

KNOWLEDGE, INTENTIONS, AND BELIEFS ABOUT FERTILITY AND ASSISTED  
REPRODUCTIVE TECHNOLOGY AMONG ILLINOIS COLLEGE STUDENTS

by

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## DEDICATION

I want to thank My Heavenly Father for all his guidance, support and love during this time. Thanks for challenging and blessing me. I have learned that you are authentic and real in my life. I also want to thank my mother and father Olivia and Arthur Morris for loving and supporting me unconditionally through this time. I am grateful for the best brother in the world Oheni Morris, thank you for your light heartedness, positivity and love. Thanks to my husband Wayon Smith III, son Wayon Smith IV (KJ) and in laws Mr. and Mrs. Wayon Simth Jr. and Mrs. Faye Freeman Smith for helping me during graduate school.

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AN ABSTRACT OF THE DISSERTATION OF

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TITLE: KNOWLEDGE, INTENTIONS, AND BELIEFS ABOUT FERTILITY AND ASSISTED REPRODUCTIVE TECHNOLOGY AMONG ILLINOIS COLLEGE STUDENTS

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The purpose of this quantitative cross sectional study was to examine knowledge, beliefs, and intentions about fertility and assisted reproductive technology among college students. This study differs from previous studies in that it examines knowledge, beliefs, and intentions about fertility and assisted reproductive technology among Illinois college students. The researcher examined differences among college students, including race, sexual orientation, age, parental status, relationship status, and gender. The researcher applied parts of the theory of planned behavior constructs to the survey instrument. The researcher studied the thought process of male and female students at Illinois universities taking foundational health courses. The researcher found that African Americans were less likely to delay parenthood compared to Caucasian Americans. While women felt that they wanted children at a younger age compared to men. Also some students felt they were ready for parenthood in their late twenties to mid-30's as oppose to earlier twenties.

## TABLE OF CONTENTS

<u>CHAPTER</u>	<u>PAGE</u>
CHAPTER 1 INTRODUCTION .....	1
CHAPTER 2 REVIEW OF RELATED LITERATURE.....	16
CHAPTER 3 METHODS AND PROCEDURES .....	33
CHAPTER 4 RESULTS .....	54
CHAPTER 5 FINDINGS & CONCLUSION.....	80
REFERENCES .....	91
APPENDIX A.....	126
APPENDIX B.....	130
APPENDIX C.....	131
APPENDIX D.....	132
APPENDIX E .....	133
APPENDIX F.....	134
APPENDIX G.....	135
APPENDIX H.....	136
APPENDIX I .....	141
APPENDIX J .....	142
APPENDIX K.....	143

LIST OF TABLES

<u>TABLE</u>	<u>PAGE</u>
Table 1. Fertility by Race and Ethnicity Births Per 1000 .....	20
Table 2. Participating University and Introductory Health Courses.....	35
Table 3. Modified and Adapted Fertility Survey Questions .....	39
Table 4. Instrument Constructs and Measurement Scales .....	39
Table 5. Summary of Research Questions, Instrument Items, and Data-Analysis Methods .....	44
Table 6. Number and Percentages of Participants from Illinois Universities.....	56
Table 7. Number and Percentages of Race, Sexual Orientation and Age.....	58
Table 8. Number and Percentages of Parental & Relationship Status and Children .....	59
Table 9. Results of Reliability Analysis .....	60
Table 10. Range of Values, Means, and Standard Deviation for scales .....	61
Table 11. Results of Kruskal Wallis test for Intentions .....	63
Table 12. Pairwise Comparison for the mean Ranks of Intentions by Race.....	64
Table 13. Pairwise Comparison for the Mean Ranks by Intentions by Age Caterogy .....	65
Table 14. Results of the Krusal Wallis Tests for Beliefs .....	66
Table 15. Pairwise Comparison for the Mean Ranks of Beliefs by Race.....	67
Table 16. Pairwise Comparison for the Mean Ranks of Beliefs by Gender .....	68
Table 17. Results of Krusal Wallis Test for Knowledge .....	69
Table 18. Variance Inflater Factor Value for the Regression Predicting Intentions.....	71
Table 19. Results of Multiple Linear Regression Predicting Intentions .....	72
Table 20. VIF Vaules for the Regression Predictor Beliefs .....	74
Table 21. Results of the Multiple Linear Regression Prediction Beliefs.....	76

Table 22. VIF Values for the Regression Predictor Knowledge .....	78
Table 23. Results of Multiple Linear Regression Knowledge .....	78

LIST OF FIGURES

<u>FIGURE</u>	<u>PAGE</u>
Figure 1. Theory of Planned Behavior.....	30
Figure 2. Mean Values of Fertility and ART intention scores by race .....	64
Figure 3. Mean values of Fertility and ART intentions by age category.....	65
Figure 4. Mean values for Fertility and ART beliefs scores by race. ....	67
Figure 5. Mean values of Fertility and ART beliefs scores by gender. ....	68
Figure 6. Residuals scatterplot testing homoscedasticity for Regression predicting intention.....	70
Figure 7. Residuals scatterplot testing homoscedasticity for Regression predicting beliefs. ....	74
Figure 8. Residuals scatterplot testing homoscedasticity for Regression predicting knowledge. ....	77

# CHAPTER 1

## INTRODUCTION

### Preface

After a diagnosis of polycystic ovarian syndrome (PCOS) in 2004, I experienced a struggle with the syndrome, which leads to acne, hair growth on the stomach and chest, weight gain, and hormonal imbalance. PCOS involves multiple cysts in a woman's ovaries that impact the hormone balance in the woman's system and may lead to infertility and conception difficulties. Fortunately, our family conceived in our mid-30s and welcomed our first child on October 24th, 2016.

For my husband and myself, like many college students and young professionals, delaying parenthood seemed as though it would be the best choice for our family even though we knew there might be a risk of infertility. Like some couples our age, we chose to delay parenthood in the hopes of establishing careers and purchasing a home for our new family. As a result, I decided to conduct a study on fertility and Assisted Reproductive Technology (ART) because I thought I would have been affected by infertility and would have had to utilize ART. I specifically choose to conduct a study similar to one conducted by Daniluk and Koert (2012) because I felt that it was more inclusive of fertility concerns, which include PCOS and other infertility challenges.

Daniluk and Koert (2012) reported that more women and men are delaying parenthood or waiting until advanced ages to start parenthood (for this study *delayed parenthood* and *advanced aged parenthood* are classified including one parent being past 35). Reasons for delaying parenthood include growing social trends that encourage delayed parenthood, changing norms regarding the best age for parenthood, the desire to establish careers, desire for greater financial stability, and an inability to find a suitable partner (Daniluk & Koert, 2013; Lampic, Skoog-

Svanberg, Karlstrom, & Tyden, 2006; Peterson, Pirritano, Tucker, & Lampic, 2012). Studies have shown that both men and women are less aware that age, not physical fitness, is more responsible for infertility (Daniluk & Koert, 2013; Lampic et al., 2006). Daniluk and Koert (2013) noted that men and women were not aware that some women might struggle with infertility, even with assisted reproductive technology (ART). ART can aid couples to conceive, but often the cost (about \$5000) and the number of rounds required for successful conception can be prohibitive (Peterson et al., 2012).

Daniluk and Koert (2013) found that men were influential in determining if and when a couple decided to have a family, even though men had less fertility and ART knowledge than women. They noted that men, regardless of education and age, were less knowledgeable than women regarding the consequences of delayed parenthood, the effects older parental age may have on infants and the availability, and cost of ART (Daniluk & Koert, 2013). Daniluk and Koert also noted that educating both men and women about fertility and ART is warranted and essential if couples want to make informed decisions to become parents. The demonstrated lack of awareness about fertility and ART, and fertility issues in general, among college students provides a rationale for continued research in this field (Daniluk & Koert, 2013; Daniluk, Koert, & Cheung, 2012; Chan, Chan, Peterson, Lampic, & Tam, 2015). Due to a gap of information about college students' beliefs, intentions, and knowledge about fertility and ART, the current study investigated the intentions, beliefs, and knowledge among a specific population of students attending college in Illinois. This introductory chapter defines terms and provides a background for the study, justifies and describes the purpose of the research, and lays out the research problem and questions.

## **Background**

Fertility, the ability to produce offspring—is also known as fecundity (American Society for Reproductive Medicine [ASRM], 2013). ASRM (2013) stated that women under the age of 35 who engaged in unprotected sex and had not conceived during a period of 12 months were infertile. Women older than 35 years who engaged in unprotected sex over the course of 6 months and did not get pregnant were considered infertile.

Knowledge of fertility also can be used to prevent pregnancy by couples who do not want children (ASRM, 2013) and includes information that can aid persons to conceive using specific types of ART. Daniluk and Koert (2013) concluded that both male and female participants in their study had little knowledge regarding delayed parenthood choices and overestimated the success rates of ART, and both men and women were misinformed about chances of pregnancy at the time of ovulation and had little awareness of when women are most fertile. Their study participants were unable to recognize the relationship between sexually transmitted infections and subsequent infertility. Generally, women were aware that reproduction at an older age might increase the chances of complications and conception difficulties (Daniluk et al., 2012). As Daniluk et al. (2012) reported, women know the most opportune time to have a family, but younger women are less aware that sexually transmitted infections and increased age (not fitness or health) can increase a woman's chances of infertility.

Assistant Reproductive Technology (ART) is described by the Centers for Disease Control and Prevention (CDC, 2014) as including all fertility treatments in which clinicians handle both eggs and sperm. Some ART treatments involve removing eggs from the woman, combining them with sperm in the laboratory, and then returning the fertilized egg into the woman (CDC, 2014). Examples of ART include in vitro fertilization (IVF), which is the process

of fertilization by extracting eggs, retrieving a sperm sample, and then manually combining an egg and sperm in a laboratory dish. The embryo(s) is then transferred to the uterus. Another procedure called zygote intrafallopian transfer is an assisted reproductive procedure similar to IVF and embryo transfer, with the difference being that the fertilized embryo is transferred into a fallopian tube instead of the uterus. Gamete intrafallopian transfer is a similar assisted reproductive procedure that involves removing a woman's eggs, mixing them with sperm, and immediately placing them into a fallopian tube. Intracytoplasmic sperm injection refers to a laboratory procedure in which a single sperm is picked up with a fine glass needle and injected directly into an egg. These treatments are designed to help couples conceive (CDC, 2014).

More couples use ART because they think it may aid them in conceiving, but Daniluk and Koert (2013) showed that not all couples who use ART conceive successfully. Chan et al. (2015) and Sabarre et al. (2013) noted a general lack of fertility knowledge and information about how truly effective ART can be. Some women believe that ART can cure infertility at any age, which is not accurate. Maheshwari, Porter, Shetty, and Bhattacharya (2008) found that 85% of infertile women and 77% of expectant mothers believe that IVF could overcome the effects of age. In a qualitative study, Benzies, Tough, Tofflemire, Frick, Faber, & Newburn-Cook. (2006) found that all 45 participants in their study were confident that ART would aid in conception. Celebrities like Celine Dion have shown that, with IVF, having children at a later age is possible, which might mislead women into thinking they can also get pregnant later in life.

Physicians agree that the most physically opportune time for a woman to have children is between the ages of 20 and 24 (American Reproductive Society of Medicine, 2012). However, many women choose to delay motherhood in order to continue their education or enter the workforce beyond this ideal timeframe (Herr & Wolfram, 2012; Lightbody, 2011; Pew Social

Trends, 2010). Among college graduates delaying parenthood is a growing trend (Chan et al., 2015). According to Lightbody (2011), although some begin to have families, many college graduates pursue their careers or continue their education with graduate school rather than have children.

Lampic et al. (2006) stated that people delay parenthood for myriad reasons, including pursuing careers or working on advanced degrees, lack of financial stability or job prospects, and not finding a suitable partner. Sometimes delaying parenthood can result in infertility, which may be a concern for couples who would like children. Some college students do not know that infertility can be difficult to treat, even with the assistance of ART. This challenge can be painful for couples who desire children. Knowledge of fertility, per Daniluk and Koert (2013), is necessary for both men and women so that they can make informed choices and decisions regarding their family planning. Some college students may not fully understand that behaviors such as unprotected sex, having repeated abortions, or delaying parenthood until advanced age (35+) can lead to infertility. On-campus programs can help college students understand the choice to delay parenthood until advanced ages.

### **Statement of the Problem**

The issues surrounding fertility and ART support the need for continued research as the problem of infertility continues for a higher proportion of educated people who delay parenthood (Hampton, Mazza, & Newton, 2013; Lundsberg et al., 2014). The specific problem is that some college students underestimate age-related fertility decline and have insufficient fertility and ART knowledge leading them to postpone parenthood into their late 30s which can result in infertility (Chan et al., 2015; Peterson et al., 2012). More women are delaying parenthood, due in part to men influencing or encouraging women to delay parenthood (Lampic et al., 2006;

Peterson et al., 2012). Unfortunately, some women are not aware that aging may cause a rapid decline in fertility and are not mindful of the fact that ART may not help (Daniluk et al., 2012; Lampic et al., 2006). Men have a strong influence on their partners because men tend to be financially stronger and traditionally lead the home (Schwartz, Brindis, Ralph, & Biggs, 2011). Similarly, little is known about the intentions of students as they apply to planning parenthood and family (Daniluk & Koert, 2012). This study has been designed to investigate the specific problem of fertility and ART intentions, beliefs, and knowledge of Illinois college students and differences based on race, sexual orientation, age, parental status, relationship status, and gender.

### **Need for the Study**

Women are most fertile between the ages of 20 and 24 (ASRM, 2003; Lampic et al., 2006). Researchers have noted these ages are also the time when some women decide to delay childbirth to complete their college education. Lampic et al. (2006) found that college students are aware that complications can occur after 35 years of age, but they lack knowledge about age-related concerns and ART treatment. College students may have some knowledge of fertility but when questioned showed little understanding of age-related fertility issues and ART (Lampic et al., 2006; Peterson et al., 2012). Similarly, some college students may have knowledge about fertility but lack knowledge regarding IVF and other ART options (Chan et al., 2015).

Maheshwari et al. (2008) reported that college students need to know about the risks and benefits of delaying parenthood from women who have suffered from being infertile. Daniluk and Koert (2013) and Lampic et al. (2006) also emphasized the need for students to learn at what ages a woman is most and least fertile. Some women, especially those who pursue postgraduate education, tend to delay parenthood, which in some cases leads to infertility or childlessness

(Chamie & Mirkin, 2012; Livingston & Cohn, 2010; Schmidt, Sobotka, Bentzen, & Andersen, 2011).

There is, therefore, a justification for further research on the intentions, beliefs, and knowledge of Illinois college students regarding fertility and ART, so that health professionals, counselors, and other caregivers can become better informed about ways of educating them. The conclusions and recommendations derived from this study could be used to help college students make informed decisions and perhaps avoid the fate of men and women who make choices about family planning that they regret later.

### **Purpose of the Study**

The purpose of this quantitative cross-sectional comparative study was to identify differences and relationships among Illinois college students' intentions, beliefs, and knowledge toward fertility and ART based on race, sexual orientation, age, parental status, relationship status, and gender.

### **Research Questions**

1. Do Illinois college students' fertility and ART intentions differ by race, sexual orientation, age, parental status, relationship status, or gender?
2. Do Illinois college students' beliefs about fertility and ART differ by race, sexual orientation, age, parental status, relationship status, or gender?
3. Do Illinois college students' knowledge of fertility and ART differ by race, sexual orientation, age, parental status, relationship status, or gender?
4. What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status, and gender) regarding college students' fertility and assisted reproductive technology intentions?

5. What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status, and gender) regarding college students' fertility and assisted reproductive technology beliefs?

6. What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status, and gender) regarding college students' fertility and assisted reproductive technology knowledge?

### **Significance to Health Education**

The results of this research may contribute to the limited existing research on college student and knowledge, intentions, and beliefs about fertility and ART. The researcher examined students' intentions, beliefs, and knowledge about fertility and ART because newly acquired findings from this study on fertility and ART could guide health educators as they decide how to disseminate information on fertility and ART in classrooms or other settings. The findings may also affect how workers at campus health services share information with men and women, further highlighting woman's fertility chances, even with ART. The results of the three independent variables of race, sexual orientation, and gender may contribute to or impact cultural competence, whereas age, parental status, and relationship status may contribute to existing literature, and more information on knowledge, intentions, and beliefs about fertility and ART will add to the literature.

### **Theoretical Framework**

The theory of planned behavior (TPB) developed by Ajzen (1985) is the overarching theory that served as the theoretical framework for this study. TPB is a modified version of the theory of reasoned action (TRA; Ajzen & Fishbein, 1980), originally designed to help predict changes in behavior. TPB and TRA differ only by the construct of perceived behavioral control

because, as Ajzen found, individuals did not have complete voluntary control over their behavior. Evaluating participants' intentions is the main component to predicting behavior in TPB. Additionally, a person's attitudes and beliefs greatly impact intentions. This study utilized knowledge, beliefs, and intentions (Ajzen, 1985, 1988).

Ajzen and Klobas (2013) and Dommermuth, Klobas, and Lappegard (2011) noted that beliefs, including subjective norms, greatly affect when couples decided to have children. Ajzen and Klobas also pointed out that the construct of belief can strongly influence a couple's decision to have children. Likewise, Daniluk and Koert (2013) noted there was a growing trend to delay parenthood, and couples' subjective norms greatly affect their intentions to have children. Couples' beliefs about when is an acceptable time to have children greatly impacted when and if they decide to have children (Dommermuth et al., 2011).

The survey in this dissertation, one modified from the Fertility Awareness Survey created by Daniluk et al (2012), included a 5-point Likert-type scale to assess the three constructs—knowledge, intentions, and beliefs—as adapted from the original survey creator (Daniluk & Koert, 2013). The three constructs of this study focus on the six research questions to examine differences in fertility and ART intentions, beliefs, and knowledge of the demographic characteristics of race, sexual orientation, age, parental status, relationship status, and gender. The researcher used these constructs to postulate that a person's behavior may be influenced by intentions and beliefs (Ajzen, 1985; Ajzen & Fishbien 1980; Ajzen & Klobas, 2013) and their<sup>1</sup> knowledge of fertility (Daniluk & Koert, 2013).

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<sup>1</sup> In this dissertation I use singular *they*, *their*, and *themselves* to recognize the concept of the gender spectrum in accordance with the American Psychological Association's (2015) "Guidelines for Psychological Practice With Transgender and Gender Nonconforming People."

## Study Sample

Participants in the study were students enrolled in introductory health education courses in the fall semester of 2017 at six 4-year public universities in Illinois: Eastern Illinois University, Illinois State University, Northern Illinois University, Northeastern Illinois University, Southern Illinois University Carbondale, and Southern Illinois University Edwardsville. A power analysis estimated that a minimum sample size of 287 students ( $\alpha = .05$ ; power = .95; margin of error = 5%) was needed in this study (Field, 2009). All six of the participating universities are public institutions of higher education. The researcher utilized nonrandom convenient sampling, in the introductory health courses among students who agreed to participate. My goal was to recruit male and female students from diverse backgrounds, aged 18 years and older, enrolled in an introductory health education courses offered as general education at the selected universities (see Tables 2 and 3).

The researcher collected data using nonrandom convenience sampling of students attending the identified seven universities. The survey was appropriate for this research because it was the most convenient for the participants and the researcher (Nulty, 2008). The survey option was the most appropriate due to low cost and convenience, and respondents were able to answer questions at their own pace in a private setting (Dillman, Smyth, & Christian, 2009). Positive aspects of using surveys are that a researcher does not have to administer the survey (Nulty, 2008) and respondents may feel less judged when completing their surveys privately.

Data collection involved asking introductory health science/health education instructors at the participating universities to distribute the surveys. The researcher mailed out surveys so that the instructors could distribute them to students in their classes and students could complete the survey after giving consent to participate in the study; students who did not give their consent

to participate not take the survey. Each professor or instructor received a \$5 gift card for mailing back their students' completed responses. The researcher allocated a period of 1 month to collect all the data from all the universities.

### **Data Analysis**

The Statistical Package for the Social Sciences (SPSS) program Version 23 was used to compute descriptive statistics, ANOVA, and multiple regression to evaluate the results of this study. The researcher used descriptive statistics which included measuring of central tendency and ANOVA to test differences between variables and multiple regression to determine the relationship between the variables. Demographic information on race, sexual orientation, and gender was analyzed using frequencies and percentages. Six independent demographic variables (race, sexual orientation, age, parental status, relationship status, and gender) were tested using ANOVA to assess differences in the three dependent variables of intentions, beliefs, and knowledge of fertility and ART. The researcher used multiple regressions to analyze the interactions between race, sexual orientation, age, parental status, relationship status, and gender to determine the relationship and predictive value of intentions, beliefs, and knowledge. Post-hoc analyses was conducted to differentiate the significant results between three or more means.

### **Assumptions**

Assumptions are preliminary beliefs about the sample, instruments, parameters, and limitations. The following assumptions were made:

1. The survey instrument is reliable and valid.
2. The survey was understood by the participants answering the instrument.
3. Participants responded honestly to the questions on the survey.

4. Participants aged 18 and older were representative of other such persons attending other Midwestern universities or colleges.
5. Male and female college students' intentions, beliefs, and knowledge regarding fertility and ART emerged.
6. The collected data will remain confidential, thereby protecting participants' identity.

### **Limitations**

Limitations are circumstances that researchers do not have control over during a study.

The following limitations or factors that cannot be controlled applied to this study:

1. Students who chose to answer may have been more interested in participating compared to students who did not participate.
2. The researcher depended on respondents to truthfully self-disclose.
3. Some respondents may have reported answers they felt were socially desirable.
4. This study had nonrandom convenient sampling limitations.

### **Delimitations**

Delimitations are situations or factors that researchers restrict during a study. The following delimitations or researcher-imposed factors applied to this study:

1. This study included college students at multiple institutions in Illinois.
2. Participants were Illinois college students aged 18 and older.
3. The study analyzed participants' knowledge, intentions, and beliefs of fertility and ART.
4. Data were collected over one month.
5. The study included students taking introductory health education/health science courses.

## Definition of Terms

*American Society for Reproductive Medicine:* A nonprofit, professional medical organization of more than 9,000 health care specialists interested in reproductive medicine.

*Assisted reproductive technology:* All fertility treatments in which both eggs and sperm are handled. In general, ART procedures involve surgically removing eggs from a woman's ovaries, combining them with sperm in the laboratory, and returning them to the woman's body or donating them to another woman (CDC, 2016).

*Beliefs:* In the Intentions, Beliefs, and Knowledge Survey of Fertility and Assisted Reproductive Technology Survey Questions 6–17 address the beliefs construct. According to the TPB, human behavior is guided by three kinds of considerations. The first belief is about the likely consequences of the behavior (behavioral beliefs), the second belief is about the normative expectations of others (normative beliefs), and the third belief is about the presence of factors that may facilitate or impede the performance of the behavior (control beliefs). This survey includes constructs of behavioral beliefs, normative and control beliefs. Questions 6–9, 12, and 13 are considered behavioral beliefs items, and Questions 10, 11, 14, and 16 are considered control beliefs items. Only Question 15 is considered a normative belief questions.

*Delayed parenthood:* Postponing parenthood until the advanced maternal and paternal ages of 35 and older.

*Fecundity:* The quality or power of producing abundantly, fruitfulness, or fertility (ASRM, 2016).

*Fertility:* The condition, quality, or degree of being able to have children (ASRM, 2016).

*Infertility:* The result of a disease or injury (an interruption, cessation, or disorder of body functions, systems, or organs) of the male or female reproductive tract that prevents the

conception of a child or the ability to carry a pregnancy to delivery. The duration of unprotected intercourse with failure to conceive should be about 12 months before an infertility evaluation is undertaken, unless medical history, age, or physical findings dictate earlier evaluation and treatment (ASRM, 2016).

*Intentions:* A combination of attitudes toward a behavior, subjective norms, and perceived behavioral control influence behavioral intention. Generally, the more favorable the attitude and subjective norm, and the greater the perceived control, the stronger a person's intention to perform a behavior. The Intentions, Beliefs, and Knowledge on Fertility and Assisted Reproductive Technology Survey intention construct is made up of five questions that ask participants their intentions toward parenting.

*In vitro fertilization:* A method of assisted reproduction that involves combining an egg with sperm in a laboratory dish. If the egg fertilizes and cell division begins, the resulting embryo is transferred into the woman's uterus, where it may implant in the uterine lining and develop further. IVF bypasses the fallopian tubes and is usually the treatment choice for women who have badly damaged or missing tubes (CDC, 2016).

*Knowledge:* According to Ajzen (1985), the construct of knowledge is a background factor that influences beliefs. Questions 17 through 34 from the Intentions, Beliefs, and Knowledge of Fertility and ART instrument were created from the knowledge construct.

*Sexual minority:* Another term for gay, lesbian, transgendered, bisexual, intersex, queer, and asexual sexual orientations (Du Toit, 2010).

*Stable relationships:* When two people are in a committed, monogamous relationship not threatened by a breakup or divorce.

*Third-party assisted ART:* In this form of ART, the egg, sperm, or uterus of people other than the couple attempting to conceive are used. Third party assisted ART procedures include surrogates and gestational carriers. A surrogate parent includes the third-party woman using her egg and the male's sperm to carry the child. The gestational carrier usually agrees to carry the fertilized egg of the couple for pay.

### **Summary**

The chapter presented an introduction to the study of the intentions, beliefs, and knowledge of Illinois college students regarding fertility and ART. The problem that provided the rationale for the study was stated, followed by the research questions, and an overview of the research methodology. In this comparative study, a quantitative research design was used to examine students' intentions, beliefs, and knowledge about fertility and ART. Descriptive statistics, ANOVA, and multiple regression analysis were used to analyze the results of the survey, and a minimum study sample of 287 was determined to be satisfactory for this study based on a power analysis (Field, 2009). This chapter provided assumptions, limitations, delimitations, and definitions of terms. Chapter 2 reviews literature relevant to the study. Chapter 3 explains the methodology, including the collection and analysis of data. Chapter 4 presents the findings, and Chapter 5 presents conclusions and recommendations based on the research.

## CHAPTER 2

### REVIEW OF RELATED LITERATURE

#### Overview

Chapter 2 summarizes and synthesizes relevant literature on fertility, advanced delayed parenthood, infertility, and Assisted Reproductive Technology (ART) as they relate to gender, race, sexual orientation, and partner influence on delayed advanced parenthood, marital status, and parental status. It also outlines the theoretical framework and constructs that provide the foundation for this study. Through a comprehensive review of the literature on these subjects, it was possible to identify foundations for the present study and gaps in the literature that the current study sought to fill.

#### **Fertility Knowledge and Assisted Reproductive Technology**

*Fertility knowledge* and *ART* are pertinent terms that may have an impact on couples who delay parenthood or struggle with infertility. Some couples may have to utilize their fertility knowledge and may possibly consider using ART to treat infertility.

Prior to discussing fertility knowledge and ART, the following information regarding fertility is relevant. *Fertility* is defined as being able to produce offspring (American Society of Reproductive Medicine [ASRM], 2008). According to ASRM (2012), 20 through 24 is a woman's optimal age range for having children. Also, women's fertility is expected to end 5–10 years before menopause. Fertility decreases by half for women in their late 30s compared to women in the early 20s (ASRM, 2008). Researchers have found lack of fertility knowledge about advanced maternal age is the primary reason that women may be infertile (Lampic et al., 2006).

*Fertility knowledge or fertility awareness* is defined as having knowledge and information about fertility (Lampic, Skoog-Svanberg, Karlstrom, & Tyden, 2006). It

encompasses how topics such as fertility timeline or spectrum, over- or underweight, diabetes, and engaging in unprotected sex may affect one's fertility, and how various fertility treatments can help men and women conceive (Lampic et al., 2006). Fortunately, in some cases, ART can help couples conceive by using various methods and procedures in a clinic. According to the Centers of Disease Control and Prevention [CDC] (2017) ART includes all fertility treatments in which both eggs and embryos are controlled. In general, ART procedures involve surgically removing eggs from a woman's ovaries, combining them with sperm in the laboratory, and returning them to the woman's body or donating them to another woman.

Some researchers found that due to a lack of knowledge regarding fertility and ART, college students were not aware of the most opportune time regarding having children, which may lead to medical concerns or infertility. Lampic et al.'s, Skoog-Svanberg, Karlstrom & Tyden's, (2006) findings indicated that university students plan to have children at ages when female fertility is decreased without being sufficiently aware of the age-related decline in fertility. This sort of plan increases the risk of involuntary infertility in this group, which is alarming in view of the great importance they put on parenthood. Similarly, Paterson et al. (2012) revealed that delaying childbearing based on incorrect perceptions of female fertility could lead to involuntary childlessness. Education regarding fertility issues is necessary to help men and women make informed reproductive decisions that are based on accurate information rather than incorrect perceptions (Paterson et al., 2012).

Some researchers indicated that men have less fertility knowledge than women. According to Daniluk and Koert (2013), childless men have no coherent body of knowledge regarding age-related fertility and ART treatment and family-building options, and men may be contributing to the trend of delaying childbearing. If men are to be effective in supporting

informed fertility and childbearing decisions, education programs must target both men and women (Daniluk & Koert, 2013). Also, Daniluk, Koert, and Chueng (2012) found that women had no coherent body of knowledge regarding age-related fertility and ART treatment options. On the other hand, Maheshwari, Porter, Shetty, and Bhattacharya (2008) found that women were largely aware of the risks and complications of delaying childbirth but erroneously believed that IVF could mitigate the effects of age.

Women may have more knowledge about fertility awareness compared to men but not by much. A study focused on professional women by Lundsberg, Pal, Garipey, Xu, Chu, and Illuzzi (2013) found that people often lack fertility awareness and even if they are aware they do not utilize their knowledge when challenged to analyze fertility. Their quantitative study assessed knowledge, attitudes, and practices related to conception and fertility among 1,000 reproductive age women. They found that the women in their sample's knowledge about ovulation, fertility, and conception was narrow. Lundsberg et al.'s main recommendation was more initiatives or programs should focus on health care professionals, distributing correct information in offices and using web-based sites to provide more information on conception and fertility for patients. Littleton (2014) reported similar findings that students who had fertility knowledge do did not know how to apply that knowledge to their lives.

Educating students on fertility and ART can help them make more informed choices regarding their fertility and ART options. Daniluk and Koert (2015) found that exposure to fertility awareness online can change fertility beliefs and increase knowledge, but the research shows that effects of the exposure may not be long term. Trent, Millstein, and Ellen's (2006) study included 302 African American adolescents; they found that more health education programs including sexually transmitted infection screenings are needed to help this group of

students to be knowledgeable so they can avoid being infertile because they lack knowledge (Trent, Millstein, and Ellen, 2006).

**Fertility and ART in race (ethnicity), gender, age and education.** Hispanic and Black men and women have higher rates of fertility than White, Asian, and American Indian men and women (Amuedo-Dorantes & Kimmel, 2008). These higher rates may be due in part to poverty, lack of knowledge regarding fertility, religious views, views on abortion, failure to complete high school, or lack of access to healthcare. Similarly, Monte and Ellis (2014) found that Hispanic women had the highest fertility rate compared to women of other races. National health data show that Hispanic and Black women are the most fertile. The National Center for Health Statistics (CDC, 2015) found that in 1980 fertility rates for Hispanic women aged 15 to 44 was 95.4 births per 1,000; the following decade showed that fertility rose to 107.7 births per 1,000 Hispanic women in that age group which was the highest in all documented decades. In 2000, rates were 95.9 births per 1,000 women, and in 2013, 72.9 (see Table 1).

In 1980, Black fertility rates were 84.9 per 1,000 women; in the following decade rates increased to 86.8; in 2000, fertility rates were 70; and in 2013, fertility rates were 64.7 per 1,000 women (see Table 1). In 1980, fertility rates in White women were 65.6, and in 1990, 68.3, whereas in 2000 fertility rates were 65.3 per 1,000 women and in 2013, 62.7 per 1,000 births (see Table 1). In 1980, Asian women's fertility rates were 73.2 per 1,000 women; in 1990, the rates were 69.6; in 2000, fertility rates were 65.8, and in 2013, fertility rates were 59.2 (see Table 1). In 1980, fertility rates for Native Americans were 82.7 births per 1,000 women, whereas in 1990, the rate was 76.2 and in 2000, 58.7 (see Table 1). In 2013 fertility rates were 46.4 per 1,000 births for Native Americans. Only in 2013 did Native American women have the lowest fertility rates, whereas before 2000 they had the third highest fertility rates after African Americans.

Table 1.

*Fertility by Race and Ethnicity Births Per 1000*

Race and ethnicity	Years			
	1980	1990	2000	2013
Hispanic	95.4	107.7	95.9	72.9
Black	84.9	86.8	70.0	64.7
White	65.6	68.3	65.3	62.7
Asian	73.2	69.6	65.8	59.2
Native American	82.7	76.2	58.7	46.4

In a literature review, Westoff and Marshall (2010) examined how religion impacted Hispanic female fertility rates, finding that Mexican women were more religious, which influenced childbearing. They noted that American-born Hispanics were more religious than non-Hispanic groups of women, but this difference explained only some of the higher fertility of Hispanics and more of the fertility difference aligned with the higher rates of poverty among Hispanics and their higher proportion of unintended births. Hispanic women who were poor and less educated focused more on religion and tended to have more children. Hispanic women who were educated tended to have fewer children. However, Westoff and Marshall (2010) revealed that research on religion and fertility was limited within the Hispanic community, whereas Bachu (1996) revealed that Black and Hispanic men have higher rates of fertility compared to other groups. Fertility was higher among Black married men (2.6 children each) than it was for White men and Asian and Pacific Islander men (2.2 children each; see Table 2). Similarly, fertility rates were also higher for married Black women than for White women or Asian and Pacific Islander women. Among men and women, Hispanics had higher levels of children ever born than non-Hispanic. Married-couple families with Hispanic husbands had 2.6 children per husband compared to 2.2 children for non-Hispanic husbands. A notable difference emerged when

Hispanic men married non-Hispanic (White, Black, Asian, or Native American) women; couples with both spouses of Hispanic origin averaged 2.8 children each compared with 1.8 children each when the wife was not of Hispanic descent.

Martinez, Daniels, and Chandra (2012) also noted that minorities were more likely to have more children. Martinez et al. analyzed birth rate data from the National Survey of Family Growth (NSFG) with a sample of 22,682 respondents (10,403 men and 12,279 women). The goal of the report was to analyze and compare earlier data from the NSFG from 2006 through 2010. Results showed that the average age for a woman's first birth was 23 and 25 for men. Hispanic women and men had more children than White and Black women and men in part because Hispanic women tend to start having families at an earlier age compared to their counterparts. Half of births to Hispanic women were non-marital, and about half of these were within cohabiting unions. White women had the fewest number of children and the highest average age of at first birth compared with Hispanic and Black women. In addition, White men and White women had the lowest percentage of non-marital first births and about half of them are within a cohabiting union. Black women had fewer children than Hispanic female participants but more than White female participants. The mean age at first birth for Black women is the youngest of the three groups. Some first births to Black women are non-marital, and the majority are also outside of the cohabiting union (Martinea, Daniels, & Chandra, 2012).

Some research shows that the more education a person has, the more their likelihood of having more children decreases. Yan and Morgan (2003) found that less-educated African Americans have higher fertility rates, educated Whites and Blacks have the lowest fertility, and less-educated Whites have fertility levels between these two groups. They showed that education is a greater predictor for fertility than race. Similarly, Brand and Davis (2011) found that fertility

rates are decreasing more among college educated women who grew up poor than women who do not have a first degree and are poor women. Women with more education from poor backgrounds lessen their fertility rates compared to women from the same background with less education.

Wellons et al. (2008) reported Black female participants were more likely to have experienced infertility. This disparity was not explained by common risk factors for infertility such as smoking and obesity; and among nonsurgical sterile female participants, it was not explained by gynecologic risk factors such as fibroids and ovarian issues. Educated Black women tend to be career focused and are less likely to find a partner with similar qualifications, and so are less likely to become pregnant (Wellons et al., 2008).

Different age groups have various perceptions, beliefs, and intentions regarding fertility and ART Knowledge. Researchers have found that the women who are 35 or older or men who are 45 or older take a longer time to conceive. Hassan and Killick (2001) found that, on average, it takes men 45 or older over a year to get their partner pregnant, whereas. While 35-year-old women take twice as long to get pregnant as 25-year-old women (Hassan & Killick, 2001). Younger couples conceive more quickly than older couples (ASRM, 2008).

Younger, less experienced individuals have less knowledge compared to their older, more experienced counterparts, who may end up childless due to lack of knowledge. Researchers employed by the Government of Australia (2012) documented that maternal and paternal ages both impact the chance of having a healthy baby, and that women over the age of 30 have increased chances of chromosomal abnormalities. Additionally, still birth and premature births are also more prominent in this age group, and male fertility starts to decline about age 45 and chances of developmental problems like autism spectrum disorder increases after age 40.

In a literature review, Bretherick, Fairbrother, Avila, Harbord, and Robinson (2010) concluded that more education is needed to inform female academics and professionals about the rate at which reproductive capacity declines with age to avoid unintended childlessness. In this study 360 female undergraduate women did not clearly comprehend the steep rate of fertility decline with age and did not identify age as the strongest risk factor for miscarriages. An all-male study by Holton et al. (2016) found that men lack knowledge of female reproductive life span and recommended that because of this lack there should be campaigns focused on men and their awareness of age-related fertility decline. It may also be beneficial for health care providers to incorporate reproductive health care and education with primary care health consultation. In another age-related study, Liu and Case (2017) recommended the following: First, young women should be counseled about age-related infertility risk and the realities of ART. Second, Women should be informed that the risk of spontaneous pregnancy loss and chromosomal abnormalities increases with age. Third, advanced paternal age appears to be associated with an increased risk of spontaneous abortion and increased frequency of some autosomal dominant conditions, autism spectrum disorders, and schizophrenia. Men over 40 and their partners who are pursuing pregnancy should be counseled about these potential risks, although the risks remain small.

**Fertility and ART knowledge in the LGBT communities.** There is little literature on ART intentions or beliefs and fewer studies of members of the lesbian, gay, bisexual and transgendered (LGBT) community. LGBT persons may have a desire to have children but face greater challenges due to discrimination based on sexual orientation. Research by Baiocco and Laghi (2013) suggested that although some Italian lesbians and gay men want to become parents, their intentions flounder due to the difficulty of accessing adoption, donor insemination, or surrogate maternity (Italy recognized same-sex civil unions in 2016 but to date has not

recognized same-sex marriage). Similarly, Riskind and Patterson (2010) completed a literature review and found that some gay and lesbian adults are parents; that many childless gay and lesbian adults report desires, expectations, and intentions for parenthood; and that there could be a generational shift in gay and lesbian pathways to parenthood. There are barriers or policies that hinder members of the LGBT community from adopting, using IVF, or having children. Lack of access to reproductive health care such as ART may be significant for many gay men and lesbians (Riskind & Patterson 2010).

Results of ART treatment of members of the LGBT community differ very little from their heterosexual counterparts. Nordqvist, Ter Keurst, Boivin, and Gameiro (2016) found there was no difference between the conception rates of heterosexual and lesbian women. Moreover, their findings revealed that sexual orientation of women does not affect the outcome of fertility treatment with donated sperm. Also, they reported that lesbian women undergoing treatment with donated sperm are equally fertile as women attempting to get pregnant without donated sperm, regardless of sexual orientation.

### **Delayed Parenthood**

Lampic et al. (2006) defined *advanced delayed parenthood* as purposefully waiting to have children until the mid-30s or older. Lampic also reported that people delayed parenthood for myriad reasons, such as pursuing careers or working on advanced degrees, lack of financial stability or job prospects, or not finding a suitable partner. However, such delays can cause fertility issues. Lampic et al. reported that university students planned to have children at ages when female fertility decreased without being sufficiently aware of the age-related decline in fertility. Women delayed parenthood without understanding the impact of advanced age motherhood (age 35+).

Delaying parenthood carries consequences. According to Kemkes-Grottenhaler (2003), many of those who merely intended to postpone children may end up involuntarily childless. Kemkes-Grottenhaler surveyed 193 childless female academics to analyze if they decided to pass on the opportunity of having children in favor of pursuing other choices or if the decision was just deferred for a later time. They claimed, “As this trend of postponing parenthood is most likely to increase shortly, the resolution of this conflict will be a major milestone in the development of modern industrialized countries” (p. 435). Kemkes-Grottenhaler’s analysis revealed that financial benefits alone will not entice women into motherhood, but societal and infrastructure changes may encourage women to start a family. Many couples, especially the main caretaker, struggle with balancing work and personal life (Kemkes-Grottenhaler, 2003). Mills, Rindfuss, McDonald and Velde (2011) found a conflict between work and family life for those who desired more children. Parents who want more offspring often perceive a conflict between work and family (Mills et al., 2011). On the other hand, Guedes and Canavarro (2015) found that after having children couples are often disappointed that they did not start earlier. Notably, Guedes and Canavarro examined 105 older parents (maternal age >35) and 93 younger parents (maternal age range 20–34) from a clinic before the obstetrical appointment. Both groups believed having a suitable partner was the key to becoming a parent. Many of the older parents were disappointed that they delayed parenthood, and older maternal age was the main predictor of women being less satisfied with child timing. Mothers, more than fathers, struggled with infertility concerns and were more likely to regret the timing of first childbirth (Guedes & Canavarro, 2015). On the other hand, Camberis, McMahon, Gibson, and Boivin (2014) found that women who had their first child in their 30s or 40s were adapted better or more mature in

entering motherhood, had less satisfaction with mothering, and the adjustment of being a mother was the equivalent to that of a younger mother's.

**Partner influences on becoming a parent.** Research shows that some men who may be educated influence women to have children at a later age. The more financially dominant spouse determines when the couple has children, (Schwartz, Brindis, Ralph, & Biggs, 2011). More men than women influence their spouses regarding when to have children. Though societal roles are becoming more inclusive of women as leaders, men typically earn more money and therefore may influence when and what actions to take if a woman is to become pregnant (Daniluk & Koert 2012). According to Schwartz et al. (2011), in Mexican-American culture men typically decide how and when their family evolves. Schwartz et al. interviewed 31 individuals (age ranges 15–35) and found that Mexican-American women are more influenced by the men in their culture than other American women. The findings reveal that men who are influenced by Mexican culture are more likely to want their pregnant wife to stay home, and men more influenced by mainstream US culture are more likely to encourage their wife to work and pursue an education. Male partners can influence pregnancy intentions, which may strengthen or weaken the relationship (Schwartz et al., 2011).

When women find a suitable and responsible partner they take on their partner's desires to increase or choose not to increase the family size. Zabin, Huggins, Emerson, and Cullins (2000) found that women who had children and found a new spouse to be "a suitable partner" assimilated their spouse's ideas of keeping the family at the current size or to expanding the family. Zabin et al. also found that the couples may want to expand their family but they delay having more children until they are emotionally or financially prepared.

As an example, Dudgeon and Inhorn (2004) found men may strongly influence women who might be poor or have little support for whether or not they have children. Dudgeon and Inhorn investigated men's influence on their partner's reproductive health and reported that young women without a stable partner are more likely to use contraceptives to prevent pregnancy. Also, male partners encourage women to use oral contraceptives, injections, implants, spermicides, diaphragms, or female condoms, and men could influence when and if female participants had abortions by withholding economic or emotional support (Dudgeon & Inhorn, 2004).

Lack of a suitable partner is a major reason why women delay parenthood. Proudfoot, Wellings, and Glasier (2009) concluded that most women were aware of the risks of delaying childbirth; however, the most common reason for delay concerned lack of the 'right' partner, which does not lend itself to intervention. Most women were more accurate in their assumption about the time it may take to conceive, and 74% of women who definitely or might want children gave reasons for not finding a suitable partner or unfulfilled relationship/s as the most common reason for the delay (Proudfoot et al., 2009). Proudfoot et al. also showed that finding a suitable partner influences women's intention on when to have children. Daniluk and Koert (2012) found that women may choose to delay parenthood because it might affect their careers or if they had not found suitable partners.

**How age and earnings impact parental status.** Many older first time parents enjoy parenting compared to younger first time parents due to established careers, stronger support systems, and access to health care. According to Criado, (2014), some younger parents experience depression because they are unsure about financial provision, lack support, lack maturity to deal with the drastic changes of parenthood, or lack education or access to health

care, whereas older parents (female >35, male >45) are happy because they may be educated, have established careers, and have access to health care. There are studies that examine the impact of enjoyment of having children on older parents because they are satisfied in other areas of their lives (Criado 2014; Amuedo-Dorantes and Kimmel (2004)). Some women may face challenges at the workplace if they want to expand their family size (Criado 2014).

People who delay parenthood for a time or permanently may have higher earnings in the long run. Men and woman have varying experiences as a result of having multiple children. Some women who postpone parenthood have flourishing careers, whereas others who have children during their career may not have same wage potential as their counterparts without children (Amuedo-Dorantes, 2004). Amuedo-Dorantes (2004) found that college-educated mothers do not experience a motherhood wage penalty at all. In fact, they enjoy a wage boost when compared to college-educated childless women. Second, fertility delay enhances this wage boost even further. Their results provide an explanation for the observed postponement of maternity for educated women. Amuedo-Dorantes and Kimmel (2004) argued that the wage boost experienced by college-educated mothers may be the result of their search for family-friendly work environments, which, in turn, yields job matches with more female-friendly firms offering greater opportunities for advancement.

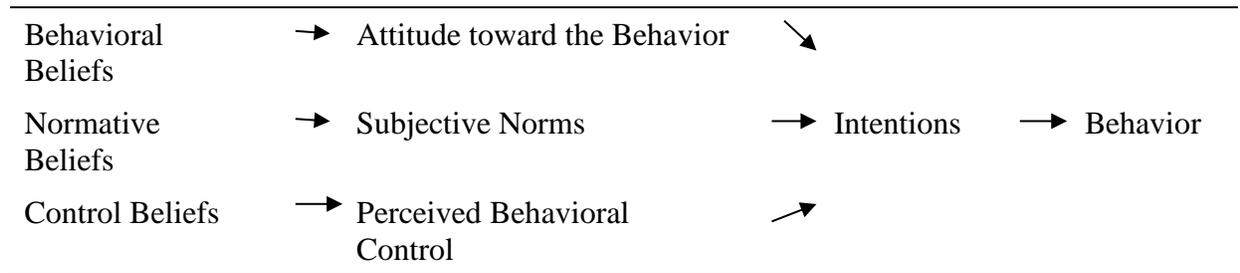
Women may have more challenges in their careers than men who would like to have multiple children. At some workplace environments women who are able to manage or balance work and life seem to obtain promotions. Cools, Markussen, and Strom (2017) found that having additional children reduced college educated women's earning, their ability to be employed by higher paying firms, and their probability of being a top earner at the workplace. There is less or no effect on family size for men in the labor market in either the short or long run. These

findings are in line with Lundborg et al. (2014), who found a 13 % reduction in women's hourly wages due to having a first child after 10 years.

**Infertility.** Infertility is defined as not being able to conceive in less than a year for couples under 35 and less than 6 months in couples over 35 (ASRM, 2012). Physicians at the ASRM (2012) reported that a third of men, a third of women, and a third of couples are infertile for some period of time. Sometimes it can be treated; for example, some couples use ART to treat infertility whereas others accept the condition. Delayed parenthood is the leading cause of infertility, and other biological reasons come second (Jose-Miller, Boyden, & Frey, 2007). The leading biomedical causes of infertility in women are interrupted ovulation, problems with fallopian tubes, unknown causes, and menstrual issues (Jose-Miller et al. 2007; Roupa et al., 2009). According to Jose-Miller et al. (2007) infertility causes in men were low sperm count, poor sperm motility, and abnormal sperm shape. Men who believe they are infertile typically go to their doctor's office so that the fertility specialist can run a series of tests, examining the men by giving them a physical examination, looking at their body mass, and evaluating hormonal levels by testing blood samples for hormone deficiency. Men and women may choose to delay parenthood until age 35 and older, which increases the possibility of fertility hindrances (Jose-Miller et al., 2007). Some other causes of infertility are sexually transmitted diseases such as chlamydia or gonorrhea, infections like pelvic inflammatory disease, poor oral health care, and poor lifestyle choices such as smoking or excessively drinking. Poor lifestyle choices and health behavior choices can increase the chance for infertility in men and women (Jose-Miller et al., 2007).

## Theoretical Constructs

Although this study does not seek to prove or test any specific theory, Malecarini, Vignoli, and Gottard (2015) indicated that for fertility studies the theoretical constructs of knowledge, belief, and intentions from the TRA and TPB are best suited for fertility studies and were used in this study (Dommermuth et al., 2011; Malecarini et al., 2015). People’s knowledge and beliefs affect their intentions and then their behavior, including about fertility and ART and having children. According to Ajzen (1985), the construct of knowledge is implied and influences beliefs. TRA and TPB are behavioral constructs that can be used to predict a person’s behavior (Figure 1). In this brief section articles including fertility intentions and fertility beliefs are analyzed, presenting evidence supporting the theoretical constructs of TRA and TPB are best used to support fertility studies.



*Figure 1.* Theory of planned behavior. *Note.* The fertility, knowledge, and beliefs of colleges students instrument was modified using portions of Fishbein and Ajzen’s (1985) theoretical constructs.

**Fertility beliefs and intentions.** Ajzen and Fishbein (1980) suggested that belief constructs impact the attitudes, perceived norms, and perceived control, which then influences the intentions of participants (University of Twente, 2010). Of the three types of beliefs, behavioral beliefs are those associated with behavioral performance linked to one’s attributes or performance (Glanz, Rimer, & Viswanath (2008). Normative beliefs follow what others believe is the appropriate choice or option, and control beliefs are one’s thoughts that may help or stop the performance of the behavior (Glanz et al., 2008). There is not a lot of literature on fertility

beliefs, but there is information on how demographers use TPB to support fertility. Studies like Bunting, Tsibulksy, and Boivin (2013) used TPB and TRA to examine fertility and population growth. Ajzen and Klobas (2013) found that fertility information may influence a persons' beliefs and perception regarding fertility choices.

Fertility Intentions are the most important construct affecting the behaviors because when people form an intention, most of them plan to follow through with it. Malecarini, Vignoli, and Gottard (2015) proved that TPB and constructs of intention can effectively be used to support fertility research. According to Glanz et al. (2008), some precursors' ideas, opinions or settings like that of education, parental influences, and knowledge in one's life that have been found to impact the level of fertility intentions, determining impacting fertility intentions and fertility behaviors.

Dommermuth, Klobas, and Lappegård (2015) found that childless people were less likely to focus on fertility intentions and were unaware of the most opportune time to have children compared to people who already had children. In accordance with the TPB, childless people may underestimate the difficulty of acting on their intentions and therefore have more difficulty realizing their intentions, versus parents who consider their ability to manage another child. Dommermuth et al. also showed that childless couples with an immediate fertility intention are more likely to succeed than those with a longer-term intention. Likewise, parents with an immediate fertility intention are more likely to realize their intention during the first two years after the interview, but after four years the childbearing rate was higher among those with longer-term fertility intentions. In addition, Dommermuth et al. (2011) found that subjective norms have a significant effect on the timing of intentions to have a child for both childless people and parents: The more both groups feel that their intention to have a child is supported by

their families and friends, the more likely they are to want a child immediately compared to within the next three years. This finding also shows that positive attitudes have a significant effect on intending to have a child sooner rather than later for parents but not for childless people. Perceived behavioral control is a significant determinant for both groups: people who consider themselves better able to cope with having child are more likely to intend to have a child in the near term rather than within the next three years.

### **Summary**

This chapter examined the literature that covers fertility knowledge and ART among college students. Chapter 2 also covered delayed parenthood, race (ethnicity), and education as they relate to fertility knowledge and ART, as well as articles on gender, age, parental status, relationship status, sexual orientation, and theoretical constructs within fertility and ART. Overall, this review of literature confirms that education, race (ethnicity), age, relationship status, and sexual orientation can be pertinent factors impacting students' beliefs, intentions, and behaviors towards fertility. This literature review highlights the lack of research examining knowledge, beliefs, and intentions in the LGBTQ community.

## **CHAPTER 3**

### **METHODS AND PROCEDURES**

Chapter 3 summarizes the purpose of the study and the research questions and details the participants, procedures, research design, and method of data analysis. Illinois college students' intentions, beliefs, and knowledge were analyzed to determine differences among six independent variables of race, sexual orientation, age, parental status, relationship status, and gender.

#### **Purpose of the Study**

The purpose of this quantitative cross-sectional comparative study was to identify differences and relationships among Illinois college students' intentions, beliefs, and knowledge toward fertility and ART based on race, sexual orientation, age, parental status, relationship status, and gender.

#### **Research Questions**

1. Do Illinois college students' fertility and ART intentions differ by race, sexual orientation, age, parental status, relationship status, or gender?
2. Do Illinois college students' beliefs about fertility and ART differ by race, sexual orientation, age, parental status, relationship status, or gender?
3. Do Illinois college students' knowledge of fertility and ART differ by race, sexual orientation, age, parental status, relationship status, or gender?
4. What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status, and/or gender) regarding college students' fertility and assisted reproductive technology intentions?

5. What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status, or and gender) regarding college students' fertility and assisted reproductive technology beliefs?

6. What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status, or and gender) regarding college students' fertility and assisted reproductive technology knowledge?

### **Research Methodology and Design**

This study utilized a quantitative comparative, cross-sectional approach to examine intentions, beliefs, and knowledge about fertility and ART. Quantitative research emphasizes objective measurements and collecting numerical data in the form of surveys or polls, or by manipulating existing data (Babbie, 2010; Field, 2009). The TPB, developed by Ajzen (1985), was the overarching theory that will served as the theoretical framework for this study. A comparative design was chosen because college students were compared for differences based on demographic characteristics specifically race, sexual orientation, age, parental status, relationship status, and gender—for their intentions, beliefs, and knowledge of fertility and ART (Daniluk & Koert, 2013). Numerical survey data were collected from the participants at a single point in time; thus, this study design allows for comparison of different variables at the same time (Field, 2009; Johnson, 2001).

### **Description of the Participants**

Data were gathered using nonrandom convenient sampling of Illinois college students, 18 years of age and older, enrolled in introductory health education courses during the fall of 2017 at six 4-year public universities in Illinois (see Table 2). The universities include Northeastern Illinois University, Eastern Illinois University, Illinois State University, Northern Illinois

University, Southern Illinois University Carbondale, and Southern Illinois University Edwardsville. Except for Illinois State University, these universities have been referenced as “directional” schools (because one university is in the northern region, one is in the northeastern region, one is in the southern region, one is in the eastern region, and one is in the western region) in Illinois (Illinois State University, 2013).

Table 2.

*Participating University and Introductory Health Courses*

University	Introductory health course
Southern Illinois University Carbondale	Foundations of Health Education (HED 101)
Illinois State University	Foundations of Health
Northern Illinois University	Contemporary Health Concepts
Northeastern Illinois University	Community Health
Eastern Illinois University	Principles of Human Health
Southern Illinois University Edwardsville	Principles and Foundation of Health

Students from introductory health education courses were sampled as it was likely the classes would be composed of different ages, races, gender, persons of various relationship status, sexual orientation, varied parental status and may have been more exposed to fertility and ART information compared to other courses. There was an assumption that having a larger sample of students attending various universities indicate differences in the population race, sexual orientation, age, parental status, relationship status, and gender. A minimum sample size of 287 was needed for a rigorous sample, based on a power analysis (Field, 2009).

A nonrandom sample was appropriate because different universities have a different number of classes. The researcher mailed surveys to each available foundational health class. This method was selected because only foundational health courses were available to the researcher and subjects are present in the classroom.

## **Human Subjects Approval**

Prior to collecting data, the researcher contacted the six universities. Each participating university wanted to ensure that human subjects' approval was granted by Southern Illinois University Carbondale before the administrators agreed to allow research at their university. Human subject approval was granted by the Southern Illinois University Human Subjects Committee in June 2016 and extended in March 2017. The six universities granted permission to conduct the study in the spring of 2017. Data were collected upon approval from the dissertation committee.

## **Data Collection**

Permission to conduct the study was obtained from the Human Subjects Committees at Southern Illinois University Carbondale, Southern Illinois University Edwardsville, Illinois State University, Northern Illinois University, Northeastern Illinois University, and Eastern Illinois University. Upon receiving approval to collect data, the researcher contacted the chairperson from each health education or health science department of these universities to obtain permission to communicate with the faculty who teach the introductory health education courses. After the instructors agreed to administer the survey in their classes, they asked students in their courses to participate.

Nonrandom sampling is appropriate because the universities have different numbers of classes. Paper surveys are preferred to an electronic instrument because the response rate is usually higher with paper compared to electronic surveys (Rasinger, 2013). The Health Science departments' websites helped to determine which basic health education courses satisfies each university's introductory health course or general education requirement. After determining the course titles, the Fall 2017 schedules were useful for identifying which faculty members were

assigned to teach the introductory courses (see Table 2). The researcher contacted those faculty members by email and sent surveys to those who agreed to participate so their students could complete the instruments. The professor or instructors who administered and returned the surveys in the provided preaddressed postage paid manila envelope received a \$5 Visa gift card.

Survey responses remained anonymous because the students were instructed to not write their names or any identifying information on the survey. The survey took 10 to 15 minutes to complete. The information reported on the survey is anonymous as the students were not named or identified. The responses were locked in a secure area that the researcher supervises. Potential participants were informed about the purpose of the investigation through a consent form attached to the survey. Therefore, students who completed the survey were presumed to have given their consent. The researcher took all necessary procedures to protect the confidentiality of the participants and data and ask students not to write their name or identification number on the survey. The data were collected over a one -month period and will be kept on the password-protected computer at the researcher's home for a minimum of 3 years.

All data were transferred to SPSS version 23 for data analysis. The data were entered manually by the researcher and, to ensure that the data were accurately entered, the researcher rechecked 10% of the entered data. The response rate was the number of participants who completed the survey divided by the number of participants in the class. The researcher's goal was to have instructors indicate how many students are in the class on the day of the survey to determine response rate.

### **Sample Recruitment**

Participants were recruited from foundational health education courses, offered as general education or introductory health classes, at the selected universities to get a broad cross-section

of students from a variety of different majors and programs (see Tables 2 and 3). First, the health science department chairs received an email, followed by a phone call to request permission to contact instructors of introductory health courses. Upon approval from the chair, the introductory health instructors were contacted regarding the participation of their students in the study. The instructors who agree to participate received the survey by mail to distribute to participating students. After the students complete the survey, the instructor placed the surveys in a provided manila envelope and mailed the surveys back to the researcher.

### **Instrumentation**

The instrument, Intentions, Beliefs, and Knowledge on Fertility and Assisted Reproductive Technology Survey was adapted for the study. Daniluk and Koert (2013) provided permission to use and adapt the survey (see Appendix A). The researcher used this instrument to assess intentions, beliefs, and knowledge about fertility and ART. The modified survey has 34 items, not including the demographic items. The items include adapted Questions 1 and 5 in the fertility intentions section, and Items 35–38 in the fertility and ART beliefs section (see Table 3). Changes also included the addition of Demographic Questions 39, 41, 44 and 46; therefore, the survey includes five open-ended fertility intention questions, 12 questions on beliefs about fertility and ART, 21 questions on knowledge of fertility and ART, and eight demographic questions (see Tables 3 and 4).

Table 3.

*Modified and Adapted Fertility Survey Questions*

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Fertility Intentions

1. Do you plan to have children in the future?

5. About how many months do you expect it to take for you or your spouse to get pregnant once you start trying? \_\_\_\_\_

Fertility and ART Knowledge

32. There is a significant decline in the quality of a man’s sperm before the age of 50 years of age?

33. Smoking cigarettes or marijuana can reduce the quality of a man’s sperm.

34. Children born to fathers >45 years of have higher rates of learning disabilities, autism, schizophrenia and some forms of cancer.

Demographics Section

35. What is your gender?

37. What is your race? \_\_\_\_\_

40. Do you have children?

42. How many children do you have?

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Table 4.

*Instrument Constructs and Measurement Scales*

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Scales	Number of Items	Survey Items	Study Constructs
Intentions	5	(1–5)	Intentions
Fertility and ART beliefs	11	(6–16)	Beliefs
Fertility and ART knowledge	18	(17–34)	Knowledge
Demographic characteristics	8	(35–42)	Not Applicable

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The original survey, created by Daniluk and Koert (2013), included separate male and female surveys. The modified survey includes gender-neutral questions and four questions intended for men (see Table 4, Questions 35–38). This study utilized open-ended questions as well as primarily Likert-type response categories to collect data from college students. A quantitative survey was the most appropriate because of the low cost, efficiency, and privacy for

respondents. Also, the survey provided an opportunity to gather numerical data from a representative sample of a larger population (McMillan & Schumacher, 2010).

Daniluk and Koert (2013) reported the instrument demonstrated internal and construct validity as evaluated through an oblique factor analysis for psychometric properties of the instrument and the internal structure of the knowledge scale was found to be adequate. Factor analysis helps to assess validity (Daniluk & Koert, 2013). They also reported adequate reliability and internal consistency of the scales through a Cronbach's alpha assessment ( $\alpha = .743$ ; Daniluk & Koert, 2013). A factor analysis was repeated to determine internal validity and further ensure for content validity.

A 5-point Likert-type scale response is used for the beliefs construct in the Fertility and Assisted Reproductive Technology Survey. That section has three answer options. The first section, the intentions section, contains five ratio-level questions whose values are measured in whole numbers. The second section, the beliefs section, contains 12 questions. The first six questions produced ratio-level values measured in whole numbers, and the remaining six questions produced ordinal values measured on 5-point Likert-type scales (5 = Very satisfied/1 = Very Dissatisfied; 5 = Very Likely/1 = Very Unlikely). The third section, the knowledge section, contains 21 questions that produced values measured on 5-point Likert scales (5 = Very Informed/1 = Very Uninformed; 5 = Strongly Agree/1 Strongly Disagree), and the demographic section has seven questions. The original Fertility and Assisted Reproductive Technology Survey demonstrated an acceptable level of reliability (.743; Gliem & Gliem, 2003; George & Mallery, 2010).

The researcher conducted a pilot study in the summer and fall of 2016 in Women and Men in Contemporary Society (WGSS 223-201) and Human Genetics (BIO 202-201) at

Southern Illinois University Carbondale. The pilot study sample consisted of 50 students. Results of Cronbach's alpha indicated a high level of reliability for the Beliefs Scale (.802) and an acceptable level of reliability for the Knowledge Scale (.505). Gliem and Gliem (2003) and George and Mallery (2010) noted anything under .5 is an unacceptable level of reliability, but the pilot study results showed coefficients ranging from .5 and higher. Items 12, 31, 35, and 39 with reliability coefficients less than .5 were excluded from the final survey to increase the reliability of the Knowledge Scale and to improve the overall reliability of the survey (see Appendix A). All scales were retested in aggregate with Cronbach's alpha and demonstrated an acceptable level of reliability ( $\alpha = .675$ ). Cronbach's alpha assessment of reliability was repeated with the final study data set prior to testing.

### **Data Analyses**

The researcher used descriptive statistics for measures of central tendency. Followed by ANOVA to analyze fertility intentions, beliefs, and knowledge among college students. Then multiple regression to determine which variables explain the variability in ART and fertility intentions, beliefs, and knowledge for the nine variables (six independent and three dependent). Data were inspected for missing values from the intentions, beliefs, and knowledge sections of the survey. Missing data were replaced with the mean scores for that item. However, if a survey was missing more than 20% of survey items, it was discarded because substituting the mean for large portions of the sample would reduce the variance of the variable (McKenzie et al., 2009). The researcher tested data assumptions for normality prior to the examination of the data (Field, 2009), and if the assumption of normality was not met, the researcher used nonparametric methods.

The researcher planned to use descriptive statistics and ANOVA to analyze data in this study. To answer the first research question, “Do Illinois college students’ fertility and ART intentions differ by race, sexual orientation, age, parental status, relationship status, and gender?”, the researcher utilized descriptive statistics on the open-ended sections before transforming the data into categories that could be analyzed using ANOVA statistics (Table 5).

For the second research question, “Do Illinois college students’ beliefs about fertility and ART differ by race, sexual orientation, age, parental status, relationship status, or gender?” the researcher used descriptive analysis because some of the questions in the section are open-ended. Then the researcher planned to use ANOVA to measure the difference in beliefs in each of the six independent variables: race, sexual orientation, age, parental status, relationship status, and gender. For the third research question, “Do Illinois college students’ knowledge of fertility and ART differ by race, sexual orientation, age, parental status, relationship status, and gender?”, the researcher used ANOVA to determine differences between six independent variables on the continuous dependent variable of knowledge (McMillan & Schumacher, 2010). Post hoc tests are designed for situations in which the researcher has already obtained a significant omnibus F test with a factor that consists of three or more means, and additional exploration of the differences among means is needed to provide specific information on which means are significantly different from each other. If any of the first three research questions was found to be significant, a post hoc test was conducted. A Post hoc analysis using Pairwise comparisons will be used in this study.

For Research Questions 4, 5, and 6, the researcher conducted multiple regression tests to establish and predict the strongest independent variables impacting each of the three dependent variables. The researcher used multiple regressions to analyze the interactions between race,

sexual orientation, age, parental status, relationship status, and gender to determine the relationship and predictive value of intentions, beliefs, and knowledge among Research Questions 4, 5, and 6 (see Table 5).

Table 5.

*Summary of Research Questions, Instrument Items, and Data-Analysis Methods*

Research questions	Survey Items	Variables	Analysis Methods
RQ1: Do Illinois college students' fertility and ART <i>intentions</i> differ by race, sexual orientation, age, parental status, relationship status, and gender?	Intentions Subscale: 1–5 Demographic Subscale: 35–42	Race, Sexual orientation, Age, Parental status, Relationship status, and gender IV: Race, Sexual orientation, Age, Parental status, Relationship status, and gender DV: Intentions	Descriptive statistics and ANOVA for all IV
RQ2: Do Illinois college students' <i>beliefs</i> about fertility and ART differ by race, sexual orientation, age, parental status, relationship status, and gender?	Beliefs Subscale: 6–11 & 12–16 Demographic Subscale: 35–42	Race, Sexual orientation, Age, Parental status, Relationship status, and gender IV: Race, Sexual orientation, Age, Parental status, Relationship status, and gender DV: Beliefs	Descriptive statistics and ANOVA for all IV
RQ3: Do Illinois college students' knowledge of fertility and ART differ by race, sexual orientation, age, parental status, relationship status, and gender?	Knowledge Subscale: 17–34 Demographics Subscale: 35–42	Race, Sexual orientation, Age, Parental status, Relationship status, and gender IV: Race, Sexual orientation, Age, Parental status, Relationship status, and gender DV: Knowledge	ANOVA for all IV
RQ4: Which variables (race, sexual orientation, age, parental status, relationship status, and gender) are the strongest predictors of college students' fertility and assisted reproductive technology <i>intentions</i> ?	Intentions Subscale: 1–5 Demographic Subscale: 35–42	Race, Sexual orientation, Age, Parental status, Relationship status, and gender IV: Race, Sexual orientation, Age, Parental status, Relationship status, and gender DV: Intentions	Descriptive and Multiple Regression
RQ5: Which variables (race, sexual orientation, age, parental status, relationship status, and gender) are the strongest predictors of college students' fertility and assisted reproductive technology <i>beliefs</i> ?	Beliefs Subscale: 12–16 Demographic Subscale: 35–42	Race, Sexual orientation, Age, Parental status, Relationship status, and gender IV: Race, Sexual orientation, Age, Parental status, Relationship status, and gender DV: Beliefs	Descriptive and Multiple Regression
RQ6: Which variables (race, sexual orientation, age, parental status, relationship status, and gender) are the strongest predictors of college students' fertility and assisted reproductive technology <i>knowledge</i> ?	Knowledge Subscale: 17–34 Demographics Subscale: 35–42	Race, Sexual orientation, Age, Parental status, Relationship status, and gender IV: Race, Sexual orientation, Age, Parental status, Relationship status, and gender DV: Knowledge	Multiple Regression

## Summary

The researcher used a quantitative comparative design to analyze Illinois college students' knowledge, intentions, and beliefs about fertility and ART based on demographic characteristics of race, sexual orientation, age, parental status, relationship status, and gender. This chapter discusses the data collection, research design, sample size, survey instrument, and data analysis. Data were collected from students in foundational health courses at six universities in the state of Illinois using a modified fertility survey. A pilot study of the survey instrument with 50 participants resulted in an acceptable level of reliability of ( $\alpha = .675$ ; George & Mallery, 2010; Gliem & Gliem, 2003). A minimum sample size of 287 participants was needed for the research (Field, 2009). The three constructs of fertility and ART beliefs, intentions, and knowledge using an adapted pre-validated survey after obtaining permission from the original authors, Daniluk and Koert (2013). The researcher used descriptive statistics, ANOVA, and multiple regression to answer the research questions.

## **CHAPTER 4**

### **RESULTS**

#### **Introduction**

This chapter provides a complete review of the study results based on the research questions including demographics of the participants. Information regarding intentions, beliefs, and knowledge about fertility and Assisted Reproductive Technology (ART) among 536 college students attending selected institutions. The purpose of this quantitative cross-sectional comparative study was to identify differences and relationships among Illinois college students' dependent variables of intentions, beliefs and knowledge toward fertility and ART based on six independent variables of race, sexual orientation, age, parental status, relationship status, and gender.

#### **Research Questions**

1. Do Illinois college students' fertility and ART intentions differ by race, sexual orientation, age, parental status, relationship status, or gender?
2. Do Illinois college students' beliefs about fertility and ART differ by race, sexual orientation, age, parental status, relationship status, or gender?
3. Do Illinois college students' knowledge of fertility and ART differ by race, sexual orientation, age, parental status, relationship status, or gender?
4. What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status and gender) regarding college students' fertility and assisted reproductive technology intentions?
5. What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status and gender) regarding college students' fertility and assisted reproductive technology beliefs?

6. What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status and gender) regarding college students' fertility and assisted reproductive technology knowledge?

### **Gaining Access to the Six Universities**

Human Subjects approval was obtained from Southern Illinois University Carbondale in June of 2016, and a pilot study with 50 participants was completed fall of 2016. The Human Subjects approval was updated March 2017. In September 2017, I contacted Department chairs from seven universities including Southern Illinois University Carbondale, Southern Illinois Edwardsville, Eastern Illinois University, Illinois State University, Western Illinois University, Northern Eastern Illinois University, and Northern Illinois University and obtained permission to conduct my study. Instructors from the various universities gave permission allowing me to survey their students. Students were surveyed fall 2017 from September to October. All universities with the exception of Western Illinois University allowed me to mail the surveys and collect data. Unfortunately the instructors at Western Illinois University were not able to assist with the study due to other studies being conducted at the university during the same time.

### **Sample Demographics**

Participants were students enrolled in classes from six Illinois universities: Southern Illinois University Carbondale ( $n = 144$ ), Southern Illinois Edwardsville ( $n = 206$ ), Eastern Illinois University ( $n = 30$ ), Illinois State University ( $n = 28$ ), Northern Illinois University ( $n = 73$ ) and Northern Eastern Illinois University ( $n = 55$ ). A total of 543 students participated in this research. One survey was thrown out because the student did not complete the knowledge scale section of the survey. An additional six survey responses were removed because they were missing more than 20% of responses across the beliefs, intentions, and knowledge scales. Values were imputed

(or filled in) to 136 cases in the dataset. Missing value imputation involves substituting missing values in a dataset (Graham, 2009). Missing values in the dataset were replaced with the mean value for the item. A total of 536 students were included in final dataset.

A post hoc power analysis was conducted using G\*Power 3.1.9.2. Power refers to the ability to accurately reject a null hypothesis that is false, and higher power values indicate higher likelihood of rejecting a null hypothesis that is false (Cohen, 1988). Based on the final sample size ( $N = 536$ ) the achieved power for the regression analysis was 1.00. The achieved power for the ANOVA analysis was 0.99. These power values indicate a high probability that the false null hypotheses were correctly rejected in the inferential analyses. Table 6 presents the total number of students who completed surveys from the six institutions.

Table 6

*Number and Percentages of Participants from Illinois Universities (N = 536)*

Institution	<i>N</i>	%
1. Southern Illinois Carbondale	144	26.87
2. Southern Illinois Edwardsville	206	38.43
3. Eastern Illinois University	30	5.60
4. Illinois State University	28	5.22
5. Northern Illinois University	73	13.62
6. Northeastern Illinois University	55	10.26
Total	536	100

Data regarding race indicated that the numbers of European/Caucasian students and African/African American students far exceeded the number of students of other racial backgrounds. Because the size disparity would decrease the validity of the comparisons, the responses related to race were recoded into European/Caucasian, African/African-American, and other minority. The majority of respondents were European/Caucasian ( $n = 327, 61\%$ ) followed

by African/African American ( $n = 128, 24\%$ ). Respondents of other minority groups comprised the smallest portion of the sample ( $n = 81, 15\%$ ).

Similar to the responses related to race, the number of participants who indicated that their sexual orientation was heterosexual were greater in number than those who indicated other sexual orientations. Responses for sexual orientation were recoded into heterosexual and LGBTQ. Sexual orientation was recoded because there were less than 50 participants in the Gay/Lesbian and Transgendered/Nonconforming category combined. So, the Researcher combined both Gay/Lesbian and Transgendered/Nonconforming groups into LGBTQ. To get valid results researchers recommend the sample size should be over 50. The majority of the sample reported their sexual orientation as heterosexual ( $n = 471, 88\%$ ). A total of 52 participants (10%) indicated LGBTQ orientation. There were several missing responses to the question about sexual orientation ( $n = 13, 2\%$ ).

Female students comprised the majority of the sample ( $n = 305, 57\%$ ) while males comprised 42% ( $n = 225$ ). Five participants (1%) self-identified as transgender. Of the responses retained in the dataset, one student did not indicate their gender. Gender was recoded to include male and female respondents since only 1% of students identified as transgendered. Research indicates to have valid results a sample size of at least 50 participants should be in each group and this was not the case for transgendered students.

The mean age of participants in the sample was 20.49 ( $SD = 3.21$ ). The age responses were recoded into the following age ranges: 18-22, 23-26, 27-30, and 31-60. The age responses were recoded so that the researcher could compare younger students to older students to specifically examine their fertility intentions, beliefs and knowledge. The majority of

participants indicated they were between 18 and 22 years of age ( $n = 471$ , 88%). Table 7 presents descriptive statistics for participants' race, sexual orientation, gender, and age category.

Table 7

*Number and Percentages of Participants' Race, Sexual Orientation, Gender, and Age Category*

	<i>N</i>	<i>%</i>
<b>Race</b>		
European/Caucasian	327	61
African/African American	128	24
Other minority	81	15
Total	536	100
<b>Sexual Orientation</b>		
Heterosexual	471	87.87
LGBTQ	52	9.70
Missing	13	2.43
Total	536	100
<b>Gender</b>		
Female	305	56.90
Male	225	41.98
Transgender	5	0.93
No response	1	0.23
Total	536	100
<b>Age Range</b>		
18-22	471	87.87
23-26	47	8.77
27-30	15	2.80
31-60	3	0.56
Total	536	100

The majority of students in the sample were not parents ( $n = 520$ , 97%) and did not have children ( $n = 527$ , 98%). Of those who had children ( $n = 15$ , 3%), the most frequent response for number of children was one ( $n = 5$ , 1%). Finally, the majority of participants indicated they were single ( $n = 311$ , 58%). A total of 195 (36%) indicated they were in a committed relationship and only

16 (3%) were married. Three participants failed to respond to the item (1%). Table 8 presents descriptive statistics for parental status, number of children, and relationship status.

Table 8

*Number and Percentages for Parental Status, Children, and Relationship Status*

Variable	N	%
Are you a parent?		
Yes	15	2.79
No	520	97
Missing	1	<1
Total	536	100
How many children do you have?		
0	527	98
1	5	1
2	3	1
3 or more	1	<1
Total	536	100
Relationship Status		
Single	311	58.02
Committed	195	36.38
Married	16	3.67
Other	11	2.05
No response	3	.69
Total	536	100

### Reliability Analysis

The researcher administered a 42-item survey. The survey has four sections comprised of three scales and a demographics section. The first section of the survey comprised the intentions scale, the second section comprised the beliefs scale, the third section comprised the knowledge scale, and the last section included demographics. The intentions scale comprises questions 1-5, the belief questions make up 6-16, the knowledge questions ranges from 17-34, and lastly

demographics questions are 35-42. All data were analyzed using SPSS statistical software version 23.0.

A reliability analysis was conducted for the beliefs, and knowledge scales. Cronbach alpha coefficients were calculated and evaluated according to the guidelines set by George and Mallery (2016). Gliem and Gliem (2003) and George and Mallery (2010) noted anything under .5 is an unacceptable level of reliability, but the study results showed coefficients ranging from .5 and higher. The reliability analysis indicated that the beliefs scale ( $\alpha = 0.69$ ) and knowledge scale ( $\alpha = 0.64$ ) fair reliability and an aggregate reliability of .665. The lack of outstanding reliability is a potential limitation to the study. The researcher suggests that caution is exercised in drawing inferences related to these scales. Table 9 presents the results of the reliability analysis.

Table 9

*Results of the Reliability Analysis*

Scale	No. of items	$\alpha$
Beliefs	15	0.69
Knowledge	18	0.64

**Descriptive Statistics for Intentions, Beliefs, and Knowledge Items**

Means and standard deviations were calculated for the intentions, beliefs, and knowledge sections of the survey. The mean score for the section of the survey measuring participants fertility and ART intentions was 13.16 ( $SD = 1.70$ ). This means the combined intention scale had an average response of 13.16 which had scores ranging from 1.12 to 31.31 and Standard Deviation of 1.70 ranging from .33 to 4.73. See Table 10 for mean, standard deviation, and range of values for each item in the intentions section of the survey. The mean score for the section of the survey assessing participants' fertility and ART beliefs was 16.19 with a mean score ranging

from 1.94 to 41.40 ( $SD = 1.87$  scores ranging from .87 to 9.83). See Table 10 for mean, standard deviation, and range of values for each item in the beliefs section of the survey. Finally, the mean score for the section of the survey assessing participants' fertility and ART knowledge was 3.33 ranging from 2.85 to 3.79 ( $SD = 0.33$ ). See Table 10 for mean, standard deviation, and range of values for each item in the knowledge section of the survey. Table 10 presents descriptive statistics for the intentions, beliefs, and knowledge scales.

### **Tables 10**

#### *Means, Standard Deviations, and Range of Values for Intentions Items*

Items	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
Intentions 1	536	0.00	2.00	1.12	0.33
Intentions 2	536	0.00	7.00	2.64	0.94
Intentions 3	536	0.00	40.00	26.90	3.63
Intentions 4	536	0.00	50.00	31.31	4.73
Intentions 5	536	0.00	24.00	3.85	2.98

#### *Means, Standard Deviations, and Range of Values for Beliefs Items*

	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
Beliefs 6	536	2.00	35.00	25.34	3.03
Beliefs 7	536	3.00	40.00	26.16	3.28
Beliefs 8	536	16.00	60.00	38.59	5.57
Beliefs 9	536	0.00	80.00	41.40	7.09
Beliefs 10	536	0.00	70.00	38.72	8.46
Beliefs 11	536	0.00	99.00	40.79	9.83
Beliefs 12	536	1.00	5.00	1.94	1.08
Beliefs 13	536	1.00	5.00	3.29	1.21
Beliefs 14	536	0.00	5.00	2.52	1.16
Beliefs 15	536	0.00	5.00	4.48	0.87
Beliefs 16	536	0.00	5.00	4.29	1.06
Beliefs 17	536	0.00	5.00	4.20	1.14
Beliefs 18	536	0.00	5.00	4.25	0.99
Beliefs 19	536	0.00	5.00	4.08	1.40
Beliefs 20	536	0.00	5.00	2.84	1.26

*Means, Standard Deviations, and Range of Values for Knowledge Items*

	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
Knowledge 21	536	0.00	5.00	3.29	0.94
Knowledge 22	536	0.00	5.00	2.86	1.00
Knowledge 23	536	0.00	5.00	3.55	0.88
Knowledge 24	536	1.00	5.00	3.23	0.89
Knowledge 25	536	1.00	5.00	2.93	1.07
Knowledge 26	536	2.00	5.00	3.54	0.73
Knowledge 27	536	1.00	5.00	2.85	0.75
Knowledge 28	536	1.00	5.00	3.79	0.84
Knowledge 29	536	1.00	5.00	3.89	0.83
Knowledge 30	536	1.00	5.00	3.36	0.78
Knowledge 31	536	1.00	5.00	3.76	0.88
Knowledge 32	536	1.00	5.00	3.22	1.03
Knowledge 33	536	1.00	5.00	2.99	0.86
Knowledge 34	536	1.00	5.00	3.21	0.81
Knowledge 35	536	1.00	5.00	3.18	1.00
Knowledge 36	536	1.00	5.00	3.14	0.92
Knowledge 37	536	1.00	5.00	3.78	0.84
Knowledge 38	536	1.00	5.00	3.29	0.89

Table 10

*Range of Values, Means, and Standard Deviations for Intentions, Beliefs, and Knowledge*

*Sections of the Survey*

	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
Intentions	536	0.00	18.40	13.16	1.70
Beliefs	536	8.47	23.93	16.19	1.87
Knowledge	536	2.17	4.39	3.33	0.33

**Analysis of Research Questions**

**Research Question 1: Intentions**

RQ #1- Do Illinois college students' fertility and ART intentions differ by race, sexual orientation, age, parental status, relationship status, or gender? To address this research question the researcher originally intended to conduct one-way ANOVAs to determine if participants'

intentions scores differed by race, sexual orientation, age, parental status, relationship status, or gender. Questions 1-5 of the survey specifically asked participants questions about their intentions regarding fertility and ART. A Shapiro Wilk test of normality was conducted to determine if the assumption normality was met for the intentions scores. The results of the test indicated that normality was not met,  $p < .001$ , therefore Kruskal-Wallis tests were used as the nonparametric alternative to the one way ANOVA.

Six Kruskal-Wallis tests were conducted to determine if intention scores were influenced by race, sexual orientation, age, parental status, relationship status, or gender. Results of the Kruskal-Wallis tests for intentions are presented in Table 11.

Table 11

*Results of the Kruskal-Wallis Tests for Intentions by Race, Sexual Orientation, Age, Parental Status, Relationship Status, and Gender*

Variable	df	$\chi^2$	$p$
Race	2	9.80	.007*
Sexual orientation	1	1.15	.283
Age	3	10.17	.017*
Parental status	1	0.11	.746
Relationship status	3	4.81	.186
Gender	1	0.96	.327

The results of the Kruskal-Wallis test were not significant for sexual orientation, parental status, relationship status, and gender. This result suggests that students' scores on intentions were similar across groups for each of these variables. Because the results were statistically significant for race ( $\chi^2 = 9.80, p = .007$ ) and age ( $\chi^2 = 10.17, p = .017$ ) post hoc pairwise comparisons for intentions were conducted by race and by age.

The pairwise comparisons for race indicated significant differences between African/African American students and European/Caucasian students (Table 12). Figure 1

presents the mean values of intentions scores by race. Scores for the dependent variable, intentions, are displayed on the y-axis while categories of the independent variable, race, are on the x-axis. The figure indicates that the mean intentions score was higher for European/Caucasian students than it was for African/African-American students.

Table 12

*Pairwise Comparisons for the Mean Ranks of Intentions by Race*

Comparison	Observed Difference	Critical Difference
African/African American-European/Caucasian	49.91	*38.66
African/African American-Other minority	44.68	52.64
European/Caucasian-Other minority	5.23	46.02

*Note.* Observed Differences > Critical Differences indicate significance at the  $p < .05$  level or \*.

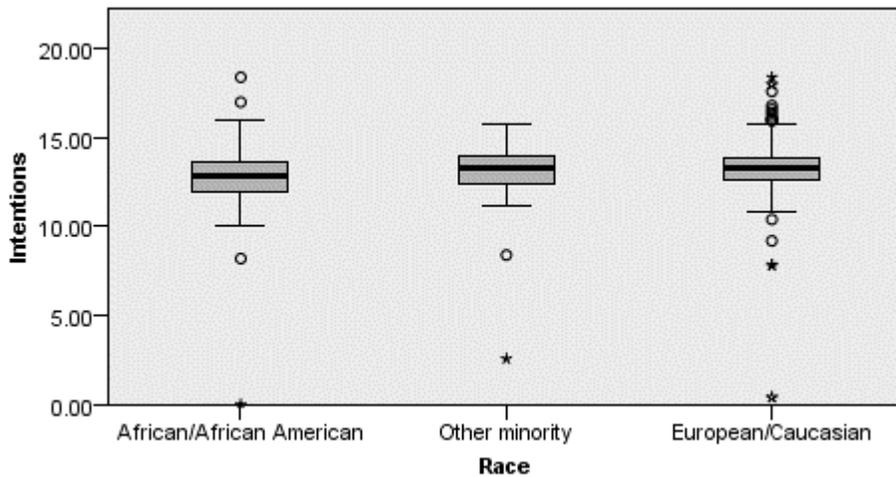


Figure 2. Mean values of fertility and ART intentions scores by race.

The pairwise comparisons for the age comparison indicated significant differences between participants aged 18-22 and those aged 27-30 (Table 13). Figure 2 presents the mean values of intentions by age group. Scores for the dependent variable, intentions, are displayed on the y-axis while categories of the independent variable, age, are on the x-axis. The figure indicates that the mean intentions score was higher for students who were 27-30 years of age than they were for other age groups.

Table 13

Pairwise Comparisons for the Mean Ranks of Intentions by Age Category

Comparison	Observed Difference	Critical Difference
18-22 to 23-26	32.81	62.50
18-22 to 27-30	107.52	107.17*
18-22 to 31-60	106.88	236.65
23-26 to 27-30	74.71	121.17
23-26 to 31-60	139.69	243.32
27-30 to 31-60	214.40	258.42

Note. Observed Differences > Critical Differences indicate significance at the  $p < .05$  level, also the (\*) indicates significant differences.

Note. Group 1=18-22, Group 2=23-26, Group 3=27-30, Group 4=31-60 this signifies the age ranges.

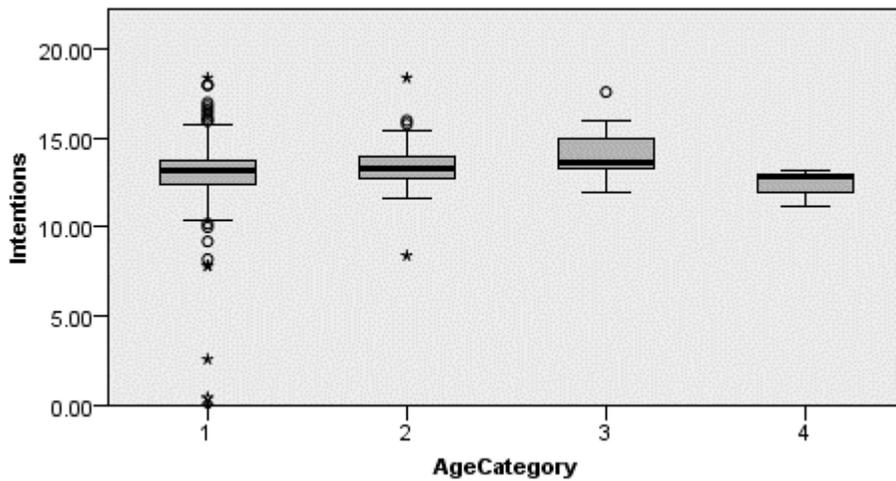


Figure 3. Mean values of fertility and ART intentions scores by age category.

### Research Question 2: Beliefs

RQ #2- Do Illinois college students' fertility and ART beliefs differ by race, sexual orientation, age, parental status, relationship status, or gender? To address this research question the researcher originally intended to conduct one way ANOVAs to determine if participants' belief scores differed by race, sexual orientation, age, parental status, relationship status, or gender. A Shapiro Wilk test of normality was conducted to determine if the assumption normality was met

for the beliefs scores. The results of the test indicated that normality was not met,  $p < .001$ .

Because the assumption was not met Kruskal-Wallis tests, the nonparametric alternative to the one way ANOVA were conducted.

Six Kruskal-Wallis tests were conducted to determine if beliefs scores were influenced by race, sexual orientation, age, parental status, relationship status, or gender. Results of the Kruskal-Wallis tests for intentions are presented in Table 14.

Table 14

*Results of the Kruskal-Wallis Tests for Beliefs by Race, Sexual Orientation, Age Category, Parental Status, Relationship Status, and Gender*

Variable	df	$\chi^2$	$p$
Race	2	8.00	.018*
Sexual orientation	1	2.23	.136
Age	3	1.94	.586
Parental status	1	0.01	.946
Relationship status	3	1.57	.665
Gender	1	5.50	.019*

*Note:* Race and Gender variables both indicate significance at the  $p < .05$  level, also the \* shows significance.

The results of the Kruskal-Wallis test were not significant for sexual orientation, age, parental status, and relationship status. This result suggests that students' scores on intentions were similar across groups for each of these variables. Because the results were statistically significant for race ( $\chi^2 = 8.00, p = .018$ ) and gender ( $\chi^2 = 5.50, p = .019$ ) post hoc pairwise comparisons for beliefs by race and by gender were conducted. .

The pairwise comparisons for race indicated significant differences between African/African American students and European/Caucasian students (Table 15). Figure 4 presents the mean values of beliefs by race. Scores for the dependent variable, beliefs, are displayed on the y-axis while categories of the independent variable, race, are on the x-axis. The

figure indicates that the mean beliefs score was higher for European/Caucasian students than it was for African/African-American students.

Table 15

*Pairwise Comparisons for the Mean Ranks of Beliefs by Race*

Comparison	Observed Difference	Critical Difference
African/African American-European/Caucasian	45.57	38.66*
African/African American-Other minority	29.50	52.64
European/Caucasian-Other minority	16.07	46.02

*Note.* Observed Differences > Critical Differences indicate significance at the  $p < .05$  level or also the \* shows significance.

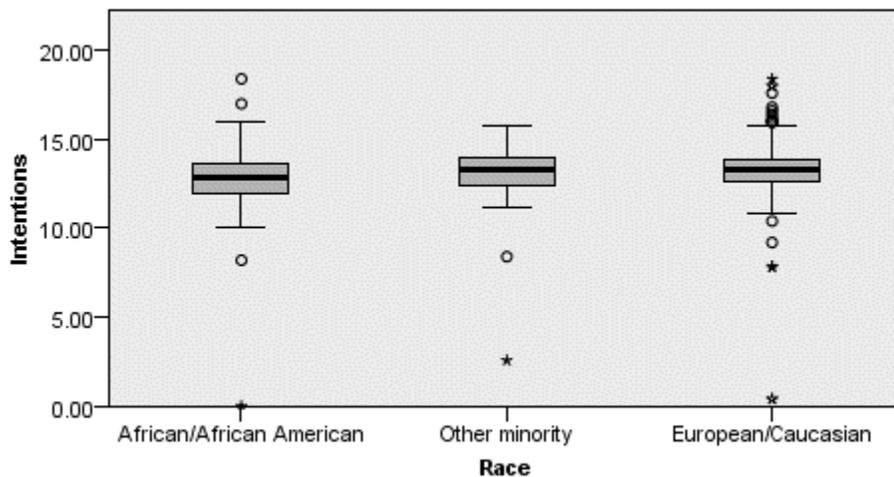


Figure 4. Mean values of fertility and ART beliefs scores by race.

The pairwise comparisons for gender indicated the presence of significant differences between male and female students (Table 16). Figure 4 presents the mean values of beliefs score by gender. Scores for the dependent variable, beliefs, are displayed on the y-axis while frequencies are on the x-axis. The figure indicates that the mean beliefs score was higher for male students than it was for female students.

Table 16

*Pairwise Comparisons for the Mean Ranks of Beliefs by Gender*

Comparison	Observed Difference	Critical Difference
Male and Female	31.55	26.38*

*Note.* Observed Differences > Critical Differences indicate significance at the  $p < .05$  level or also the \* shows significance.

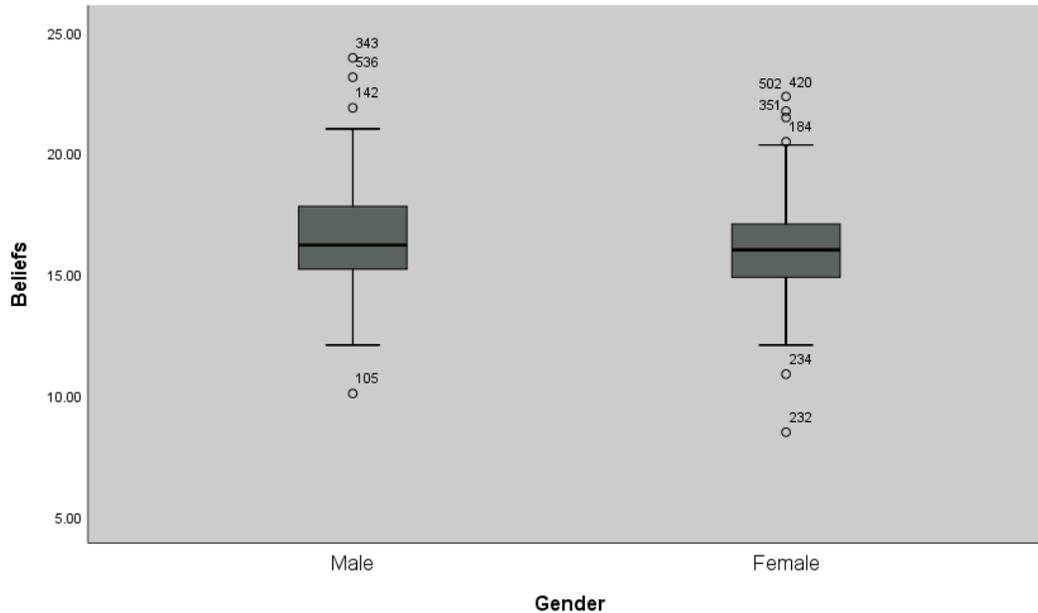


Figure 5. Mean values of fertility and ART beliefs scores by gender.

**Research Question 3: Knowledge**

RQ #3- Do Illinois college students’ fertility and ART knowledge differ by race, sexual orientation, age, parental status, relationship status, or gender? To address this research question one way ANOVAs was originally intended to conduct to determine if participants’ knowledge scores differed by race, sexual orientation, age, parental status, relationship status, or gender. A Shapiro Wilk test of normality was conducted to determine if the assumption normality was met for the knowledge scores. The results of the test indicated that normality was not met,  $p = .008$ . Because the assumption was not met, Kruskal-Wallis tests were conducted, the nonparametric alternative to the one way ANOVA.

Six Kruskal-Wallis tests were conducted to determine if knowledge scores were influenced by race, sexual orientation, age, parental status, relationship status, or gender. Results of the Kruskal-Wallis tests for intentions are presented in Table 17. The results indicated that there were no statistically significant differences in knowledge scores for any of the independent variables. This finding indicates that knowledge scores for students are similar across all groups for race, sexual orientation, age, parental status, relationship status, and gender.

Table 17

*Results of the Kruskal-Wallis Tests for Knowledge by Race, Sexual Orientation, Age Category, Parental Status, Relationship Status, and Gender*

Variable	df	$\chi^2$	<i>p</i>
Race	2	1.47	.480
Sexual orientation	1	0.53	.467
Age	3	2.09	.554
Parental status	1	0.17	.677
Relationship status	3	0.70	.872
Gender	1	0.70	.872

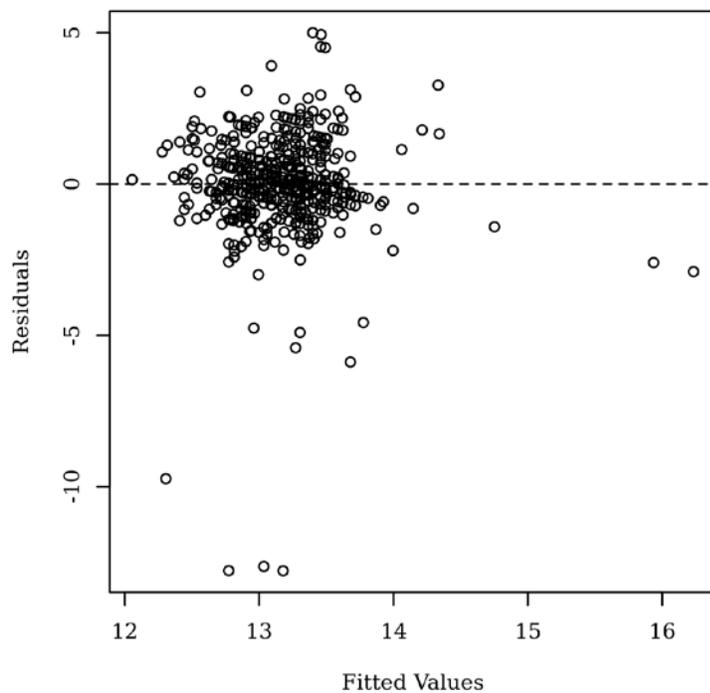
*Note:* No significance among the variables.

#### **Research Question 4: Predicting Intentions**

RQ # 4 What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status and gender) regarding college students' fertility and assisted reproductive technology intentions?

To address the fourth research question a multiple linear regression was conducted to assess the predictive relationship between race, sexual orientation, age, parental status, relationship status, gender, and college students' fertility and assisted reproductive technology intentions. Before conducting the analysis, the assumptions of homoscedasticity and multicollinearity were assessed. The assumption of normality was previously assessed, and it was found that the assumption of normality was violated for intentions scores. However,

multiple linear regression analysis is considered robust to violations of the assumption with large sample sizes (Stevens, 2009). Homoscedasticity was assessed using a plot of the regression residuals versus the predicted values (Field, 2013). Homoscedasticity refers to a state of having equal error values for all predictor variable values (Field). Figure 6 presents the residual plot for the regression. In the scatterplot, the predicted values for the regression model are displayed on the x-axis while the error term between the observed and predicted values of the dependent variable are displayed on the y-axis (Tabachnick & Fidell, 2013). The plot indicates that the assumption was met as the plot lacks curvature and the data points appear randomly distributed with a mean value of zero (Field, 2013).



*Figure 6.* Residuals scatterplot testing homoscedasticity for the regression predicting intentions.

The absence of multicollinearity was assessed using variance inflation factors (VIFs). Multicollinearity refers to high intercorrelation among the independent variables (Stevens, 2009).

VIF values greater than 10 can be considered evidence of increased multicollinearity in the regression model (Stevens). Table 18 presents the VIF values for the independent variables.

Table 18

*Variance Inflation Factor Values for the Regression Predicting Intentions*

Variable	VIF
Race	1.05
Sexual orientation	1.02
Age	1.43
Relationship status	1.69
Parental status	1.36
Gender	1.05

The results of the multiple linear regression analysis predicting intention were statistically significant,  $F(9,502) = 2.91, p = .002, R^2 = 0.05$ . This result indicated that the regression model containing race, sexual orientation, age, relationship status, parental status, and gender contributed to the variation in intentions score among college students. However, the model only accounted for approximately 5% of the variance in intentions which may be considered evidence of poor model fit. The results of the multiple linear regression predicting intentions are presented in Table 19.

The individual predictor variables were examined to determine their contribution to the variation in the intention score. Each categorical variable (race, sexual orientation, relationship status, parental status, and gender) was dummy coded prior to the analysis. Analysis of the contribution of the individual predictor variables indicated that gender, sexual orientation, and parental status were not statistically significant predictors of intentions.

Race, relationship status, and age were statistically significant predictors in the model. For race, the findings indicated that European/Caucasian students' intentions score were on

average 0.50 units higher than African/African-American students' average intentions score,  $B = 0.50$ ,  $t(502) = 2.72$ ,  $p = .007$ . There was no statistically significant effect for the Other Minority group. For relationship status, the findings indicated that students in a committed relationship scored on average 0.36 points on the intentions scale less than single students,  $B = -0.36$ ,  $t(502) = -2.26$ ,  $p = .024$ . Age was also a statistically significant predictor of intentions,  $B = 0.09$ ,  $t(502) = 3.37$ ,  $p < .001$ . The results indicated that as age responses increased from one category to the next, intentions score also increased by 0.09 units on average. Table 19 summarizes the results of the regression model.

Table 19

*Results of the Multiple Linear Regression Predicting Intentions*

Variable	<i>B</i>	<i>SE</i>	95% CI	$\beta$	<i>t</i>	<i>P</i>
(Intercept)	11.13	0.89	[9.38, 12.88]	0.00	12.49	< .001
Gender – Female (ref: Male)	0.13	0.16	[-0.18, 0.43]	0.04	0.82	.411
Parental status – No (ref: Yes)	0.19	0.55	[-0.90, 1.28]	0.02	0.35	.729
Relationship status – Committed (ref: Single)	-0.36	0.16	[-0.68, -0.05]	-0.10	-2.26	.024
Relationship status – Married (ref: Single)	-0.61	0.57	[-1.73, 0.50]	-0.06	-1.08	.281
Relationship status – Other (ref: Single)	-0.94	0.52	[-1.97, 0.09]	-0.08	-1.80	.072
Age	0.09	0.03	[0.04, 0.15]	0.18	3.37	< .001
Race – European/Caucasian (ref: African/African-American)	0.50	0.18	[0.14, 0.86]	0.14	2.72	.007
Race – Other minority (ref: African/African-American)	0.16	0.25	[-0.33, 0.65]	0.03	0.63	.528
Sexual orientation – LGBTQ (ref: Heterosexual)	-0.32	0.26	[-0.83, 0.19]	-0.05	-1.23	.220

*Note.* Results:  $F(9,502) = 2.91$ ,  $p = .002$ ,  $R^2 = 0.05$

Unstandardized Regression Equation: Intentions = 11.13 + 0.13\*Gender.Female + 0.19\*Child.No - 0.36\*Relationship.Committed - 0.61\*Relationship.Married -

$0.94 * \text{Relationship.Other} + 0.09 * \text{Age} + 0.50 * \text{Race.EuropeanCaucasian} + 0.16 * \text{Race.Other minority} - 0.32 * \text{Sexualorientation.LGBTQ}$

### **Research Question 5: Predicting Beliefs**

RQ # 5 What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status and gender) regarding college students' fertility and assisted reproductive technology beliefs?

To address the fifth research question a multiple linear regression was conducted to assess the predictive relationship between race, sexual orientation, age, parental status, relationship status, gender, and college students' fertility and assisted reproductive technology beliefs. Again, before conducting the analysis, the assumptions of homoscedasticity and multicollinearity were assessed. The assumption of normality was previously assessed, and it was found that the assumption of normality was violated for beliefs scores. As mentioned previously, multiple linear regression analysis is considered robust to violations of the assumption with large sample sizes (Stevens, 2009). Homoscedasticity was assessed using a plot of the regression residuals versus the predicted values (Field, 2013). Figure 6 presents the residual plot for the regression. The plot indicates that the assumption was met as the plot lacks curvature and the data points appear randomly distributed with a mean value of zero (Field, 2013).

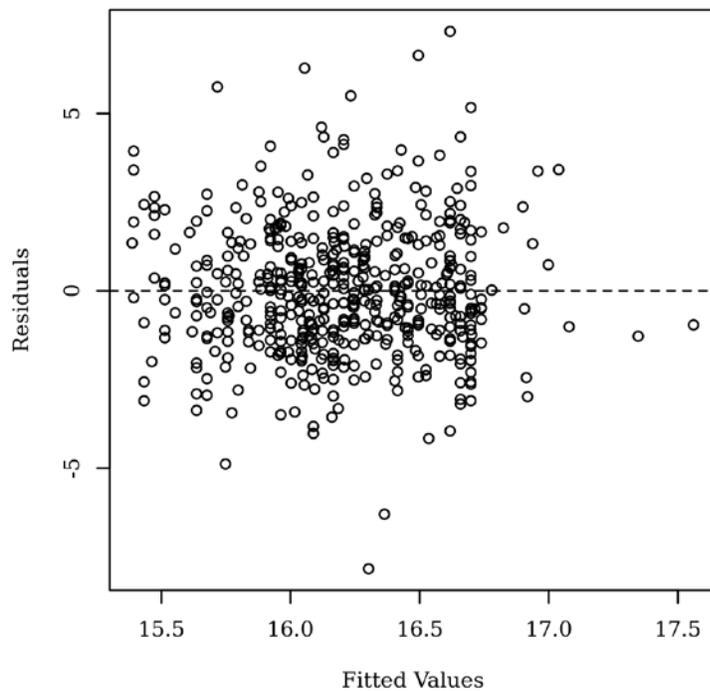


Figure 7. Residuals scatterplot testing homoscedasticity for the regression predicting beliefs.

The absence of multicollinearity was assessed using variance inflation factors (VIFs). Multicollinearity refers to high intercorrelation among the independent variables (Stevens, 2009). VIF values greater than 10 can be considered evidence of increased multicollinearity in the regression model (Stevens). Table 20 presents the VIF values for the independent variables.

Table 20

*VIF Values for the Regression Predicting Beliefs*

Variable	VIF
Race	1.05
Sexual orientation	1.02
Age	1.43
Relationship status	1.69
Parental status	1.36
Gender	1.05

The results of the multiple linear regression analysis predicting beliefs were statistically significant,  $F(9,502) = 2.13$ ,  $p = .026$ ,  $R^2 = 0.04$ . This result indicated that the regression model containing race, sexual orientation, age, relationship status, parental status, and gender contributed to the variation in beliefs score among college students. However, the model only accounted for approximately 4% of the variance in beliefs score which may be considered evidence of poor model fit. The results of the multiple linear regression predicting beliefs are presented in Table 21.

The individual predictor variables were examined to determine their contribution to their variation in beliefs score. Each categorical variable (race, sexual orientation, relationship status, parental status, and gender) was dummy coded prior to the analysis. Analysis of the contribution of the individual predictor variables indicated that parental status, relationship status, age, and sexual orientation were not statistically significant predictors of beliefs.

Race and gender were statistically significant predictors in the model. For race, the findings indicated that European/Caucasian students' mean beliefs score was 0.53 higher than African/African-American students' average beliefs score,  $B = 0.53$ ,  $t(502) = 2.64$ ,  $p = .009$ . There was no statistically significant effect for the Other minority group. For gender, the findings indicated that the mean beliefs score for female students was 0.41 units lower than male students,  $B = -0.41$ ,  $t(502) = -2.41$ ,  $p = .016$ . This finding indicates that female students reported lower responses for the items related to their fertility and ART beliefs, such as the ideal age for giving birth the first time or likelihood of becoming a parent without a spouse through sperm or egg donation. Table 21 summarizes the results of the regression model.

Table 21

*Results of the Multiple Linear Regression Predicting Beliefs*

Variable	<i>B</i>	<i>SE</i>	95% CI	$\beta$	<i>t</i>	<i>p</i>
(Intercept)	15.37	0.98	[13.45, 17.30]	0.00	15.70	< .001
Gender – Female (ref: Male)	-0.41	0.17	[-0.75, -0.08]	-0.11	-2.41	.016
Parental status – No (ref: Yes)	0.29	0.61	[-0.91, 1.49]	0.02	0.48	.635
Relationship status – Committed (ref: Single)	-0.24	0.18	[-0.59, 0.11]	-0.06	-1.37	.171
Relationship status – Married (ref: Single)	-0.14	0.62	[-1.37, 1.09]	-0.01	-0.22	.823
Relationship status – Other (ref: Single)	-0.25	0.57	[-1.38, 0.87]	-0.02	-0.44	.658
Age	0.04	0.03	[-0.02, 0.10]	0.07	1.32	.187
Race – European/Caucasian (ref: African/African-American)	0.53	0.20	[0.13, 0.92]	0.14	2.64	.009
Race – Other minority (ref: African/African-American)	0.32	0.27	[-0.22, 0.85]	0.06	1.15	.250
Sexual orientation – LGBTQ (ref: Heterosexual)	-0.34	0.28	[-0.90, 0.22]	-0.05	-1.20	.232

*Note.* Results:  $F(9,502) = 2.13, p = .026, R^2 = 0.04$

Unstandardized Regression Equation: Beliefs = 15.37 - 0.41\*Gender.Female + 0.29\*Child.No - 0.24\*Relationship.Committed - 0.14\*Relationship.Married - 0.25\*Relationship.Other + 0.04\*Age + 0.53\*Race.EuropeanCaucasian + 0.32\*Race.Other minority - 0.34\*Sexualorientation.LGBTQ

**Research Question 6: Predicting Knowledge**

RQ # 6 What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status and gender) regarding college students' fertility and assisted reproductive technology knowledge?

To address the sixth research question a multiple linear regression was conducted to assess the predictive relationship between race, sexual orientation, age, parental status, relationship status, gender, and college students' fertility and assisted reproductive technology

knowledge. The assumptions of homoscedasticity and multicollinearity were assessed prior to the multiple linear regression analysis. The assumption of normality was found to be violated for knowledge scores in a previous analysis. However, multiple linear regression analysis is considered robust to violations of the assumption with large sample sizes (Stevens, 2009). Homoscedasticity was assessed using a plot of the regression residuals versus the predicted values (Figure 8; Field, 2013). The plot indicates that the assumption was met because of the lack of curvature and random distribution of data about a mean of zero (Field, 2013).

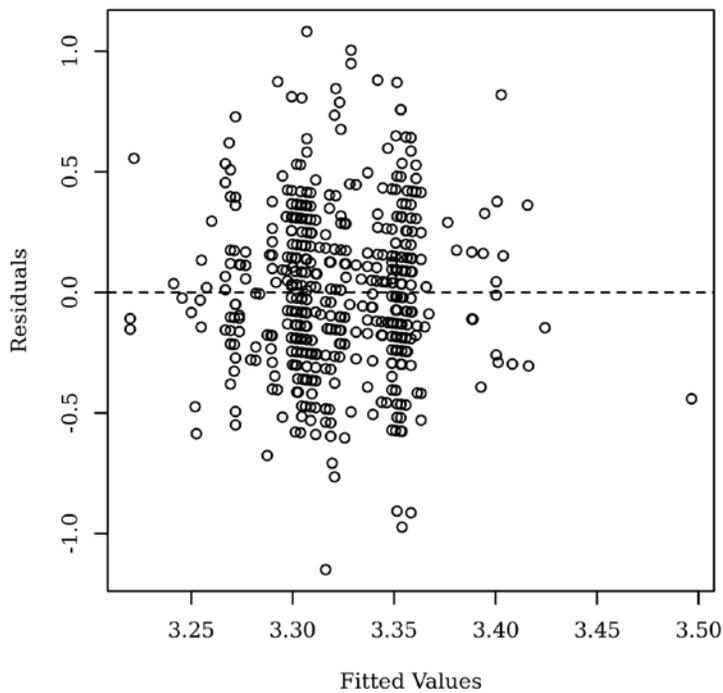


Figure 8. Residuals scatterplot testing homoscedasticity for the regression predicting knowledge.

The lack of high correlations among predictor variables, multicollinearity, was assessed using VIF values (Stevens, 2009). VIF values greater than 10 were considered evidence of increased multicollinearity among predictors (Stevens). There were no VIF values exceeding 10. Table 22 presents the VIF values for the independent variables.

Table 22

*VIF Values for the Regression Predicting Knowledge*

Variable	VIF
Race	1.05
Sexual orientation	1.02
Age	1.43
Relationship status	1.69
Parental status	1.36
Gender	1.05

The results of the multiple linear regression analysis predicting knowledge were not statistically significant,  $F(9,502) = 0.57$ ,  $p = .823$ ,  $R^2 = 0.01$ . This result indicated that the regression model containing race, sexual orientation, age, relationship status, parental status, and gender did not contribute to the variation in knowledge score among college students. Because the regression model was not statistically significant the individual predictors were not examined further. The results of the multiple linear regression predicting knowledge are presented in Table 23.

Table 23

*Results of the Multiple Linear Regression Predicting Knowledge*

Variable	<i>B</i>	<i>SE</i>	95% CI	$\beta$	<i>t</i>	<i>p</i>
(Intercept)	3.17	0.18	[2.82, 3.52]	0.00	17.95	< .001
Gender – Female (ref: Male)	0.05	0.03	[-0.01, 0.11]	0.07	1.61	.109
Parental status – No (ref: Yes)	0.00	0.11	[-0.21, 0.22]	0.00	0.02	.988
Relationship status – Committed (ref: Single)	0.00	0.03	[-0.06, 0.06]	0.00	0.06	.953
Relationship status – Married (ref: Single)	0.05	0.11	[-0.17, 0.27]	0.02	0.44	.661
Relationship status – Other (ref: Single)	0.04	0.10	[-0.16, 0.25]	0.02	0.42	.672

Table 23 Results of the Multiple Linear Regression Predicting Knowledge Continued

Age	0.00	0.01	[-0.01, 0.01]	0.02	0.46	.649
Race – European/Caucasian (ref: African/African-American)	0.03	0.04	[-0.04, 0.10]	0.05	0.90	.368
Race – Other minority (ref: African/African-American)	0.02	0.05	[-0.08, 0.12]	0.02	0.42	.676
Sexual orientation – LGBTQ (ref: Heterosexual)	0.05	0.05	[-0.05, 0.15]	0.04	0.96	.336

Note. Results:  $F(9,502) = 0.57, p = .823, R^2 = 0.01$

Unstandardized Regression Equation: Knowledge = 3.17 + 0.05\*Gender.Female + 0.00\*Child.No + 0.00\*Relationship.Committed + 0.05\*Relationship.Married + 0.04\*Relationship.Other + 0.00\*Age + 0.03\*Race.EuropeanCaucasian + 0.02\*Race.Other minority + 0.05\*Sexualorientation.LGBTQ

### Summary

For research question one related to fertility and ART intentions the researcher found that there was a statistically significant difference in intentions scores by race and age category. The mean intentions score was higher for European/Caucasian students than it was for African/African-American students, and the intentions score was higher for those aged 27-30 than those aged 18-22. For research question two related to fertility and ART beliefs the researcher assessed statistically significant differences by race and gender. European/Caucasian students reported higher scores than African/African-American students, and male students reported higher beliefs scores than female students. For research question three, there were no statistically significant differences in fertility and ART knowledge by the independent variables.

For research question four race, relationship status, and age were statistically significant predictors of fertility and ART intentions. For research question five race and gender were statistically significant predictors of fertility and ART beliefs. Finally, for research question six none of the predictor variables were statistically significant.

## **CHAPTER 5**

### **CONCLUSIONS, DISCUSSIONS AND RECOMMENDATIONS**

#### **Introduction**

This chapter provides a detailed discussion of conclusions and limitations of this research study's results. This chapter will also offer recommendations for future research on Health Educators and College students regarding fertility knowledge and Assisted Reproductive Technology. Additionally, the chapter includes the limitations experienced during the course of the study, recommendations for health educators, and recommendations for further research.

#### **Purpose**

The purpose of this quantitative cross-sectional comparative study was to identify differences and relationships among Illinois college students' intentions, beliefs and knowledge toward fertility and ART based on race, sexual orientation, age, parental status, relationship status, and gender.

#### **Research Questions**

1. Do Illinois college students' fertility and ART intentions differ by race, sexual orientation, age, parental status, relationship status, or gender?
2. Do Illinois college students' beliefs about fertility and ART differ by race, sexual orientation, age, parental status, relationship status, or gender?
3. Do Illinois college students' knowledge of fertility and ART differ by race, sexual orientation, age, parental status, relationship status, or gender?

4. What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status and gender) regarding college students fertility and assisted reproductive technology intentions?

5. What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status and gender) regarding college students fertility and assisted reproductive technology beliefs?

6. What is the relationship among the variables (race, sexual orientation, age, parental status, relationship status and gender) regarding college students' fertility and assisted reproductive technology knowledge?

### **Findings**

Caucasian students had higher overall scores on intentions and beliefs of fertility and ART treatments. As such, it was determined that, on average, Caucasian students wanted more children, intended on starting a family later than African/African American students, and thought that conception took a longer time than their African/African American counterparts. Additionally, Caucasian students' beliefs scores were higher, and they felt that it was okay to parent children at an older age, utilize ART treatments such as IVF, and that every sexual orientation has the right to use ART. Age was also a statistically significant predictor of intentions. Older students (ages 23-30) had higher intentions scores than younger students (ages 18-22), which means they intended to have future children sooner and expected to be older when they had their last child. Older students also felt it took longer to get pregnant.

As per relationship status, participants in a committed relationship status scored less on the intention scale compared to single students. While participants in a committed

relationship indicated that they intend to have children and have children at a younger age, they also indicated that they may want their last child at a younger age. Additionally, participants in a committed relationship believed that conception takes a shorter time than their single counterparts. As per belief scores, men had higher belief scores when compared with women, which means that more men than woman were more comfortable with being older first-time parents. Also, more men thought that both women and men could have the last child at later ages. The literature supports that women have more knowledge and are aware of fertility and ART treatment options and risks compared to some men (Daniluk & Koert 2013). Furthermore, previous literature indicates that women thought that couples should have children sooner than men and felt that IVF should be utilized for all sexual orientations (Daniluk & Koert, 2013). Overall knowledge for college students could be improved as there were no significant differences in any of the groups on knowledge scores.

### **Conclusions**

1. Caucasian students believed that having children at older ages was acceptable when compared with African American students. Also, older students (aged 26-30) expressed more readiness to have children as compared to the younger age groups.
2. Caucasian students had a greater belief that they could have children at a later age, when compared with their African American counterparts. Also, Caucasian students had a higher belief than African Americans in utilizing ART. In addition, Caucasian students had slightly higher beliefs that persons of any sexual orientation can utilize ART and IVF to have children when compared with African American students. Male students held higher beliefs than females regarding fertility and ART.

3. Race, sexual orientation, age, parental status, relationship status, and gender had no impact regarding fertility knowledge and ART.
4. Regarding race, Caucasians had higher intentions of having children at later ages, having more children, and felt that it took longer to conceive compared to African American students. In respect to relationship status, students in committed relationships wanted children sooner compared to single students. In regard to age, the older the student, the sooner they wanted children.
5. Regarding beliefs, the two groups, age and gender, had greater impact on beliefs than the other groups. Caucasian students had higher intentions of having children and having children at a later age compared to African Americans. In addition, men had slightly higher beliefs about using ART, and having children later compared to females.
6. There was no disparity among the groups with regards to fertility knowledge and ART.

### **Discussion**

The literature shows that college students lack knowledge and are unaware of the limitations of ART and age-related infertility (Lampic, Skoog-Svanberg, Karlstrom, & Tyden, 2006; Paterson et al. 2012). The findings of this study revealed that there was no difference or variation of knowledge between race, sexual orientation, age, parental status, relationship status, and gender. While there were differences in intention and belief scales, there were no significant changes in knowledge. Just in this study, there was not a difference in gender and knowledge. There is evidence indicating that regardless of race, sexual orientation, age, parental status, relationship status, and gender that students need more knowledge regarding fertility and ART and age-related infertility. Students mostly do not understand or know that regardless of if an individual receives IVF or various forms of ART,

infertility can occur. Other studies have shown that men are less knowledgeable than women (Daniluk & Koert, 2013), and often influence women to delay parenthood so that they can establish their careers (Amuedo-Dorantes, 2004). This is not entirely unique to men, as women also lack knowledge regarding age-related fertility and ART treatment options (Daniluk, Koert, & Chueng, 2012).

Findings from this study also revealed that older participants had higher intentions scores and had stronger fertility intentions compared to their younger counterparts. The Theory of Planned Behavior supports that the construct of intention is the critical predictor of fertility behavior (Glanz, Rimer, & Viswanath, 2008). Unfortunately for couples who want children and delay children until an older age—mid-thirties for women and mid-forties for men—they may struggle with premature births, stillborn births, miscarriages, and age-related infertility. This was supported by Hassan and Killick (2001), who asserted that women over 35 years of age take twice the amount of time to get pregnant as women under age 25, while men who are 45 or older take roughly a year to get their spouse pregnant. Parents who are older may reap the benefits of having education, established careers, and access to health care while younger parents lack financial provision and the maturity to deal with drastic changes of parenthood (Criado, 2014).

Results from this study support that persons in a committed relationship scored lower on the intention items compared to single students. This could mean that they did not want children or that they want to become parents at an earlier age compared to single couples or they feel it may take them less time to conceive a child compared to single couples. However, more women are delaying parenthood until they find a suitable partner and establish their careers (Daniluk & Koert, 2012). Single women who were aware of the risk of

delaying childbirth did not want to have children without finding the suitable partner (Proudfoot, Wellings, & Glasier, 2009). If a woman is poor and has children, she is less likely to want more children unless she finds a spouse who is responsible and committed (Dudgeon & Inhorn, 2004). Previous research determined that men tend to influence when the couple should start having children (Schwartz, Brindis, Ralph, & Biggs, 2011). Schwartz, Brindis, Ralph, and (2011) found that some Mexican American women are strongly influenced by the men in their culture, which encourages pregnant wives to stay at home and take care of children. Conversely, some Mexican American men who do not identify with the traditional cultural experience feel that women should work and pursue an education (Schwartz et al., 2011). The current literature shows that Hispanics and African Americans have higher fertility rates than Caucasians, Asians, and American Indians (Amuedo-Dorantes & Kimmel, 2008). Religion, access to healthcare, and poverty may impact the high fertility rates for Hispanics and African Americans. Conversely, researchers found that, regardless of race, the chance of infertility increases as education increases (Yan & Morgan, 2003).

The present investigation also found that males tend to score higher on the belief section compared to women, which includes items that ask about what the participant thinks the ideal age for giving birth is for a woman and a man. Caucasian students scored higher on intentions and beliefs compared to their African American counterparts. This indicates that Caucasian students may plan to have more children in the future compared to African Americans, or they expected to have their first and last child at older ages compared to African Americans, which supports the literature of African Americans having children at younger ages. Lastly, Caucasian student may have felt it took longer to conceive a child. In the belief section, Caucasian participants may have thought it was okay to utilize ART

treatments such as IVF compared to African Americans, and that all sexual orientations should be to use ART in their attempts to produce a child. There is a lack of literature on the intentions and beliefs of members of the lesbian, gay, bisexual, and transgendered (LGBT) community. The literature shows that this group has been discriminated against and often do not have coverage to obtain ART treatments (Riskind & Patterson, 2010). However, when members of the community do have coverage, the results of the ART treatment in the members of the LGBT community are similar to their heterosexual counterparts (Nordqvist, Ter Keurst, Boivin, & Gameiro, 2016).

### **Limitations**

There were several limitations that should be considered when interpreting the results of the present investigation, the first being the lower reliability scores of belief and knowledge scale. The beliefs scale was that of ( $\alpha = 0.69$ ), and knowledge scale ( $\alpha = 0.64$ ) exhibited fair reliability. Typically, researchers aim to get a reliability score of .7. The piloted survey conducted in the fall of 2016 had a Belief Scale reliability of ( $\alpha = .802$ ) and Knowledge Scale of ( $\alpha = .505$ ) and a combined reliability score of ( $\alpha = .675$ ). The low reliability in the belief section was due to the open-ended questions along with the Likert Scale formatted questions which did not produce cohesive means.

The second limitation was that of small sample sizes for some demographic groups including race and sexual orientation. To have an accurate representation, the sample size should be 50 or greater. However, in this study some racial groups fell below 50 participants and sample size had to be recoded as Other minority. Race was recoded to African American, Other minority, and Caucasian from African American, Asian American, Native Hawaiian or Pacific Islander, American Indian or Alaskan Native, Caucasian, and Other. The recoding in

race was based on having a sample size of 50 and over. Caucasians had a sample size of 327, while African American had a sample size of 128, and Other minority had a combined sample size of 81.

Due to sample size, sexual orientation was recoded to include heterosexual and LGBTQ instead of heterosexual, gay/lesbian, and bisexual. Gender was recoded to include male and female, which led to modification to initial analysis plan to run ANOVA to binominal analysis (the other, like race, which has more than two categorical variables, will use chi-square analysis). What differentiates gender and sexual orientation is an emotional state or affiliation of their sexual preference, while gender was operationalized in this study to refer to physical makeup.

The final limitation was linked to the use of the Kruskal-Wallis test. To address this research question, the researcher originally intended to conduct one-way ANOVAs to determine if participants intentions scores differed by race, sexual orientation, age, parental status, relationship status, or gender. A Shapiro Wilk test of normality was conducted to determine if the assumption normality was met for the intentions scores. The results of the test indicated that normality was not met,  $p < .001$ , because the assumption was not met, the researcher conducted Kruskal-Wallis tests, the nonparametric alternative to the one-way ANOVA.

### **Recommendations for Health Educators**

When discussing sexual health, health educators should emphasize the importance of age-related infertility and the effectiveness of ART options among the student population. Having a mixture of male and female students together debating fertility knowledge and ART treatment options would be influential because research and the findings of this study

show that different genders have varying perception regarding intentions, beliefs, and knowledge. Additionally, health educators should encourage discussions in their human sexuality classes about fertility and ART treatment options relating to age and infertility. They can give students assignments that would allow them to share their perceptions with other students. Health educators can inform all students who want to have children on the benefits and disadvantages of delaying parenthood, especially when wanting to further their education. When health educators are presenting information to students, they can list studies or examples in the group meeting of persons who delayed parenthood to further their careers and struggled with infertility. I would also recommend when public health educators have to make presentation about sexual health in the community, they talk about fertility and the growing trend of delayed parenthood and how Caucasians, younger students, and men are more likely to delay parenthood compared to African Americans, older students, and women. Public health educators who teach about family planning topics, which include anything that deals with sexual health, can briefly include that age-related infertility is the number one cause of infertility so that participants have some idea of the expanding trend. This study found that 80% of students surveyed felt that persons of any sexual orientation have the right to utilize IVF or other ART options in order to have children. Therefore, I would recommend that more information regarding ART and IVF becomes available for members of the LGBTQ community.

### **Recommendation for Future Research**

There were not statistically significant results when dealing with knowledge so of all the six groups (race, age, gender, sexual orientation, relationship status, and parental status), no single group exhibited stronger knowledge about fertility or ART options than the other. I

recommend further studies having a larger sample of persons of various sexual orientation, more minorities and social class. The researcher recommends that developing a more reliable and valid instrument for college students primarily focusing on the intention scale would be useful. The researcher is interested in examining if students attending Western, Eastern Midwest, and Southern institutions to determine if students from different regions vary in fertility and ART intentions, beliefs, and knowledge. This may be of interest because different regions have various persons and different curriculum. There was a study conducted in California and the Midwest, but none so far in the Eastern or Southern regions of the United States.

### **Summary**

Results of this study provided insight into intentions, beliefs, and knowledge among college students regarding fertility and assisted reproductive technology. It was found that Caucasian students believed that having children at older ages was acceptable when compared with African American students and older students expressed more readiness to have children as compared to the younger age groups. Caucasian students also had a greater belief that they could have children at a later age, when compared with their African American counterparts. Caucasian students had a higher belief than African Americans in utilizing ART. In addition, Caucasian students had slightly higher beliefs that persons of any sexual orientation can utilize ART and IVF to have children when compared with African American students. Male students held higher beliefs than females regarding fertility and ART. Race, sexual orientation, age, parental status, relationship status, and gender had no impact regarding fertility knowledge and ART.

Regarding race, Caucasians had higher intentions of having children at later ages, having more children, and felt that it took longer to conceive compared to African American students. In respect to relationship status, students in committed relationships wanted children sooner compared to single students. In regard to age, the older the student, the sooner they wanted children. Regarding beliefs, the two groups, age and gender, had greater impact on beliefs than the other groups. Caucasian students had higher intentions of having children and having children at a later age compared to African Americans. In addition, men had slightly higher beliefs about using ART, and having children later compared to females. There was no disparity among the groups with regards to fertility knowledge and ART. The results from this study also show that there is a need for more research in fertility knowledge and ART treatment options.

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## APPENDICES

APPENDIX A  
Amended Survey Instrument

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**Intentions, Beliefs and Knowledge on Fertility and Assisted Reproductive Technology Survey**

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This survey includes Fertility and Assisted Reproductive Technology questions for college students. It was modified from the Canadian Fertility Survey by Daniluk and Koert (2013). The survey focuses on fertility intentions, beliefs and knowledge. Thank you for taking your time to participate in the survey.

**Directions:** Please circle the answer below or write your best answer

**PART I: FERTILITY INTENTIONS**

1. Do you plan to have children in the future? (Circle one)

YES or NO (If no skip to question 6)

2. How many children do you hope to have? (Fill in the blank with a number) \_\_\_\_\_

3. About how old you expect to be when you become a parent with your first child? (Please write a number) If you already have had your first child please skip to question 4. \_\_\_\_\_

4. If you intend to have more than one child, about how old do you expect to be when you have your last child? (Fill in the blank with a number) \_\_\_\_\_

5. About how many months do you expect it to take for you or your spouse to get pregnant once you start trying? (Fill in the blank with a number) \_\_\_\_\_

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**PART II: BELIEFS ABOUT FERTILITY AND ASSISTED REPRODUCTIVE TECHNOLOGY (ART)**

6. What do you consider to be the ideal age for a woman to give birth to a child for the first time? (Please write a number) \_\_\_\_\_

7. What do you consider to be the ideal age for a man to father a child for the first time? (Please write a number) \_\_\_\_\_

8. What would you consider to be the latest age a woman should consider bearing a child? (Please write a number) \_\_\_\_\_

9. What would you consider to be the latest age a man should consider fathering a child? (Please write a number) \_\_\_\_\_

10. What do you believe the upper age limit should be for a woman to be assisted in becoming pregnant at a fertility clinic? (Please write a number) \_\_\_\_\_

11. What do you believe the upper age limit should be for a man to be treated at a fertility clinic? (Please write a number) \_\_\_\_\_

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Please circle the best answer

12. How likely is it that you would consider becoming a parent without a spouse through the use of donated sperm or eggs?

Very Likely

Likely

Neither  
Likely nor  
Unlikely

Unlikely

Very  
Unlikely

<b>13. If you and your partner had difficulties conceiving, how likely is it that you would consider using In-Vitro fertilization (IVF) – a procedure whereby the sperm and eggs are fertilized in a laboratory and a few days later the resulting embryo is transferred to the uterus?</b>	Very Likely	Likely	Neither Likely nor Unlikely	Unlikely	Very Unlikely
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<b>14. If your spouse was unable to produce a child using his/her own sperm/eggs, how likely is it that you would consider using the sperm/eggs of another person, to produce an embryo?</b>	Very Likely	Likely	Neither Likely nor Unlikely	Unlikely	Very Unlikely
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<b>15. Who do you believe has the rights to use assisted reproductive technology in their attempts to produce a child?</b>	<b>Very Likely</b>	<b>Likely</b>	<b>Neither Likely nor Unlikely</b>	<b>Unlikely</b>	<b>Very Unlikely</b>
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<b>a. Heterosexual Couples</b>	VL	L	NL nor UL	UL	VUL
<b>b. Same Sex Female Couples</b>	VL	L	NL nor UL	UL	VUL
<b>c. Same Sex Male Couples</b>	VL	L	NL nor UL	UL	VUL
<b>d. Single Women</b>	VL	L	NL nor UL	UL	VUL
<b>e. Single Men</b>	VL	L	NL nor UL	UL	VUL

<b>16. How likely it is that you would consider having your eggs/sperm frozen and stored at the fertility clinic so they could be used when you are ready to become a parent?</b>	Very Likely	Likely	Neither Likely nor Unlikely	Unlikely	Very Unlikely
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**PART III: FERTILITY AND ART KNOWLEDGE (Please circle the best answer)**

<b>17. Overall how do you rate your current women's fertility knowledge?</b>	<b>Very Informed</b>	<b>Informed</b>	<b>Neither Informed nor Uninformed</b>	<b>Uninformed</b>	<b>Very Uninformed</b>
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<b>18. Overall, how would you rate current knowledge of Assisted Reproductive Technology procedures and fertility treatments (e.g., In Vitro Fertilization and Intracytoplasmic Sperm Injections)?</b>	Very Informed	Informed	Neither Informed nor Uninformed	Uninformed	Very Uninformed
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<b>19. For women over 30, overall health and fitness level is a better indicator of fertility than age.</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neither Agree nor Disagree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
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<b>20. Taking birth control pills for more than 5 years negatively affects a woman's fertility.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>21. A woman's eggs are as old as she is.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>22. Prior to a woman reaching menopause, the assisted reproductive technologies (e.g., In Vitro Fertilization, also known as IVF) can help most women to have a baby using their own eggs.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>23. The total cost of one cycle of In-Vitro Fertilization (IVF) is under \$5,000.00.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>24. There is a progressive decrease in a woman's ability to become pregnant after the age of 35.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>25. The rates of miscarriage are significantly higher for women in their 40s than for women in their 30s, even for physically fit women in excellent health.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>26. Egg freezing before the age of 35 can significantly prolong a woman's fertility.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>27. Sexually transmitted Infections (e.g. Chlamydia, Gonorrhea) significantly increase the risk of later infertility.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>28. A man's age is an important factor in a couple's chances of becoming pregnant.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>29. The majority of fertility conditions are caused by problems with the woman's fertility.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>30. Most couples have to go through IVF more than once to have a baby.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

<b>31. A woman's weight affects her chances of conceiving a child.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>32. There is a significant decline in the quality of a man's sperm before the age of 50.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Agree
<b>33. Smoking cigarettes or marijuana can reduce the quality of a man's sperm.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>34. Children born to fathers over the age of 45 have higher rates of learning disabilities, autism, Schizophrenia and some forms of cancer.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

**PART IV: DEMOGRAPHICS** Please provide the requested information and circle the best answer

**35. What is your gender? (Circle one)**

- a. Male      b. Female      c. Transgender/Gender-Nonconforming

**36. In what year were you born? \_\_\_\_\_**

**37. Which racial or ethnic group do you most identify with (Circle the best answer)**

- a. African/African American      b. Asian/Asian American      c. Native Hawaiian or Pacific Islander  
d. American Indian or Alaskan Native      e. European/Caucasian      f. Other \_\_\_\_\_

**38. What is your ethnicity?**

- a. Hispanic or Latino      OR      b. Not Hispanic or Latino

**39. With what sexual orientation do you most identify?**

- a. Gay/Lesbian      b. Bisexual      c. Heterosexual

**40. Do you have children?**

- a. Yes      or      b. No

**41. What is your current relationship status?**

- a. Single      b. In a committed relationship      c. Married      d. Other

**42. How many children do you have? \_\_\_\_\_**

## APPENDIX B:

### Email Solicitation to Department Chair

Dear Chairperson,

My name is Akilah Morris and I am a Doctoral Candidate in the Health Education and Recreation Department at Southern Illinois University Carbondale. I am conducting a study on awareness of fertility among university students in Illinois.

The purpose of the quantitative comparative study is to identify differences in Illinois college students' intentions, beliefs and knowledge toward fertility and ART based on race, sexual orientation, age, parental status, relationship status, and gender.

I would like your permission to contact the instructors in the Health Education or Health Science Department who teach introductory health education courses. If you grant permission, then I will contact the instructors and request to mail survey booklets so that the instructors can administer the Intentions, Beliefs and Knowledge on Fertility and Assisted Reproductive Technology Survey to the students in their classes. The survey booklet will contain a consent form and the survey. The survey will only take 10-15 minutes. When students are finished they will place the completed surveys in a pre-address postage paid manila envelope located in front of the class and the Instructor will then seal and mail back envelope to the researcher. There is a \$5 gift card given to each participating teacher who mails back the completed surveys.

I will follow up by contacting you via email at the end of each week for two weeks. Should I not get a response after two weeks, I will try another couple weeks to contact you by phone. If I don't hear from you by that time I will then contact the office secretary to speak with you or leave a message.

Please reply to [ammorri@siu.edu](mailto:ammorri@siu.edu) or call 217-766-8313 informing me if you agree or decline to have the health education or health science instructors participate in the study. If you do agree to give me permission to contact the health education or health science instructors the next step would be me contacting the instructors asking them to distribute and collect the surveys in their class for their participation in the research.

If there are any questions please contact me Akilah Morris (217) 766-8313, [ammorri@siu.edu](mailto:ammorri@siu.edu) or my supervising professor Dr. Juliane Wallace ([juliane@siu.edu](mailto:juliane@siu.edu)) or Aaron Diehr ([aaron@siu.edu](mailto:aaron@siu.edu)) Department of Health Education and Recreation, SIUC, Carbondale, IL 62901-4632, phone number (618) 453-2777.

Thank you Akilah Morris

**This project has been reviewed and approved by the SIUC Human Subjects Committee. Questions concerning your rights as a participant in this research may be addressed to the Committee Chairperson, Office of Sponsored Projects Administration, SIUC, Carbondale, IL 62901-4709. Phone (618) 453-4533. E-mail: [siuhsc@siu.edu](mailto:siuhsc@siu.edu)**

## APPENDIX C:

### Email Solicitation to Health Education and Science Faculty

Dear Health Faculty,

My name is Akilah Morris and I am a Doctoral Candidate in the Health Education and Recreation Department at Southern Illinois University Carbondale. I am conducting a study on the Intentions, Beliefs and Knowledge on Fertility and Assisted Reproductive Technology. I would like to request your assistance in administering my survey instrument in your classes.

The purpose of the quantitative comparative study is to identify differences in Illinois college students' intentions, beliefs and knowledge toward fertility and ART based on race, sexual orientation, age, parental status, relationship status, and gender.

I will mail the survey booklet which contains a consent form and a survey. I will also include some pencils for the students to use. The survey will only take approximately 10-15 minutes. After the students have completed the survey please direct them to place completed surveys in the pre-addressed postage-paid manila envelope provided then seal and mail back the envelope to researcher. Once I receive the completed surveys in the manila envelope, a \$5 gift card will be mailed to you for your assistance in administering the survey.

I will follow up by contacting you via email at the end of each week for two weeks. Should I not get a response after two weeks, I will try for another couple of weeks to contact you by phone. If I don't hear from you by that time I will then contact the office secretary to speak with your or leave a message.

Please send an email to [ammorri@siu.edu](mailto:ammorri@siu.edu) or call 217-766-8313 let me know if you would be willing to administer the survey to your class.

If there are any questions please contact me Akilah Morris (217) 766-8313, [ammorri@siu.edu](mailto:ammorri@siu.edu) or my supervising professors Dr. Juliane Wallace ([juliane@siu.edu](mailto:juliane@siu.edu)) or Aaron Diehr ([aaron@siu.edu](mailto:aaron@siu.edu)) Department of Health Education and Recreation, SIUC, Carbondale, IL 62901-4632, phone number (618) 453-2777.

Thank you  
Akilah Morris

**This project has been reviewed and approved by the SIUC Human Subjects Committee. Questions concerning your rights as a participant in this research may be addressed to the Committee Chairperson, Office of Sponsored Projects Administration, SIUC, Carbondale, IL 62901-4709. Phone (618) 453-4533. E-mail: [siuhsc@siu.edu](mailto:siuhsc@siu.edu)**

**APPENDIX D:**  
Survey Consent Form

My name is Akilah Morris. I am a graduate student at Southern Illinois University Carbondale and I need your assistance with help with my research study. I am asking you as a fellow student to participate in my doctoral research study.

The purpose of the quantitative comparative study is to identify differences in Illinois college students' intentions, beliefs and knowledge toward fertility and ART based on race, sexual orientation, age, parental status, relationship status, and gender.

If you choose to take part in the study, you will be asked to complete a short survey about your knowledge, attitudes, beliefs about fertility and Assisted Reproductive Technology. The survey will take approximately 10-15 minutes of your time. All your responses will be kept confidential. Since I am the only researcher who will have access to the questionnaire all the answers will be confidential. Please do not put your name anywhere on the survey. When you are finished place your completed survey in the pre-addressed postage-paid manila envelope located in front of the class. Your instructor will then seal and mail back to me the manila envelope containing your survey.

Completion of the survey indicates your voluntary consent to participate in this study. **Although there are no risks anticipated from participation, students are encouraged to seat themselves spaced which increases the chances of you being comfortable answering the questions confidentially. Participation is limited to adults aged 18 and older.**

If you have any questions about the study, please contact me or my advisors, Juliane Wallace ([juliane@siu.edu](mailto:juliane@siu.edu)) or Aaron Diehr ([aaron@siu.edu](mailto:aaron@siu.edu)).

Akilah Morris  
Graduate Student  
(217)-766-8313  
[ammorri@siu.edu](mailto:ammorri@siu.edu)

Juliane Wallace, PhD  
Dept. Chair of Public Health and Recreation or  
Aaron Diehr  
Associate Professor  
Dept. of Health Education and Recreation  
(618) 453-2777  
[Juliane@siu.edu](mailto:Juliane@siu.edu)

Thank you for taking the time to assist me in this research.

**This project has been reviewed and approved by the SIUC Human Subjects Committee. Questions concerning your rights as a participant in this research may be addressed to the Committee Chairperson, Office of Sponsored Projects Administration, SIUC, Carbondale, IL 62901-4709. Phone (618) 453-4533. E-mail: [siuhsc@siu.edu](mailto:siuhsc@siu.edu)**

**APPENDIX E:**  
Eastern Illinois University  
Email Solicitation to Department Chair

Dear Chairperson,

My name is Akilah Morris and I am a Doctoral Candidate in the Health Education and Recreation Department at Southern Illinois University Carbondale. I am conducting a study on fertility awareness among university students in Illinois. The purpose of the quantitative comparative study is to identify differences in Illinois college students' intentions, beliefs and knowledge toward fertility and ART based on race, sexual orientation, age, parental status, relationship status, and gender.

I would like your permission to contact the instructors in the Health Education or Health Science Department who teach introductory health education courses. If you grant permission, then I will contact the instructors and request to mail survey booklets so that the instructors can administer the Fertility Awareness Survey to the students in their classes. Human Subjects at Eastern Illinois University would like the instructors to make the surveys available to students outside of the class time. The students can pick up the survey, but then complete the survey outside of the class, then return it to an envelope in the classroom at the next class session.

The survey booklet will contain a consent form and the survey. The survey will only take 10-15 minutes. There is a \$5 gift card given to each participating teacher who mails back the completed surveys. When students are finished they will place the completed surveys in a pre-address postage paid manila envelope located outside of the class and the Instructor will then seal and mail back envelope to the researcher. I will follow up by contacting you via email at the end of each week for two weeks. Should I not get a response after two weeks, I will try another couple weeks to contact you by phone. If I don't hear from you by that time I will then contact the office secretary to speak with you or leave a message.

Please reply to [ammorri@siu.edu](mailto:ammorri@siu.edu) or call 217-766-8313 informing me if you agree or decline to have the health education or health science instructors participate in the study. If you do agree to give me permission to contact the health education or health science instructors the next step would be me contacting the instructors asking them to distribute and collect the surveys in their class for their participation in the research.

If there are any questions please contact me Akilah Morris (217) 766-8313, [ammorri@siu.edu](mailto:ammorri@siu.edu) or my supervising professors Dr. Julianne Wallace ([juliane@siu.edu](mailto:juliane@siu.edu)) or Aaron Diehr ([aaron@siu.edu](mailto:aaron@siu.edu)) Department of Health Education and Recreation, SIUC, Carbondale, IL 62901-4632, phone number (618) 453-2777.

Thank you  
Akilah Morris

**This project has been reviewed and approved by the SIUC Human Subjects Committee. Questions concerning your rights as a participant in this research may be addressed to the Committee Chairperson, Office of Sponsored Projects Administration, SIUC, Carbondale, IL 62901-4709. Phone (618) 453-4533. E-mail: [siuhsc@siu.edu](mailto:siuhsc@siu.edu)**

**APPENDIX F:**  
Eastern Illinois University  
Email Solicitation to Health Education and Science Faculty

Dear Health Faculty,

My name is Akilah Morris and I am a Doctoral Candidate in the Health Education and Recreation Department at Southern Illinois University Carbondale. I am conducting a study on fertility awareness among university students in Illinois. I would like to request your assistance in administering my survey instrument in your classes. The purpose of the quantitative comparative study is to identify differences in Illinois college students' intentions, beliefs and knowledge toward fertility and ART based on race, sexual orientation, age, parental status, relationship status, and gender.

I will mail the survey booklet which contains a consent form and a survey. I will also include some pencils for the students to use. The survey will only take approximately 10-15 minutes. Human Subjects at Eastern Illinois University would like the instructors to make the surveys available to students outside of the class time. The students can pick up the survey, but then complete the survey outside of the class, then return it to an envelope in the classroom at the next class session. After the students have completed the survey please direct them to place completed surveys in the pre-addressed postage-paid manila envelope located outside of class. The instructor will then seal and mail back the envelope to researcher. Once I receive the completed surveys in the manila envelope, a \$5 gift card will be mailed to you for your assistance in administering the survey.

I will follow up by contacting you via email at the end of each week for two weeks. Should I not get a response after two weeks, I will try for another couple of weeks to contact you by phone. If I don't hear from you by that time I will then contact the office secretary to speak with your or leave a message.

Please send an email to [ammorri@siu.edu](mailto:ammorri@siu.edu) or call 217-766-8313 let me know if you would be willing to administer the survey to your class.

If there are any questions please contact me Akilah Morris (217) 766-8313, [ammorri@siu.edu](mailto:ammorri@siu.edu) or my supervising professors Dr. Juliane Wallace ([juliane@siu.edu](mailto:juliane@siu.edu)) or Aaron Diehr ([aaron@siu.edu](mailto:aaron@siu.edu)) Department of Health Education and Recreation, SIUC, Carbondale, IL 62901-4632, phone number (618) 453-2777.

Thank you  
Akilah Morris

**This project has been reviewed and approved by the SIUC Human Subjects Committee. Questions concerning your rights as a participant in this research may be addressed to the Committee Chairperson, Office of Sponsored Projects Administration, SIUC, Carbondale, IL 62901-4709. Phone (618) 453-4533. E-mail: [siuhsc@siu.edu](mailto:siuhsc@siu.edu)**

**APPENDIX G:**  
Eastern Illinois University  
Survey Consent Form

My name is Akilah Morris. I am a graduate student at Southern Illinois University Carbondale and I need your assistance with help with my research study. I am asking you as a fellow student to participate in my doctoral research study.

The purpose of the quantitative comparative study is to identify differences in Illinois college students' intentions, beliefs and knowledge toward fertility and ART based on race, sexual orientation, age, parental status, relationship status, and gender.

If you choose to take part in the study, you will be asked to complete a short survey about your knowledge, attitudes, beliefs about fertility and Assisted Reproductive Technology. Human Subjects at Eastern Illinois University would like the instructors to make the surveys available to students outside of the class time. The students can pick up the survey, but then complete the survey outside of the class, then return it to an envelope in the classroom at the next class session. The survey will take approximately 10-15 minutes of your time. All your responses will be kept confidential. Since I am the only researcher who will have access to the questionnaire all the answers will be confidential. Please do not put your name anywhere on the survey. When you are finished place your completed survey in the pre-addressed postage-paid manila envelope located in outside of the class. Your instructor will then seal and mail back to me the manila envelope containing your survey.

Completion of the survey indicates your voluntary consent to participate in this study. Although there are no risks anticipated from participation, students are encouraged to seat themselves spaced which increases the chances of you being comfortable answering the questions confidentially. Participation is limited to adults aged 18 and older.

If you have any questions about the study, please contact me or my advisor, Juliane Wallace.

Akilah Morris  
Graduate Student  
(217)-766-8313  
ammorri@siu.edu

Juliane Wallace, PhD  
Dept. Chair of Public Health and Recreation  
(618) 453-2777  
juliane@siu.edu

Thank you for taking the time to assist me in this research.

**This project has been reviewed and approved by the SIUC Human Subjects Committee. Questions concerning your rights as a participant in this research may be addressed to the Committee Chairperson, Office of Sponsored Projects Administration, SIUC, Carbondale, IL 62901-4709. Phone (618) 453-4533. E-mail: siuhsc@siu.edu**

**APPENDIX H:**  
Old Survey Instrument

**Intentions, Beliefs and Knowledge on Fertility and Assisted Reproductive Technology Survey**

This survey includes Fertility and Assisted Reproductive Technology questions for college students. It was modified from the Canadian Fertility Survey by Daniluk and Koert (2013). The survey focuses on fertility intentions, beliefs and knowledge. Thank you for taking your time to participate in the survey.

**Directions:** Please circle the answer below or write your best answer

**PART I: FERTILITY INTENTIONS**

1. Do you plan to have children in the future? (Circle one)  
YES or NO (If no skip to question 6)

2. How many children do you hope to have? (Fill in the blank with a number) \_\_\_\_\_

3. About how old you expect to be when you become a parent with your first child? (Please write a number) If you already have had your first child please skip to question 4. \_\_\_\_\_

4. If you intend to have more than one child, about how old do you expect to be when you have your last child? (Fill in the blank with a number) \_\_\_\_\_

5. About how many months do you expect it to take for you or your spouse to get pregnant once you start trying? (Fill in the blank with a number) \_\_\_\_\_

**PART II: BELIEFS ABOUT FERTILITY AND ASSISTED REPRODUCTIVE TECHNOLOGY (ART)**

6. What do you consider to be the ideal age for a woman to give birth to a child for the first time? (Please write a number) \_\_\_\_\_

7. What do you consider to be the ideal age for a man to father a child for the first time? (Please write a number) \_\_\_\_\_

8. What would you consider to be the latest age a woman should consider bearing a child? (Please write a number) \_\_\_\_\_

9. What would you consider to be the latest age a man should consider fathering a child? (Please write a number) \_\_\_\_\_

10. What do you believe the upper age limit should be for a woman to be assisted in becoming pregnant at a fertility clinic? (Please write a number) \_\_\_\_\_

11. What do you believe the upper age limit should be for a man to be treated at a fertility clinic? (Please write a number) \_\_\_\_\_

Please circle the best answer

<b>12. How would you feel if you were never able to have children?</b>	<b>Very Satisfied</b>	<b>Satisfied</b>	<b>Neutral</b>	<b>Dissatisfied</b>	<b>Very Dissatisfied</b>
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<b>13. How likely is it that you would consider becoming a parent without a spouse through the use of donated sperm or eggs?</b>	Very Likely	Likely	Neither Likely nor Unlikely	Unlikely	Very Unlikely
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<b>14. If you and your partner had difficulties conceiving, how likely is it that you would consider using In-Vitro fertilization (IVF) – a procedure whereby the sperm and eggs are fertilized in a laboratory and a few days later the resulting embryo is transferred to the uterus?</b>	Very Likely	Likely	Neither Likely nor Unlikely	Unlikely	Very Unlikely
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<b>15. If your spouse was unable to produce a child using his/her own sperm/eggs, how likely is it that you would consider using the sperm/eggs of another person, to produce an embryo?</b>	Very Likely	Likely	Neither Likely nor Unlikely	Unlikely	Very Unlikely
--	-------------	--------	-----------------------------	----------	---------------

<b>16. Who do you believe has the rights to use assisted reproductive technology in their attempts to produce a child?</b>	<b>Very Likely</b>	<b>Likely</b>	<b>Neither Likely nor Unlikely</b>	<b>Unlikely</b>	<b>Very Unlikely</b>
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<b>f. Heterosexual Couples</b>	VL	L	NL nor UL	UL	VUL
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<b>g. Same Sex Female Couples</b>	VL	L	NL nor UL	UL	VUL
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<b>h. Same Sex Male Couples</b>	VL	L	NL nor UL	UL	VUL
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<b>i. Single Women</b>	VL	L	NL nor UL	UL	VUL
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<b>j. Single Men</b>	VL	L	NL nor UL	UL	VUL
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<b>17. How likely it is that you would consider having your eggs/sperm frozen and stored at the fertility clinic so they could be used when you are ready to become a parent?</b>	Very Likely	Likely	Neither Likely nor Unlikely	Unlikely	Very Unlikely
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**PART III: FERTILITY AND ART KNOWLEDGE (Please circle the best answer)**

<b>18. Overall how do you rate your current women's fertility knowledge?</b>	<b>Very Informed</b>	<b>Informed</b>	<b>Neither Informed nor Uninformed</b>	<b>Uninformed</b>	<b>Very Uninformed</b>
--	----------------------	-----------------	--	-------------------	------------------------

<b>19. Overall, how would you rate current knowledge of Assisted Reproductive Technology procedures and fertility treatments (e.g., In Vitro Fertilization and Intracytoplasmic Sperm Injections)?</b>	Very Informed	Informed	Neither Informed nor Uninformed	Uninformed	Very Uninformed
--	---------------	----------	---------------------------------	------------	-----------------

<b>20. For women over 30, overall health and fitness level is a better indicator of fertility</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neither Agree nor Disagree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
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than age.	Disagree				
<b>21. Taking birth control pills for more than 5 years negatively affects a woman's fertility.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>22. A woman's eggs are as old as she is.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>23. Prior to a woman reaching menopause, the assisted reproductive technologies (e.g., In Vitro Fertilization, also known as IVF) can help most women to have a baby using their own eggs.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>24. The total cost of one cycle of In-Vitro Fertilization (IVF) is under \$5,000.00.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>25. There is a progressive decrease in a woman's ability to become pregnant after the age of 35.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>26. The rates of miscarriage are significantly higher for women in their 40s than for women in their 30s, even for physically fit women in excellent health.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>27. Most fertility clinics will not provide treatment to women over the age of 45.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>28. Egg freezing before the age of 35 can significantly prolong a woman's fertility.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>29. Sexually transmitted Infections (e.g. Chlamydia, Gonorrhea) significantly increase the risk of later infertility.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>30. A man's age is an important factor in a couple's chances of becoming pregnant.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>31. Children conceived through the use of assisted reproductive technologies such as IVF and ICSI have more long-term health</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

problems than children conceived without the use of these fertility treatments.

<b>32. The majority of fertility conditions are caused by problems with the woman's fertility.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>33. Most couples have to go through IVF more than once to have a baby.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>34. A woman's weight affects her chances of conceiving a child.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>35. The upper age limit for a man to be treated at most clinics is 55 years of age.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>36. There is a significant decline in the quality of a man's sperm before the age of 50.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Agree
<b>37. Smoking cigarettes or marijuana can reduce the quality of a man's sperm.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<b>38. Children born to fathers over the age of 45 have higher rates of learning disabilities, autism, Schizophrenia and some forms of cancer.</b>	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

**PART IV: DEMOGRAPHICS** Please provide the requested information and circle the best answer

**39. What is your gender? (Circle one)**

- a. Male      b. Female      c. Transgender/Gender-Nonconforming

**40. In what year were you born? \_\_\_\_\_**

**41. Which racial or ethnic group do you most identify with (Circle the best answer)**

- a. African/African American      b. Asian/Asian American      c. Native Hawaiian or Pacific Islander  
 d. American Indian or Alaskan Native      e. European/Caucasian      f. Other \_\_\_\_\_

**42. What is your ethnicity?**

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**a. Hispanic or Latino    OR    b. Not Hispanic or Latino**

**43. With what sexual orientation do you most identify?**

**a. Gay/Lesbian    b. Bisexual    c. Heterosexual**

**44. Do you have children?**

**a. Yes    or    b. No**

**45. What is your current relationship status?**

**a. Single    b. In a committed relationship    c. Married    d. Other**

**46. How many children do you have? \_\_\_\_\_**

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## APPENDIX I

### Appendix Tables

#### *Means, Standard Deviations, and Range of Values for Intentions Items*

Items	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
Intentions 1	536	0.00	2.00	1.12	0.33
Intentions 2	536	0.00	7.00	2.64	0.94
Intentions 3	536	0.00	40.00	26.90	3.63
Intentions 4	536	0.00	50.00	31.31	4.73
Intentions 5	536	0.00	24.00	3.85	2.98

#### *Means, Standard Deviations, and Range of Values for Beliefs Items*

	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
Beliefs 6	536	2.00	35.00	25.34	3.03
Beliefs 7	536	3.00	40.00	26.16	3.28
Beliefs 8	536	16.00	60.00	38.59	5.57
Beliefs 9	536	0.00	80.00	41.40	7.09
Beliefs 10	536	0.00	70.00	38.72	8.46
Beliefs 11	536	0.00	99.00	40.79	9.83
Beliefs 12	536	1.00	5.00	1.94	1.08
Beliefs 13	536	1.00	5.00	3.29	1.21
Beliefs 14	536	0.00	5.00	2.52	1.16
Beliefs 15	536	0.00	5.00	4.48	0.87
Beliefs 16	536	0.00	5.00	4.29	1.06
Beliefs 17	536	0.00	5.00	4.20	1.14
Beliefs 18	536	0.00	5.00	4.25	0.99
Beliefs 19	536	0.00	5.00	4.08	1.40
Beliefs 20	536	0.00	5.00	2.84	1.26

#### *Means, Standard Deviations, and Range of Values for Knowledge Items*

	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
Knowledge 21	536	0.00	5.00	3.29	0.94
Knowledge 22	536	0.00	5.00	2.86	1.00
Knowledge 23	536	0.00	5.00	3.55	0.88
Knowledge 24	536	1.00	5.00	3.23	0.89
Knowledge 25	536	1.00	5.00	2.93	1.07
Knowledge 26	536	2.00	5.00	3.54	0.73
Knowledge 27	536	1.00	5.00	2.85	0.75

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Knowledge 28	536	1.00	5.00	3.79	0.84
Knowledge 29	536	1.00	5.00	3.89	0.83
Knowledge 30	536	1.00	5.00	3.36	0.78
Knowledge 31	536	1.00	5.00	3.76	0.88
Knowledge 32	536	1.00	5.00	3.22	1.03
Knowledge 33	536	1.00	5.00	2.99	0.86
Knowledge 34	536	1.00	5.00	3.21	0.81
Knowledge 35	536	1.00	5.00	3.18	1.00
Knowledge 36	536	1.00	5.00	3.14	0.92
Knowledge 37	536	1.00	5.00	3.78	0.84
Knowledge 38	536	1.00	5.00	3.29	0.89

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## APPENDIX J

### VITA

#### AKILAH MORRIS SMITH

1743 Independence Ave, Urbana, IL 61802 | [akilahmorris@yahoo.com](mailto:akilahmorris@yahoo.com)

#### EDUCATION

- Southern Illinois University, Carbondale, IL May 2018  
**Doctoral Candidate, Health Education**  
Dissertation: Fertility Awareness among College Students
- Illinois State University-Normal, IL 2008  
**Masters of Science, College Student Personnel Administration**  
Capstone: Completed a project at the Career Center
- Illinois State University-Normal, IL 2006  
**Bachelors of Science, Health Education**  
Community Health

#### PUBLICATIONS

- “THE STUDENT MONOGRAPH: 26 YEARS AT A GLANCE”** 2011  
STUDENT MONOGRAPH JOURNAL  
A content analysis that included information on Health Education leadership styles.

#### PRESENTATIONS

- “SINGLE MOTHERS COPING WITH COLLEGE”** 2012  
TOWN HALL MEETING CARBONDALE, IL  
Presented research on single mothers and their undergraduate experiences.
- “US VS INTERNATIONAL STUDENTS DIETS”** 2012  
TOWN HALL MEETING CARBONDALE, IL  
Presented research findings, comparing diets and dieting behaviors of US and International students.
- “LEADERSHIP IN HEALTH EDUCATION ROUNDTABLE”** 2010  
Presented at the AMERICAN SCHOOL HEALTH ASSOCIATION conference  
A roundtable presentation conducted by four students and a professor on Health Education leadership.
- “GLOBAL HEALTH THAILAND”** 2010  
SOUTHERN ILLINOIS UNIVERSITY CARBONDALE-MORRIS LIBRARY CARBONDALE, IL  
Presented information about Thailand and the countries health disparities
- “STUDENTS INVOLVED IN ATHLETICS”** 2007  
ILLINOIS STATE UNIVERSITY COLLEGE STUDENT PERSONNEL  
Presented to the College Student Personnel board of advisors on a project involving student and athletics.

**MAJOR DISSERTATION PROFESSORS:** Roberta Ogletree & Juliane Wallace

**APPENDIX: K**

Permission to modify and use survey  
Human Subjects approval from the Universities

**Subject:** Re: Please can I have a copy of the instrument  
**From:** Daniluk, Judith (judith.daniluk@ubc.ca)  
**To:** akilahmorris@yahoo.com;  
**Date:** Friday, October 16, 2015 9:30 AM

Sorry, but I do not have that information readily available and with my current work commitments I don't have time to access this information...

Judith

Sent from my iPad

On Oct 15, 2015, at 10:53 PM, Akilah Morris <akilahmorris@yahoo.com> wrote:

Good morning Professor Daniluk,

This is Akilah M Smith again. I wanted to ask if you have specifics on the data analysis, reliability figures (Cronbach Alpha) and validity information. This would help me report the reliability information properly.

Akilah M Smith

On Monday, September 14, 2015 7:40 PM, Akilah Morris <akilahmorris@yahoo.com> wrote:

Yay thank you Dr. Daniluk!

On Monday, September 14, 2015 11:58 AM, "Daniluk, Judith" <judith.daniluk@ubc.ca> wrote:

Hello Akilah,

You can access the survey at this link: [http://www.veritagroup.com/FAS/Survey\\_English.aspx](http://www.veritagroup.com/FAS/Survey_English.aspx). Please be sure to acknowledge the source should you elect to use all or part of the survey in your study. Best of luck with your research.

Cheers,  
Judith

On Sep 13, 2015, at 11:38 AM, Akilah Morris <akilahmorris@yahoo.com> wrote:

Good afternoon Dr. Daniluk,

My name is Akilah Morris and I am a doctoral student at Southern Illinois University located in Carbondale, IL.

I have a strong interest in fertility awareness and wanted to know if I can get permission and possibly get a copy and of your instrument that was used in the article: **The other side of the fertility coin: a comparison of childless men's and women's knowledge of fertility and assisted reproductive technology.** This article is found Fertil Steril. 2013 Mar 1;99(3):839-46. doi: 10.1016/j.fertnstert.2012.10.033. Epub 2012 Nov 10.

I am asking for the instrument because I would like to know how certain questions were coded.

Dr. Daniluk, I am in my 7th year in this program and my professor feels that your instrument is the best instrument for the dissertation study because it captivates male and female knowledge.

I would appreciate any help!!!

Thank you  
Akilah Morris  
309-750-2057

**Subject:** Re: Survey modification  
**From:** Roberta J Ogletree (bobbie@siu.edu)  
**To:** akilahmorris@yahoo.com;  
**Date:** Wednesday, April 6, 2016 2:50 PM

Akilah,

Excellent! She's giving permission to go either way. Take a close look at the men's survey and see if you think we can use it and whether we need to make the same modifications to the demographics that we made on the other one.

I'm impressed with how quickly she responded to you!

Dr. O

Roberta J. Ogletree, HSD, MCHES, FASHA  
Professor Emerita - Health Education  
Southern Illinois University  
Carbondale, IL. 62901

On Apr 6, 2016, at 2:44 PM, Akilah Morris <akilahmorris@yahoo.com> wrote:

On Wednesday, April 6, 2016 9:55 AM, "Daniluk, Judith" <judith.daniluk@ubc.ca> wrote:

Hi Akilah,

The version that we used when surveying men (FAS-M) can be found at this link:  
[http://www.veritagroup.com/FAS/Survey\\_English\\_M1.aspx](http://www.veritagroup.com/FAS/Survey_English_M1.aspx)  
You'll see the language of the questions in the two surveys is somewhat different based on the gender of the respondents. If you intend to use the same survey for women and men, you'll need to pay attention to, and likely adapt, the questions so that they apply to both women and men.

Cheers,  
Judith

On Apr 6, 2016, at 6:09 AM, Akilah Morris <akilahmorris@yahoo.com> wrote:

Good morning Dr. Daniluk,

My name is Akilah Morris and I am very appreciative of the link you sent me....

[http://www.veritagroup.com/FAS/Survey\\_English.aspx](http://www.veritagroup.com/FAS/Survey_English.aspx)

I am planning on presenting the study to my committee members. However the link that you sent does not have the following four male added questions which will help my research (comparing male and female persons FAS):

17. The upper age limit for a man to be treated at most Canadian fertility clinics is 55 y of age.
18. There is a significant decline in the quality of a man's sperm before the age of 50 y.
19. Smoking cigarettes of marijuana can reduce the quality of a man's sperm.
20. Children born to fathers >45 y have higher rates of learning disabilities, autism, schizophrenia, and some forms of cancer.

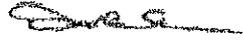
I will like to get permission from you to modify the survey which will include me adding those four male questions to the FAS survey. This will allow both men and women to take the survey.

As always I will credit you and Ms. Koert in my research.

Thank you  
Akilah Morris

HSC Approval letter (exempt)

To: Akilah Morris

From: Wayne R. Glass, CRA   
Interim Chair, Human Subjects Committee

Date: July 29, 2016

Subject: *Fertility Awareness among Illinois University Students*

Protocol Number: 16241

The revisions to the above referenced study have been approved by the SIUC Human Subjects Committee. The study is determined to be exempt according to 45 CFR 46.101(b)2. This approval does not have an expiration date; however, any future modifications to your protocol must be submitted to the Committee for review and approval prior to their implementation.

Your Form A approval is enclosed.

This institution has an Assurance on file with the USDHHS Office of Human Research Protection. The Assurance number is FWA00005334.

WG:kr

cc: Wendi Middleton

SIUC HSC FORM A

REQUEST FOR APPROVAL TO CONDUCT RESEARCH ACTIVITIES  
INVOLVING HUMAN SUBJECTS

Project Title

Fertility Awareness among Illinois University Students

CERTIFICATION STATEMENT

By making this application, I certify that I have read and understand the University's policies and procedures governing research activities involving human subjects. I agree to comply with the letter and spirit of those policies. I acknowledge my obligation to:

1. Accept responsibility for the research described, including work by students under my direction.
2. Obtain written approval from the Human Subjects Committee of any changes from the originally approved protocol **BEFORE** implementing those changes.
3. Retain signed consent forms in a secure location separate from the data for at least **three** years after the completion of the research.
4. Immediately report any adverse effects of the study on the subjects to the Chairperson of the Human Subjects Committee, SIUC, Carbondale, Illinois - 618-453-4533 and to the Director of the Office of Sponsored Projects Administration, SIUC. Phone 618-453-4540. E-mail: [siuhsc@siu.edu](mailto:siuhsc@siu.edu)

Akilah Morris

Researcher(s) or Project Director(s)

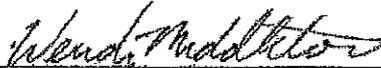
07/26/16

Date

Please print or type name below signature.

RESEARCH ADVISOR/PROJECT DIRECTOR'S ASSURANCE: My signature on this application certifies that the student is knowledgeable about the regulations and policies governing research with human subjects and that I have thoroughly reviewed the student's protocol for compliance with university policy. I am aware of my obligations stated on Form A and will be available to supervise the research. When on sabbatical leave or vacation, I will arrange for an alternate faculty sponsor to assume responsibility during my absence. I will advise the Human Subjects Committee by letter of such arrangements.

Dr. Wendi Middleton



7-26-16

Researcher's Advisor or Faculty Sponsor (required for all student projects) 07/26/16

Date

Please print or type name below signature.

The request submitted by the above-named researcher(s) was approved by the SIUC Human Subjects Committee.

This approval is valid for one year from the review date for non-exempt research. Unless the protocol is approved as exempt, researchers must request an extension to continue the research after that date. This approval form must be included in all Master's theses/research papers and Doctoral dissertations involving human subjects that are submitted to the Graduate School.



7-28-16

Interim Chairperson, Southern Illinois University Human Subjects Committee

Date



WESTERN  
ILLINOIS  
UNIVERSITY

March 28, 2017

Akilah Morris  
Southern Illinois University Carbondale

Dear Akilah Morris:

The Institutional Review Board (IRB) at Western Illinois University (WIU) has reviewed your request to conduct research and recruit participants from our campus in order to complete your dissertation at **Southern Illinois University Carbondale**. Your research project is entitled *Fertility Awareness among Illinois University Students*, which has approval from SIUC IRB# 16241.

Per the OHRP *Guidance on Engagement of Institutions in Human Subject Research*, October 2008, WIU is not engaged in research. The WIU IRB understands that WIU will be used only as a recruitment site and there will not be any agents of WIU obtaining the informed consent of participants or the collection of data. No one associated with WIU will have access to individual responses, all data will be confidential and securely stored, and participation in the study will be voluntary.

WIU is pleased to support your research project. Your request to use WIU as a recruitment site is granted, however, the Department Chair and Health Faculty are free to decide whether they want to share your study with their students. We look forward to working with you.

Sincerely,

A handwritten signature in cursive script that reads "Rebecca Van Tine".

Rebecca Van Tine, M.S.  
Institutional Review Board // Compliance Specialist

Research and Sponsored Programs

600 Lincoln Avenue  
Charleston, Illinois 61920-3099

Office: (217) 581-2125  
Fax: (217) 581-7181  
<http://www.eiu.edu/grants>

Institutional Review Board



March 28, 2017

Akilah Morris  
Health Education and Recreation  
Southern Illinois University Carbondale

Dear Ms. Morris:

I have reviewed your request to recruit participants and perform data collection at Eastern Illinois University for your study titled, "Knowledge, Intentions, and Beliefs about Fertility and Assisted Reproductive Technology among Midwestern US College Students".  
You may proceed with your study at EIU.

Sincerely,

A handwritten signature in black ink, appearing to read "JB", written over a large, stylized loop.

John Bickford, PhD  
Chair, EIU Institutional Review Board

SOUTHERN ILLINOIS UNIVERSITY  
**EDWARDSVILLE**

GRADUATE SCHOOL/OFFICE OF RESEARCH AND PROJECTS

Office of Research & Projects  
Campus Box 1046,  
Phone: 618-650-2958  
Fax: 618-650-3523  
e-mail: [lskelto@siue.edu](mailto:lskelto@siue.edu)

SIUE Institutional  
Review Board  
Assurance No: FWA 00001703

July 7, 2016

Akilah Morris  
Education (Health Education)  
SIU Carbondale

Dear Akilah:

This letter of support is to inform you that you may ask SIUE instructors to distribute a survey for your research project involving the use of human subjects once you have completed the required IRB training for human subject research and have received approval from your IRB. It is the decision of each instructor to determine if and when they will distribute your survey. The SIUE IRB recommends that you contact the instructor(s) as soon as possible once you have received approval from your IRB.

Sincerely,



Linda L. Skelton  
Research Administrator/Ethical Compliance Coordinator

SIUC HSC FORM A

REQUEST FOR APPROVAL TO CONDUCT RESEARCH ACTIVITIES  
INVOLVING HUMAN SUBJECTS

Project Title  
Fertility Awareness among Illinois University Students

CERTIFICATION STATEMENT

By making this application, I certify that I have read and understand the University's policies and procedures governing research activities involving human subjects. I agree to comply with the letter and spirit of those policies. I accept my obligation to:

1. Accept responsibility for the research described, including work by students under my direction.
2. Obtain written approval from the Human Subjects Committee of any changes from the originally approved protocol **BEFORE** implementing those changes.
3. Retain signed consent forms in a secure location separate from the data for at least three years after the completion of research.
4. Immediately report any adverse effects of the study on the subjects to the Chairperson of the Human Subjects Committee, SIUC, Carbondale, Illinois - 618-453-4533 and to the Director of the Office of Sponsored Projects Administration, SIUC, Carbondale, Illinois - Phone 618-453-4540. E-mail: [siuhsc@siu.edu](mailto:siuhsc@siu.edu)

Akilah Morris

Researcher(s) or Project Director(s) 07/26/16 Date  
Please print or type name below signature.

RESEARCH ADVISOR/PROJECT DIRECTOR'S ASSURANCE: My signature on this application certifies that the student is knowledgeable about the regulations and policies governing research with human subjects and that I have thoroughly reviewed the student's protocol for compliance with university policy. I am aware of my obligations stated on Form A and will be available to supervise the research. When on sabbatical leave or vacation, I will arrange for an alternate faculty sponsor to assume responsibility during my absence. I will advise the Human Subjects Committee by letter of such arrangements.

Dr. Wendi Middleton Wendi Middleton 7-26-16  
Researcher's Advisor or Faculty Sponsor (required for all student projects) 07/26/16 Date  
Please print or type name below signature.

The request submitted by the above-named researcher(s) was approved by the SIUC Human Subjects Committee.

This approval is valid for one year from the review date for non-exempt research. Unless the protocol is approved, researchers must request an extension to continue the research after that date. This approval form must be included in Master's theses/research papers and Doctoral dissertations involving human subjects that are submitted to the Graduate School.

Wendi Middleton 7-28-16

SIUC HSC FORM A

REQUEST FOR APPROVAL TO CONDUCT RESEARCH ACTIVITIES  
INVOLVING HUMAN SUBJECTS

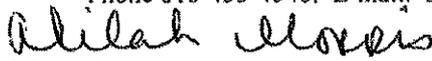
Project Title

Knowledge, Intentions, and Beliefs about Fertility and Assisted Reproductive Technology  
Midwestern US College Students

CERTIFICATION STATEMENT

By making this application, I certify that I have read and understand the University's policies and procedure research activities involving human subjects. I agree to comply with the letter and spirit of those policies. I my obligation to:

1. Accept responsibility for the research described, including work by students under my direction.
2. Obtain written approval from the Human Subjects Committee of any changes from the originally approved protocol **BEFORE** implementing those changes.
3. Retain signed consent forms in a secure location separate from the data for at least **three** years after the completion of the research.
4. Immediately report any adverse effects of the study on the subjects to the Chairperson of the Human Subjects Committee, SIUC, Carbondale, Illinois - 618-453-4533 and to the Director of the Office of Sponsored Projects Administration, SIUC, Carbondale, Illinois - Phone 618-453-4540. E-mail: [siuhsc@siu.edu](mailto:siuhsc@siu.edu)

  
Akilah Morris

Researcher(s) or Project Director(s)

2/28/2017

Date

Please print or type name below signature.

RESEARCH ADVISOR/PROJECT DIRECTOR'S ASSURANCE: My signature on this application certifies that the sponsor is knowledgeable about the regulations and policies governing research with human subjects and that I have thoroughly reviewed the student's protocol for compliance with university policy. I am aware of my obligations stated on Form A and will be responsible to supervise the research. When on sabbatical leave or vacation, I will arrange for an alternate faculty sponsor to assume my duties during my absence. I will advise the Human Subjects Committee by letter of such arrangements.

Dr. Juliana<sup>E</sup> Poock Wallace



Researcher's Advisor or Faculty Sponsor (required for all student projects) 2/28/2017

Date

Please print or type name below signature.

The request submitted by the above-named researcher(s) was approved by the SIUC Human Subjects Committee.

This approval is valid for one year from the review date for non-exempt research. Unless the protocol is approved for extension, researchers must request an extension to continue the research after that date. This approval form must be included in the Master's theses/research papers and Doctoral dissertations involving human subjects that are submitted to the School.

HSC Approval letter (exempt)

To: Akilah Morris

From: Wayne R. Glass, CRA   
Interim Chair, Human Subjects Committee

Date: July 29, 2016

Subject: *Fertility Awareness among Illinois University Students*

Protocol Number: 16241

The revisions to the above referenced study have been approved by the SIUC Human Subjects Committee. The study is determined to be exempt according to 45 CFR 46.101(b)2. This approval does not have an expiration date; however, any future modifications to your protocol must be submitted to the Committee for review and approval prior to their implementation.

Your Form A approval is enclosed.

This institution has an Assurance on file with the USDHHS Office of Human Research Protections. The Assurance number is FWA00005334.

WG:kr

cc: Wendi Middleton

HSC modification approval letter (exempt)

To: Akilah Morris

From: Wayne R. Glass, CRA  
Interim Chair, Human Subjects Committee

Date: March 6, 2017

Subject: *Knowledge, Intentions, and Beliefs about Fertility and Assisted Reproductive Technology among Midwestern US College Students*

Protocol Number: 16241

The SIUC Human Subjects Committee has approved the modification request to the above referenced project submitted on 3/2/2017 and you may proceed.

NOTE: Your study is determined to be exempt according to 45 CFR 46.101(b)2. Your project does not have an expiration date; however, any future modifications to your protocol must be submitted to the Committee for review and approval prior to their implementation.

Thank you for helping us keep your file up-to-date.

WG:kr

cc: Juliane Wallace

**Subject:** RE: ISU HSC approval  
**From:** Spence, Kathy (sspenc2@ilstu.edu)  
**To:** akilahmorris@yahoo.com;  
**Cc:** researchoffice@ilstu.edu; rec@illinoisstate.edu;  
**Date:** Wednesday, July 6, 2016 4:29 PM

Hello Akilah,

The Illinois State IRB requires an informal review of the project before we issue what we call a “courtesy approval.” Please forward a copy of the SIU IRB protocol. If we are satisfied with it, we will send you a letter with a copy to the ISU Department of Health Sciences to let them know that the IRB has no issues with the project. It is up to the department to decide whether to give you access to the students.

Please let me know if you have any questions.

Thanks,

Kathy Spence

S. Kathleen Spence, Esq.

Director, Research Ethics and Compliance

Illinois State University

Campus Box 3330

Hovey Hall 307

Normal, IL 61790

309-438-2520

Email: [rec@ilstu.edu](mailto:rec@ilstu.edu)

Website: <http://research.illinoisstate.edu/ethics/>

**From:** Akilah Morris [mailto:akilahmorris@yahoo.com]  
**Sent:** Wednesday, July 06, 2016 11:33 AM  
**To:** Research Office; Research Ethics and Compliance  
**Subject:** ISU HSC approval

Good morning,

My name is Akilah Morris and I am a graduate student at Southern Illinois University Carbondale. I am currently seeking Human subjects approval from my university.

The primary purpose of my study is to identify male and female college students' awareness of fertility, and their beliefs and intentions toward Assisted Reproductive Technology procedures. The secondary purpose of this study is to determine if participants' knowledge, beliefs and intentions about fertility awareness and ART differ based on race, sexual orientation, gender and age.

I am only asking instructors in the foundational health education courses to help me administer the survey. The HSC at my university would like me to ask the following: Is it okay for me to ask your instructors to administer the survey during their class time? What, if any, obligations does your university may have to conduct research using the resources (faculty, classroom, and class time)? My research is likely to be categorized as exempt under 45 CFR 46.101(b)(2).

Here is the requested information by the HSC at SIUC pasted below for further clarification:

"2. Since you are asking instructors at other universities to administer your survey during class time, their respective IRBs may determine their institution to be engaged in the research and require independent review and approval of your research or an authorization agreement with our HSC. The SIU HSC encourages you to contact the IRB at each respective institution to inquire what, if any, obligations you may have to conduct research using their resources (faculty, classrooms, class time). Please be sure to mention to them that the research is likely to be categorized as exempt under 45 CFR 46.101(b)(2)." SIU HSC chair

Attached first is email solicitation to the chair of the health education/science department asking for participation from instructors in his department. The second letter is to the teacher asking for their participation in the study, the third letter is a consent letter asking for student's participation.

**Subject:** Re: ISU HSC approval  
**From:** Akilah Morris (akilahmorris@yahoo.com)  
**To:** sspenc2@ilstu.edu;  
**Cc:** researchoffice@ilstu.edu; rec@illinoisstate.edu;  
**Date:** Friday, March 24, 2017 12:22 PM

Ms Spence,

I was just checking to see if you received my email about conducting research at your institution specifically in the Health education department.

On Sunday, March 19, 2017 11:42 AM, Akilah Morris <akilahmorris@yahoo.com> wrote:

Good morning Ms. Spence,

My name is Akilah Morris and I emailed you last July asking if I could conduct my Fertility awareness study at ISU. I did receive approval please see attached documents. Is there anything else you would like me to do?

On Wednesday, July 6, 2016 4:29 PM, "Spence, Kathy" <sspenc2@ilstu.edu> wrote:

Hello Akilah,

The Illinois State IRB requires an informal review of the project before we issue what we call a "courtesy approval." Please forward a copy of the SIU IRB protocol. If we are satisfied with it, we will send you a letter with a copy to the ISU Department of Health Sciences to let them know that the IRB has no issues with the project. It is up to the department to decide whether to give you access to the students.

Please let me know if you have any questions.

Thanks,

Kathy Spence  
S. Kathleen Spence, Esq.  
Director, Research Ethics and Compliance  
Illinois State University  
Campus Box 3330  
Hovey Hall 307  
Normal, IL 61790  
309-438-2520  
Email: [rec@ilstu.edu](mailto:rec@ilstu.edu)

Website: <http://research.illinoisstate.edu/ethics/>

**From:** Akilah Morris [mailto:akilahmorris@yahoo.com]  
**Sent:** Wednesday, July 06, 2016 11:33 AM  
**To:** Research Office; Research Ethics and Compliance  
**Subject:** ISU HSC approval

Good morning,

My name is Akilah Morris and I am a graduate student at Southern Illinois University Carbondale. I am currently seeking Human subjects approval from my university.

The primary purpose of my study is to identify male and female college students' awareness of fertility, and their beliefs and intentions toward Assisted Reproductive Technology procedures. The secondary purpose of this study is to determine if participants' knowledge, beliefs and intentions about fertility awareness and ART differ based on race, sexual orientation, gender and age.

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Here is the requested information by the HSC at SIUC pasted below for further clarification:

"2. Since you are asking instructors at other universities to administer your survey during class time, their respective IRBs may determine their institution to be engaged in the research and require independent review and approval of your research or an authorization agreement with our HSC. The SIU HSC encourages you to contact the IRB at each respective institution to inquire what, if any, obligations you may have to conduct research using their resources (faculty, classrooms, class time). Please be sure to mention to them that the research is likely to be categorized as exempt under 45 CFR 46.101(b)(2)." SIU HSC chair

Attached first is email solicitation to the chair of the health education/science department asking for participation from instructors in his department. The second letter is to the teacher asking for their participation in the study, the third letter is a consent letter asking for student's participation.

On Tuesday, March 21, 2017 1:54 PM, Jeanette Gommel <jgommel@niu.edu> wrote:

Akilah, since this project was determined to be exempt, you do not need to do anything further to conduct this research here at NIU. Thank you for your diligence in checking with us.

**From:** Akilah Morris [mailto:akilahmorris@yahoo.com]  
**Sent:** Friday, March 17, 2017 3:03 PM  
**To:** Akilah Morris <akilahmorris@yahoo.com>; Jeanette Gommel <jgommel@niu.edu>  
**Subject:** Re: HSC approval

Sorry it took so long Mrs. Gommel I was sick.

On Wednesday, March 15, 2017 10:54 AM, Akilah Morris <akilahmorris@yahoo.com> wrote:

Yes Mrs. Gommel, I have to go to the library and get it scan and I will send it to you.

THANK YOU so much

Akilah

On Wednesday, March 15, 2017 10:32 AM, Jeanette Gommel <jgommel@niu.edu> wrote:

I do need to see a copy of the IRB approval letter from your institution. Can you send me a scanned copy, please?

**From:** Akilah Morris [mailto:akilahmorris@yahoo.com]  
**Sent:** Wednesday, March 15, 2017 5:50 AM

**To:** Jeanette Gommel <[jgommel@niu.edu](mailto:jgommel@niu.edu)>  
**Subject:** Re: HSC approval

Mrs. Gommel,

My name is Akilah Morris and I emailed you last year July to inquire about human subjects approval at your institution. I believe you need an approval letter from my institution which I have and the completed IRB application package from my university (SIUC).

I have to scan the approval letter as a PDF so that you can see it. Attached is the complete IRB application package.

Do I need to do anything else?

On Monday, July 11, 2016 9:23 AM, Jeanette Gommel <[jgommel@niu.edu](mailto:jgommel@niu.edu)> wrote:

From the information you have provided, I can't tell whether we would consider the project exempt or not. It would be exempt if there were no way to link the survey responses to the identity of the person who completed the survey, either through names, email addresses, or any other combination of demographic information. Once your IRB has approved the project, you will need to send me a copy of the approval letter and the complete IRB application package for your institution. Then we can decide how to proceed from there.

Just a question: Have you considered giving your survey online (via a platform like Survey Monkey or Qualtrix) rather than as a paper survey? If you only have the instructors of NIU classes give the recruitment information for your survey to our students and then provide them with a link to the online survey, then our instructors would not be considered to be engaged in research. We have a platform called Blackboard that instructors could use to provide the recruitment information and the survey link to their students if you chose to do it online. This is just food for thought for you; you might want to discuss it with your advisor.

**From:** Akilah Morris [<mailto:akilahmorris@yahoo.com>]  
**Sent:** Wednesday, July 06, 2016 11:36 AM  
**To:** Jeanette Gommel <[jgommel@niu.edu](mailto:jgommel@niu.edu)>  
**Subject:** HSC approval

Good morning,

My name is Akilah Morris and I am a graduate student at Southern Illinois University Carbondale. I am currently seeking Human subjects approval from my university.

The primary purpose of my study is to identify male and female college students' awareness of fertility, and their beliefs and intentions toward Assisted Reproductive Technology procedures. The secondary purpose of this study is to determine if participants' knowledge, beliefs and intentions about fertility awareness and ART differ based on race, sexual orientation, gender and age.

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Attached first is email solicitation to the chair of the health education/science department asking for participation from instructors in his department. The second letter is to the teacher asking for their participation in the study, the third letter is a consent letter asking for student's participation.