynecologist	○	○	○	○	○
School	○	○	○	○	○
Media or news	○	○	○	○	○

64) Please select the option that best describes how true or untrue you think each statement is. Please do not look up the answers to these – we are trying to find out what you already know.

	Definitely Untrue	Probably Untrue	Neither True nor Untrue	Probably True	Definitely True
Fertility decreases with age for women	○	○	○	○	○ *
Age does not affect fertility in men	○ *	○	○	○	○
Women are likely to experience a decrease in fertility before the age of 30	○	○	○	○	○ *
Women typically have a marked decrease in fertility at a later age than men	○ *	○	○	○	○
In vitro fertilization (IVF) results in a successful pregnancy more than half of the time	○ *	○	○	○	○
The chance of a woman becoming pregnant from in vitro fertilization (IVF) remains constant regardless of what the woman's age is	○ *	○	○	○	○
A couple is considered infertile if they have been actively been trying to become pregnant for one full year but have not become pregnant yet	○	○	○	○	○ *
Women are most fertile before the age of 20	○ *	○	○	○	○

Please answer the following questions (#59–#66) based on your own level of knowledge. Please do not look up the answers to these questions – we are trying to find out what you already know.

65) At what age are women most fertile?
- ○ 15-19
- ○ 20-24*
- ○ 25-29
- ○ 30-34
- ○ 35-39
- ○ 40-44
- ○ 45-49
- ○ 50-54
- ○ 55 or older
- ○ I don't know

66) At what age is there a slight decrease in a woman's ability to become pregnant?
- 15-19
- 20-24
- 25-29*
- 30-34
- 35-39
- 40-44
- 45-49
- 50-54
- 55 or older
- I don't know

67) At what age is there a marked decrease in women's ability to become pregnant?
- 15-19
- 20-24
- 25-29
- 30-34
- 35-39*
- 40-44
- 45-49
- 50-54
- 55 or older
- I don't know

68) At what age is there a marked decrease in male fertility?
- 15-19
- 20-24
- 25-29
- 30-34
- 35-39
- 40-44
- 45-49
- 50-54*
- 55 or older
- Never – male fertility does not decrease with age
- I don't know

69) A woman and a man regularly have unprotected intercourse during a period of 1 year. What is the chance that the woman will become pregnant if she is 25-30 years old?
- 0-9%
- 10-19%
- 20-29%
- 30-39%
- 40-49%
- 50-59%

- 60-69%
- 70-79%*
- 80-89%
- 90-100%
- I don't know

70) A woman and a man regularly have unprotected intercourse during a period of 1 year. What is the chance the woman will become pregnant if she is 35-40 years old?
- 0-9%
- 10-19%
- 20-29%
- 30-39%
- 40-49%
- 50-59%*
- 60-69%
- 70-79%
- 80-89%
- 90-100%
- I don't know

71) How many couples in the United States are involuntarily childless?
- 0-9%
- 10-19%*
- 20-29%
- 30-39%
- 40-49%
- 50-59%
- 60-69%
- 70-79%
- 80-89%
- 90-100%
- I don't know

72) If a couple undergoes treatment with in vitro fertilization (IVF), what is their chance, on average, of getting a child?
- 0-9%
- 10-19%
- 20-29%
- 30-39%*
- 40-49%
- 50-59%
- 60-69%
- 70-79%
- 80-89%
- 90-100%
- I don't know

73) How educated do you think you are about topics relating to how age affects the likelihood of certain pregnancy and childbirth issues?

Not at all educated	Slightly educated	Somewhat educated	Quite a bit educated	Extremely educated
○	○	○	○	○

74) Below is a list of possible sources that could have given you information on how age affects the likelihood of certain pregnancy and childbirth issues. Please select the option that best describes how much you have learned about topics relating to how age affects the likelihood of certain pregnancy and childbirth issues from each of these sources.

	None	Very Little	Some	A Lot	All or Almost All
Family	○	○	○	○	○
Friends	○	○	○	○	○
Doctor or gynecologist	○	○	○	○	○
School	○	○	○	○	○
Media or news	○	○	○	○	○

75) Please select the option that best describes how true or untrue you think each statement is. Please do not look up the answers to these – we are trying to find out what you already know.

	Definitely Untrue	Probably Untrue	Neither True nor Untrue	Probably True	Definitely True
The chance of having pregnancy or childbirth complications increases with age	○	○	○	○	○ *
As women age, the chance of having a child with Down Syndrome increases	○	○	○	○	○ *
As women age, the chance of having twins or triplets decreases	○ *	○	○	○	○
The chance of having a premature baby is decreased with age (Note: a premature baby is a baby born at less than 37 weeks gestation)	○ *	○	○	○	○
As women age, the chance of having a low birth weight baby increases (Note: a low birth weight baby is a baby that is born weighing less than 5 lbs. 8 oz. or 2500 grams)	○	○	○	○	○ *
The chance of having a low birth weight baby does not depend on the father's age (Note: a low birth weight baby is a baby that is born weighing less than 5 lbs. 8 oz. or 2500 grams)	○ *	○	○	○	○
In women over the age of 45, more than half of all pregnancies will result in a miscarriage.	○	○	○	○	○ *
As men age, the chance of having a child with an autism spectrum disorder	○	○	○	○	○ *

or schizophrenia increases					

Please answer the following questions (#70–#77) based on your own level of knowledge. Please do not look up the answers to these questions – we are trying to find out what you already know.

76) What is the chance that a woman 15-24 years old will give birth to a child with Down Syndrome?
- o 1 in 2,000
- o 1 in 1,600
- o 1 in 1,300*
- o 1 in 1,000
- o 1 in 500
- o 1 in 350
- o 1 in 200
- o 1 in 100
- o 1 in 50
- o 1 in 20
- o I don't know

77) What is the chance that a woman at the age of 35 will give birth to a child with Down Syndrome?
- o 1 in 2,000
- o 1 in 1,600
- o 1 in 1,300
- o 1 in 1,000
- o 1 in 500
- o 1 in 350*
- o 1 in 200
- o 1 in 100
- o 1 in 50
- o 1 in 20
- o I don't know

78) What is the chance that a woman 15-24 years old will give birth to a child with any type of chromosomal abnormality? (Note: Down Syndrome is one example of chromosomal abnormalities that are possible)
- o 1 in 2,000
- o 1 in 1,600
- o 1 in 1,300
- o 1 in 1,000
- o 1 in 500*
- o 1 in 350
- o 1 in 200
- o 1 in 100
- o 1 in 50
- o 1 in 20
- o I don't know

79) What is the chance that a woman at the age of 45 will give birth to a child with any type of chromosomal abnormality? (Note: Down Syndrome is one example of chromosomal abnormalities that are possible)
   - 1 in 2,000
   - 1 in 1,600
   - 1 in 1,300
   - 1 in 1,000
   - 1 in 500
   - 1 in 350
   - 1 in 200
   - 1 in 100
   - 1 in 50
   - 1 in 20*
   - I don't know

80) How much more likely are men over the age of 40 to have a child with an autism spectrum disorder compared to men under the age of 30?
   - Less likely
   - Equally likely
   - 1-2 times more likely
   - 3-4 times more likely
   - 5-6 times more likely*
   - 7-8 times more likely
   - 9-10 times more likely
   - Over 10 times more likely
   - I don't know

81) What percentage of pregnancies in women at the age of 35 will result in a miscarriage?
   - 0-9%
   - 10-19%
   - 20-29%*
   - 30-39%
   - 40-49%
   - 50-59%
   - 60-69%
   - 70-79%
   - 80-89%
   - 90-100%
   - I don't know

82) What percentage of pregnancies in women at the age of 40 will require a cesarean section (C-section) for delivery?
   - 0-9%
   - 10-19%
   - 20-29%

- 30-39%
- 40-49%*
- 50-59%
- 60-69%
- 70-79%
- 80-89%
- 90-100%
- I don't know

83) What percentage of pregnancies in women at the age of 35 will result in a low birth weight baby? (Note: a low birth weight baby is a baby that is born weighing less than 5 lbs. 8 oz. or 2500 grams)
   - 0-9%
   - 10-19%*
   - 20-29%
   - 30-39%
   - 40-49%
   - 50-59%
   - 60-69%
   - 70-79%
   - 80-89%
   - 90-100%
   - I don't know

84) Please write down any questions, comments, or issues that you may have had with this questionnaire.

_____

*NOTE: * refers to the correct answer based on current literature (symbol is not shown on questionnaire filled out by participants)*