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Evaluating Levels of Depression, Anxiety and Stress in Women Undergoing IVF Treatments

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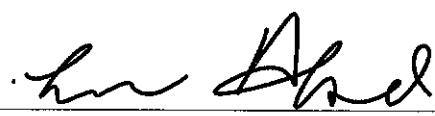
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Abstract

Purpose: The purpose of this study was to determine and evaluate the prevalence of depression, anxiety, and stress in women undergoing infertility treatment at a fertility clinic. To evaluate for a potential relationship between the intervention (in vitro fertilization (IVF) treatment) and its effects on the prevalence of depression, anxiety, and stress. The goal is to increase provider awareness of changes in depression, anxiety, and stress levels that occur throughout treatment cycles.

Design: Sixteen women receiving medical treatment for infertility participated in the study from the Fertility and Endocrine Associates in Louisville, KY. The project was a quasi-experimental study with the purpose of comparing depression, anxiety, and stress screening scores of women pre- and post-IVF treatment while using the Depression, Anxiety and Stress Scale 21 (DASS-21) tool to measure the data collected.

Results: Depression, anxiety, and stress symptoms were found in women undergoing IVF. Women showed a higher level of anxiety and stress at the beginning of IVF treatment in comparison to after treatment. Levels of depression were higher after treatment when compared to before treatment levels.

Conclusion: Infertility providers need to be aware that their patients undergoing fertility treatments often experience increased levels of depression, anxiety, and stress compared to patients not seeking fertility treatments. It is essential and recommended that those who offer infertility services, screen and monitor for physical, mental and environmental health changes, while providing coping tools and resources so their patients are able to mitigate and manage their levels of depression, anxiety, and stress alongside the support of their providers.

Evaluating Levels of Depression, Anxiety and Stress in Women Undergoing IVF Treatments

Infertility is a common diagnosis that is rarely discussed outside of the populations of men, women, and couples that are directly affected. In a world where many life events are lived out online, seeing pictures of pregnant people or hearing of another pregnancy announcement on social media can be emotionally triggering for those experiencing infertility. What is not noticed, is the fact that seeking pregnancy is not always joyous and happy. For many, it can cause tremendous emotional and physical stress. As a society, we fail to recognize the darker side of fertility. We fail to notice families hidden in the darkness of miscarriages, still births, sub fertility, secondary infertility, sterility, and lastly, primary infertility.

Infertility is defined as the inability to achieve a pregnancy within 12 months of regular and unprotected sex in individuals under 35 and six months for those older than 35 (Borght & Wyns, 2018). It is a unique condition that most commonly affects couples rather than individuals. Approximately 1.5 million women in the United States are directly affected by infertility with causes stemming from age, uterine anomalies, tubal issues, genetic conditions, lifestyle choices, acute or chronic illnesses, and infectious diseases (Cunningham, 2017). With a rate of roughly one in eight couples being affected, including 6% of marriages, infertility is not simply a diagnosis that affects women, but also men (Cunningham, 2017). According to the World Health Organization (WHO), "between 48 million couples and 186 million individuals live with infertility globally" (World Health Organization, 2020).

Infertility affects multiple aspects of the individual or couples' life. It is emotionally, financially, mentally and physically exhausting. Increased levels of stress can be detrimental to anyone's health. For those individuals not experiencing underlying illnesses, being in a stressful

environment can trigger headaches, heartburn, increased heart and respiration rate, difficulty with sleep, weakened immune system, increased blood sugar, and create more tension in the muscles (Pietrangelo, 2020). For someone trying to conceive, this additional type of stress can result in potential added risks for a future pregnancy. While stress can create fluctuations in hormones for all individuals, making natural pregnancy difficult, the "precise influence to stress on fetal development and pregnancy duration is poorly understood, although theories have linked chronic stress to poor health outcomes including preterm birth" (King et al., 2019). Stress can increase blood pressure, putting the future pregnant person at risk for chronic hypertension or preeclampsia during pregnancy. Additionally, the stressors of infertility treatment go beyond affecting health. The stressors can directly affect relationships with partners, family, friends and work, where navigating and juggling an in-vitro fertilization (IVF) schedule can be challenging. The prevalence of depression, anxiety and stress in women undergoing infertility treatment is not uncommon, but goes widely underreported. Existing literature acknowledges the pervasiveness of these adverse mental health outcomes, but responsibilities lies with providers to proactively address and encourage patients to openly discuss their feelings.

The purpose of this project is to determine and evaluate the prevalence of depression, anxiety and stress in women undergoing infertility treatment at a fertility clinic, and whether or not depression, anxiety and stress levels increase or decrease during IVF treatment. The goal is to increase provider awareness of changes in depression, anxiety and stress levels that occur throughout treatment cycles.

Background and Literature Review

The history of infertility goes back several years into the ancient era, the common era, the medieval period and the Middle Ages. During these times, the worth of a woman and the success of her marriage weighed heavily on her pre-marriage purity and her ability to bear a child. To avoid being childless, it was not uncommon for men during these times to take a second wife if his first wife could not bear a child. Divorce was also an option. A woman's infertility was a major contributing factor for divorce and why polygamy became commonplace (Sharma et al., 2018).

The development of techniques for the treatment of infertility can be traced back to 1677, when scientist Antonie Philips van Leeuwenhoek first discovered sperm through the use of a microscope (Sharma et al., 2018). Over the years, infertility treatment techniques emerged such as the development of cryopreservation of both sperm and oocyte, artificial insemination and IVF, and the birth of the first "test tube baby."

The first IVF baby was born the morning of July 25, 1978, marking a historic moment for Great Britain that would forever change our worlds' view on IVF. Approximately a decade later, the British Government set up the Human Fertilization and Embryology Authority (HFEA) in 1990. This authoritative group was the first of its kind in the world, with the sole purpose of monitoring and inspecting fertility clinics, and providing impartial information regarding fertility treatments, including location of clinics and sperm/egg/embryo donation (Diaz-Garcia, 2020). This evolving technology also allowed new parents and researchers the opportunity to determine sex and to screen for certain inheritable conditions (Diaz-Garcia, 2020). Since then, many individuals and couples battling infertility have been helped, and hundreds of thousands of babies have been born through IVF.

IVF treatments, while successful for many, are not successful for all. Over the past three decades, there has been an increase in the use of IVF. A contributing factor for the increased is the drastic change in the social culture for women over the last few decades. Women are working in more professional jobs, pursuing higher education, and creating more opportunities for themselves, thus delaying starting a family which has led to an increase in infertility rates (Loughran, 2018). The impact of undergoing IVF has a direct effect on ones' health and quality of life. Despite IVF being a common form of infertility treatment or fertility preservation, it is still a topic that is placed in the shadows of discussion away from the public eye.

Prevalence of Mental Health Stressors

Several studies show that infertility results in a specific cause of physiological and mental disruption in infertile couples, affecting all involved in the fertility process (Mousavi et al., 2013; Chiaffarino et al., 2010). Unlike other medical diagnoses and treatment, infertility treatments are for many, long-term and riddled with unknown answers and uncertain results. As a result of this psychological burden, many patients undergoing infertility treatments frequently have symptoms of both anxiety and depression that occur before, during and after a treatment cycle (Gdańska et al., 2017).

Compared to men, women generally experience the highest levels of both anxiety and depression directly related to lack of control, feelings of helplessness, duration of infertility and treatment, treatment failures, and invasive procedures (Gdańska et al., 2017; Chiaffarino et al., 2010). Men also experienced both anxiety and depression but at a slightly lower rate. In a longitudinal observational study of 1000 couples in an Italian infertility department, 4.5% of men had symptoms of anxiety and 6.9% had depression symptoms with women experiencing 14.7% and 17.9% respectively for anxiety and depression (Chiaffarino et al., 2010). Patel, et al. (2018)

compared 81 infertile couples undergoing intrauterine insemination (IUI), for the presence of infertility distress. The data suggests that women report higher levels of depression, anxiety, stress and feelings of helplessness specific to infertility, while men were the opposite in all measured items, except feelings of acceptance. The levels of depression and anxiety for women was overall higher, and statistically significant ($p < 0.001$). Based on the data collected from anxiety and depression, women exhibited higher levels of anxiety and depression during an IUI treatment.

Prevalence of Social Stressors

Infertility has the power to inappropriately affect the quality of life in infertile couples. Infertility treatment(s) brings additional stressors to life, work, relationships, finances, sexuality and individual identity (Bakhtiyar et al., 2019; Boivin et al., 2020; Luk & Loke, 2018). All of these additional stressors can directly impact the individual's mental health and increase levels of depression and anxiety. These stressors do not necessarily affect each person in a relationship equally, but both are affected in some way.

Individuals within an infertile couple often experience psychological issues differently, especially in societies where there may be more pronounced gender roles or prejudices against women. In these situations, an infertile woman, may unknowingly react to day-to-day stressors with a higher level of frustration and anger which directly affects her relationships with her spouse, family and friends (Bakhtiyar et al., 2019). Women dealing with infertility are more likely to develop increased levels of mental distress, marital dissatisfaction, and infertility-related sexual stress (Bakhtiyar et al., 2019; Luk & Loke, 2018). Sexual satisfaction does affect both individuals, especially when the focus of sex is no longer about enjoyment, but a means for conception. When the goal of sex is for conception, it results in increased frustration and

pressure to have sex on a very rigid schedule, thus creating a loss of enjoyment (Luk & Loke, 2018). It is not uncommon for couples to continue with intimacy issues and loss of sexual satisfaction for years after infertility treatment, even if treatment is successful.

Infertile couples may also have the added perceived or real pressure from family and society to create a family. What many would consider enjoyable family gatherings for holidays and celebrations, couples dealing with infertility may find them filled with anxiety and sadness. The pressures and stress on how to respond to family members who inquire about family planning can be unbearable for many causing them to simply forego attending these types of functions. Situations can affect their self-esteem and social support as they navigate interactions and conversations surrounding family planning (Asazawa et al., 2019; Bakhtiyar et al., 2019).

Several factors have been evaluated when measuring the effects of infertility on couples including age, education, duration of marriage, environment, current physical and medical conditions, home ownership, work-life balance, employment status for both individuals and social support (Bakhtiyar et al., 2019; Boivin et al., 2020; Hassan et al., 2020). Older women who are seeking fertility treatment, generally have more established lives as seen by more years in careers, stronger social networks and relationships, financial stability, increased resiliency and emotional stability (Bakhtiyar et al., 2019; Boivin et al., 2020). There are conflicting studies on how older women versus younger women responded to social stressors while undergoing IVF. A 2016 study of 137 women (76 aged 20-34 and 61 aged 35-44) showed that younger women reported higher distress and rumination than their older peers, and for those who had higher hope, increased hope was directly related to having a greater well-being (Ben Shlomo et al., 2016). In contrast, some findings note that older women, while more educated and financially stable, faced other challenges that created stress such as advanced maternal age, health

comorbidities, juggling work schedules with IVF schedules and potential disruptions to marriage. Other research indicated that older women who were more educated, employed, owned a home and had a healthy marriage, demonstrated mental resiliency to the stresses of infertility (Bakhtiyar et al., 2019; Boivin et al., 2020).

Review of Management Strategies

Coping mechanisms for managing day-to-day stressors and emotional regulation is extremely individualized. However, adding the stressors of infertility, which is out of ones' control, may mean additional support is needed for those receiving fertility treatments. Depression, anxiety and stress relieving strategies have included: experiential avoidance, yoga, acceptance, autonomy, self-regulation, self-compassion, self-judgement, social support groups, spousal support groups, blogs, online infertility peer support groups and social media (Cunha et al., 2016; Darbandi et al., 2018; Galhardo et al., 2019; Li et al., 2019; Sormunen et al., 2020). Practices such as yoga, acceptance, autonomy, self-regulation, and self-compassion are similar in that they require individual awareness, understanding, self-care, patience, and slow controlled techniques of utilizing one's own personal space.

Having a feeling of autonomy and being able to self-regulate one's emotions and self-compassion are desirable; however, it is incredibly important to be able to connect with other couples or individuals going through IVF, or those who have already completed IVF. Getting first-hand information on what to expect with anticipatory guidance and strategies that others have used to help manage stress, may be more helpful than acceptance alone. An online infertility peer support group, comprised of men and women of diverse infertility backgrounds, proved to be successful during its trial run. These peer groups acted as an acceptable forum for infertility sufferers, facilitating a space of comfort to express their stressors and discomforts,

while receiving support from people with similar situations. Additionally, social media can allow similar access with a more widespread network of individuals from across the country to support those in need of encouragement (Grunberg et al., 2020; Sormunen et al., 2020). Experiential avoidance could cause the opposite effect, sometimes leading to the surfacing of unresolved emotions that escalate forcing the individual to address these feelings all at once.

Methods

Theoretical Framework

This project was guided by the Stetler model of evidence-based practice. This model helps practitioners assess how research findings and other relevant evidence can be applied to practice (Stetler, 2001). The model highlights the initial use of research to aid decision making that will result in an evidence-informed practice (Stetler, 2001). The model is based on five phases: preparation, validation, comparative evaluation/decision making, translation/application, and evaluation (Stetler, 2001). The use of the five phases is designed to: facilitate the practical application of the research findings, use the evidence in the context of daily practice, and diminish human errors that may occur in decision making (Stetler, 2001).

Design

The project was a quasi-experimental study with the purpose of comparing depression, anxiety and stress screening scores of women pre- and post-IVF treatments. The aims of the project were to collect and compare these scores for patients undergoing IVF treatment from two points of time, pre cycle and post egg retrieval, with the use of the Depression, Anxiety and Stress Scale 21 (DASS-21). The goal was to evaluate for a potential relationship between the intervention (IVF treatment) and changes in the prevalence of depression, anxiety and stress. Survey results were evaluated by the Seattle University (SU) principal investigator and provider

stakeholder at the project setting. The SU Internal Review Board has identified this project as *Not Human Participant Research*, concluding that the project posed minimal risk to participants.

Setting

The project setting was Fertility and Endocrine Associates in Louisville, KY, a reproductive endocrinology and fertility clinic. Fertility and Endocrine Associates serves the largest county and city of Kentucky, with a population of 28,474 (U.S. Census Bureau QuickFacts: Jeffersontown City Kentucky, 2021). The population within this county consists of primarily White and Black or African Americans, with a mean household income of $68,803 (U.S. Census Bureau QuickFacts: Jeffersontown City Kentucky, 2021).

Recruitment of Participants

Women who were starting an IVF stimulation round were invited to participate. Stimulation is where the woman is given a various array of medications to help promote the development of multiple follicles within the ovaries. Women of all age groups, ethnicities and racial groups, educational background and marital status were eligible. Patients with secondary infertility and those using donor gametes were excluded. Participants needed to read and write English. Participants were recruited at their first appointment prior to starting stimulation medication. The participants were given a short handout introducing the student and project. Additional stakeholders included providers at the fertility clinic.

Data Collection Procedures

Depression, anxiety and stress scores were collected through paper surveys at two points of time: pre-cycle and post-egg retrieval. At Fertility and Endocrine Associates, Kit Devine, DNP, WHNP-BC, ARNP, FAANP was responsible for handing out and collecting paper surveys from their patients at pre-cycle appointments and at post-egg retrieval follow-ups. Kit Devine,

DNP mailed the completed surveys to the SU principal investigator. Data collection occurred from January 2022 through April 2022.

Measures

The DASS-21, a truncated version of the 42-item DASS survey, is a set of three self-report scales designed to measure the emotional states of depression, anxiety and stress (Lovibond et al., 1995). This survey tool was used to evaluate these three emotional states pre-cycle and post-egg retrieval in the women who participated in the project (See Appendix B). With the use of the Cronbach's alpha, which measures internal consistency, the reliability of DASS-21 showed alpha values of 0.81, 0.89, and 0.78, indicating higher levels of internal consistency (Coker et al., 2018).

Data Analysis

The quantitative data was collected and analyzed in Microsoft Excel, with a paired t-test to investigate both the significance (p value < 0.05) or difference of data collected from individuals' reported depression, anxiety, and stress prevalence throughout the IVF cycle. Each of the DASS-21 scales contain seven items that are divided into subscales with similar content; and each question within the scale is given a numerical score. The scores for depression, anxiety and stress were calculated by adding the numerical value for each question that is assigned to its specific scale, then categorized with a severity label of normal, mild, moderate, severe, or extremely severe (Lovibond, et al., 1995). The SU principal investigator was the individual responsible for data analysis. The data measured whether levels of depression, anxiety and stress have either increased or decreased during treatment. Statistical data analysis was also analyzed with the use of IBM SPSS.

Results

Outcomes

Data was collected over three IVF cycles occurring in 2 week intervals in January, February and March of 2022 with a total of 16 participants. Of the 16 participants, 12 (75%) completed both surveys and 4 (25%) were unable to complete the second survey for various reasons that will be discussed later. The survey provided to participants also gathered demographic information on seven major categories: age group, years of infertility, ethnicity, marital status, highest level of education, infertility diagnosis, and number of IVF treatments completed. The demographics questionnaire (Appendix C) revealed 4 (25%) were aged 25-30, 5 (31%) were 31-35, 5 (31%) were 36-40 and 2 (13%) were 41-45. Of these participants, 11 (69%) of them have experienced four or less years of infertility while 5 (31%) experienced more than six years. Over half (56%) of the participants were White, while the remainder were Hispanic (19%), Black or African American (13%) and Asian (13%). A majority of the participants were married, 13 (82%), followed by 1 (6%) each of unmarried, single and divorced. Approximately one third of the participants' infertility diagnosis was related to endometriosis (31%), closely followed by unexplained infertility (25%). An overwhelming number of the participants (11) had never completed an IVF cycle, while four had completed at least one, and one person completed two (Figures 1-4 in Appendix A).

Depression data was compared pre-cycle and post-egg retrieval. The average depression score before ($M = 1.583$, $SD = 2.020$) was higher than after the post-egg retrieval surgery ($M = 1.916$, $SD = 2.644$). This change, .33, 95% CI [-1.554, .888] was not statistically significant, $t(11) = -.601$, $p > 0.05$ (Table 1 in Appendix A). Based on the data collected, depression levels increased from the pre-cycle to post-egg retrieval cycle (Figure 5 in Appendix A).

Anxiety pre-cycle and post-egg retrieval scores were compared. On average, pre-cycle anxiety levels (M = 2.500, SD = 3.147) were higher than post-egg retrieval levels (M = .666, SD = .887). This improvement, 1.834, 95% CI [-.348,4.014], was statistically significant, $t(11)$ = 1.850, p < 0.05 (See Table 2). Similarly, stress pre- and post-egg retrieval scores were compared. On average, pre-cycle stress levels (M = 6.916, SD = 3.604) were higher than post-egg retrieval levels (M = 4.750, SD = 4.614). This improvement, 2.166, 95% CI [-.659,4.993] showed moderate statistical significance, $t(11)$ = 1.68 with a p-value just above 0.05 (See Table 1). Unlike depression scores, participants had more obvious decreased levels of anxiety and stress from pre-cycle to post-egg retrieval (Figure 6 and Figure 7 in Appendix A).

Limitations

Limitations during this project include sample size, project setting, and individuals responding differently to stimulation medications. In some of the participants, there was a decrease in symptoms, but due to the small sample size, the data was not statistically significant. If the sample size was larger and access to more fertility clinics in Washington state was attainable, it is likely the DASS-21 scores would reflect similar results to previous studies showing a decrease in levels of depression, anxiety and stress upon completion of IVF treatment cycles. Lastly, of the four individuals who were not able to complete the second survey, the reasons listed were cycle cancellation due to money, poor ovarian response, no ovarian response and no developing embryos after oocyte fertilization. These reasons are not uncommon for couples or individuals who discontinue treatment. According to Rajkhowa et al, additional reasons include, "live birth, lack of success, lack of funding, psychological stress, medical advice, physical discomfort, personal and other reasons" (Rajkhowa et al., 2006, p358). With the

varying degrees of individual responses to medication protocols, this alone can affect completion of a second survey in these types of studies.

Implications for Fertility Clinics

The DASS-21 is an effective screening tool for early identification of the presence of depression, anxiety and stress among individuals going through IVF treatment. With the use of this tool, providers can quickly assess and identify people with increased levels of depression, anxiety and stress in their fertility clinic setting. Screening tools, whether electronic or on paper, may be seen as both labor intensive and time-consuming for both participant and provider. However, when the screening tool is concise, and produces consistent and reliable results, the additional time it takes to review and complete the survey outweighs the risk of missing the opportunity to recognize mental health stressors in individuals undergoing IVF treatment.

Recommendations and Summary

Whether or not the woman achieves pregnancy, the prevalence and incidence of depression, anxiety and/or stress symptoms in individuals and couples going through IVF treatment are common and should be evaluated prior to treatment and throughout the treatment process. Psychosocial interventions are crucial in the care of all patients who decide to pursue infertility treatments. The importance of identifying depression, anxiety and stress early on and having initial discussions with patients regarding various forms of treatment and/or coping mechanisms, may improve patients' quality of life and results of their fertility treatment. If left untreated, these stressors can have lasting negative effects on a potential pregnancy and the developing fetus. It is therefore essential, and recommended, that providers who offer infertility services, screen and monitor for physical, mental and environmental health changes. For sustainability it would be advantageous for the clinic to integrate a screening tool such as the

DASS-21, or implement a clinic policy to provide screening at specific intervals during treatment. If implementing a clinic policy to provide screening at specific points of time, it would be important for the clinic to insure chart reviews are completed periodically. Additionally, providing coping tools and resources to patients will help to mitigate and manage their levels of depression, anxiety and stress.

References

Asazawa, K., Jitsuzaki, M., Mori, A., Ichikawa, T., & Shinozaki, K. (2020). Effectiveness of a spousal support program in improving the quality of life of male patients undergoing infertility treatment: A pilot study. *International journal of community based nursing and midwifery, 8*(1), 23–33. https://doi.org/10.30476/IJCBNM.2019.81329.0

Bakhtiyar, K., Beiranvand, R., Ardalan, A., Changaee, F., Almasian, M., Badrizadeh, A., Bastami, F., & Ebrahimzadeh, F. (2019). An investigation of the effects of infertility on Women's quality of life: a case-control study. *BMC Women's Health, 19*(1), 114. https://doi.org/10.1186/s12905-019-0805-3

Ben Shlomo, S., Skvirsky, V., Taubman - Ben-Ari, O., Azuri, Y., & Horowitz, E. (2016). Mental health of women entering fertility treatment: What role do age and internal resources play? *Stress and Health, 33*(4), 470–476. https://doi.org/10.1002/smi.2733

Boivin, J., Domar, A. D., Vassena, R., & Collura, B. L. (2020). Impact of the infertility treatment journey on the mental health and relationships of infertile patients and their partners. *Fertility and Sterility, 114*(3), e464–e465. https://doi.org/10.1016/j.fertnstert.2020.08.1336

Chiaffarino, F., Baldini, M. P., Scarduelli, C., Bommarito, F., Ambrosio, S., D'Orsi, C., Torretta, R., Bonizzoni, M., & Ragni, G. (2011). Prevalence and incidence of depressive and anxious symptoms in couples undergoing assisted reproductive treatment in an Italian infertility department. *European Journal of Obstetrics & Gynecology and Reproductive Biology, 158*(2), 235-241. https://doi.org/10.1016/j.ejogrb.2011.04.032

Coker, A. O., Coker, O. O., & Sanni, D. (2018). Psychometric properties of the 21-item depression anxiety stress scale (DASS-21). *African Research Review,* 12(2), 135. https://doi.org/10.4314/afrrev.v12i2.13

Cunha, M., Galhardo, A., & Pinto-Gouveia, J. (2016). Experiential avoidance, self-compassion, self-judgment and coping styles in infertility. *Sexual & Reproductive Healthcare, 10*(10), 41–47. https://doi.org/10.1016/j.srhc.2016.04.001

Cunningham J. (2017). Infertility: A primer for primary care providers. *JAAPA : official journal of the American Academy of Physician Assistants*, *30*(9), 19–25. https://doi.org/10.1097/01.JAA.0000522130.01619.b7

Darbandi, S., Darbandi, M., Khorram Khorshid, H. R., & Sadeghi, M. R. (2018). Yoga Can Improve Assisted Reproduction Technology Outcomes in Couples With Infertility. *Alternative therapies in health and medicine, 24(*4), 50–55.

Diaz-Garcia, C. (2020, January 7). *41 years ago today the first IVF baby was born*. IVI UK. https://www.ivi.uk/blog/first-uk-ivf-baby/

Galhardo, A., Alves, J., Moura-Ramos, M., & Cunha, M. (2019). Infertility-related stress and depressive symptoms – the role of experiential avoidance: a cross-sectional study. *Journal of Reproductive and Infant Psychology, 38*(2), 139–150. https://doi.org/10.1080/02646838.2019.1612046

Gdańska, P., Drozdowicz-Jastrzębska, E., Grzechocińska, B., Radziwon-Zaleska, M., Węgrzyn, P., & Wielgoś, M. (2017). Anxiety and depression in women undergoing infertility treatment. *Ginekologia Polska, 88*(2), 109-112. https://doi.org/10.5603/GP.a2017.0019

Grunberg, P. H., Dennis, C.-L., Da Costa, D., Gagné, K., Idelson, R., & Zelkowitz, P. (2020). Development and evaluation of an online infertility peer supporter training program.

Patient Education and Counseling, 103(5), 1005–1012.

https://doi.org/10.1016/j.pec.2019.11.019

Hassan, S.-U.-N., Siddiqui, S., & Friedman, B. D. (2019). Health Status and Quality of Life of Women Seeking Infertility Treatments in Baluchistan, Pakistan. *The British Journal of Social Work, 50*(5), 1401–1418. https://doi.org/10.1093/bjsw/bcz130

King, T. L., Brucker, M. C., Osborne, K., & Jevitt, C. M. (2019). Varney's Midwifery (6th Edition ed.). Jones & Bartlett Learning.

Li, J., Luo, H., & Long, L. (2019). Mindfulness and fertility quality of life in Chinese women with infertility: assessing the mediating roles of acceptance, autonomy and self-regulation. *Journal of Reproductive and Infant Psychology, 37*(5), 455–467.

https://doi.org/10.1080/02646838.2019.1577958

Loughran, T. (2021, January 22). *Infertility through the ages – and how IVF changed the way we think about it*. The Conversation. https://theconversation.com/infertility-through-the-ages-and-how-ivf-changed-the-way-we-think-about-it-87128.

Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the depression anxiety stress scales* (2nd ed.). Psychology Foundation Of Australia.

Luk, B. H. K., & Loke, A. Y. (2019). Sexual satisfaction, intimacy and relationship of couples undergoing infertility treatment. *Journal of Reproductive and Infant Psychology, 37*(2), 108-122. https://doi.org/10.1080/02646838.2018.1529407

Mousavi, S. A., Masoumi, S. Z., Keramat, A., Pooralajal, J., & Shobeiri, F. (2013). Assessment of questionnaires measuring quality of life in infertile couples: a systematic review. *Journal of Reproduction & Infertility, 14*(3), 110-119.

https://www.ncbi.nlm.nih.gov/pubmed/24163794

Rajkhowa, M., Mcconnell, A., & Thomas, G. E. (2005). Reasons for discontinuation of IVF treatment: a questionnaire study. *Human Reproduction*, *21*(2), 358–363. https://doi.org/10.1093/humrep/dei355

Patel, Ansha, Sharma, P S V N, Kumar, Pratap, & Binu, V. S. (2018). Illness cognitions, anxiety, and depression in men and women undergoing fertility treatments: A dyadic approach. *Journal of Human Reproductive Sciences, 11*(2), 180-189.

Pietrangelo, A. (2020, March 29). *The Effects of Stress on Your Body*. Healthline. https://www.healthline.com/health/stress/effects-on-body#1.

Sharma, R. S., Saxena, R., & Singh, R. (2018). Infertility & assisted reproduction: A historical & modern scientific perspective. *The Indian journal of medical research, 148*(Suppl), S10–S14. https://doi.org/10.4103/ijmr.IJMR_636_18

Sormunen, T., Karlgren, K., Aanesen, A., Fossum, B., & Westerbotn, M. (2020). The role of social media for persons affected by infertility. *BMC Women's Health, 20*(1). https://doi.org/10.1186/s12905-020-00964-0

Stetler C. B. (2001). *Updating the Stetler Model of research utilization to facilitate evidence-based practice. Nursing outlook, 49*(6), 272–279. https://doi.org/10.1067/mno.2001.120517

U.S. Census Bureau QuickFacts: Jeffersontown city, Kentucky. (2021, July 1). Www.census.gov. https://www.census.gov/quickfacts/jeffersontowncitykentucky

Vander Borght, M., & Wyns, C. (2018). Fertility and infertility: Definition and epidemiology. *Clinical biochemistry, 62*, 2–10. https://doi.org/10.1016/j.clinbiochem.2018.03.012

World Health Organization. *Infertility*. World Health Organization. https://www.who.int/news-room/fact-sheets/detail/infertility.

Appendix A

Table 1

Depression, Anxiety and Stress levels pre-cycle and post-egg retrieval

	Pre-Cycle		Post Egg-Retrieval		95% Confidence Interval		*t* (11)	*p*	Cohen's *d*
	M	*SD*	*M*	*SD*	*Lower*	*Upper*			
Depression	1.583	2.020	1.916	2.644	-1.554	0.888	-0.601	0.280	1.922
Anxiety	2.500	3.147	0.666	0.887	-0.348	4.014	1.850	0.046	3.433
Stress	6.916	3.604	4.750	4.614	-0.659	4.993	1.687	0.060	4.448

Note. Data was collected over the three different IVF cycles from January to March 2022. For each participant, they were given the same survey pre-cycle and post egg-retrieval. Items measured were Depression, Anxiety and Stress. For the entire project, sample size was $n = 12$. Mean and standard deviation is shown for all three categories, as well as the 95% confidence interval, p-value and Cohen's d.
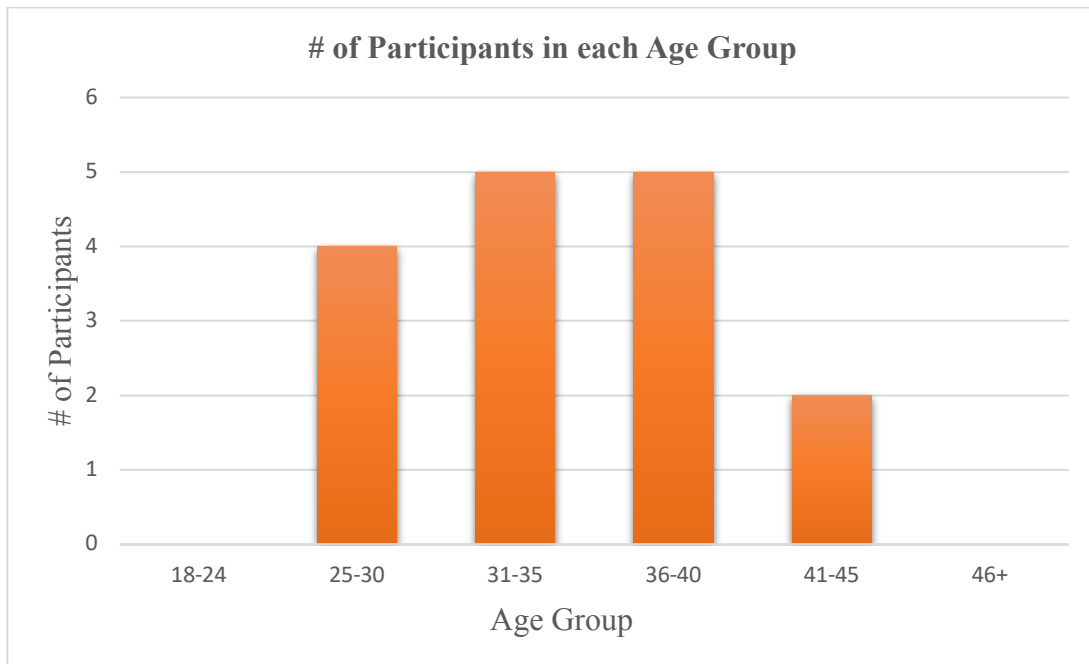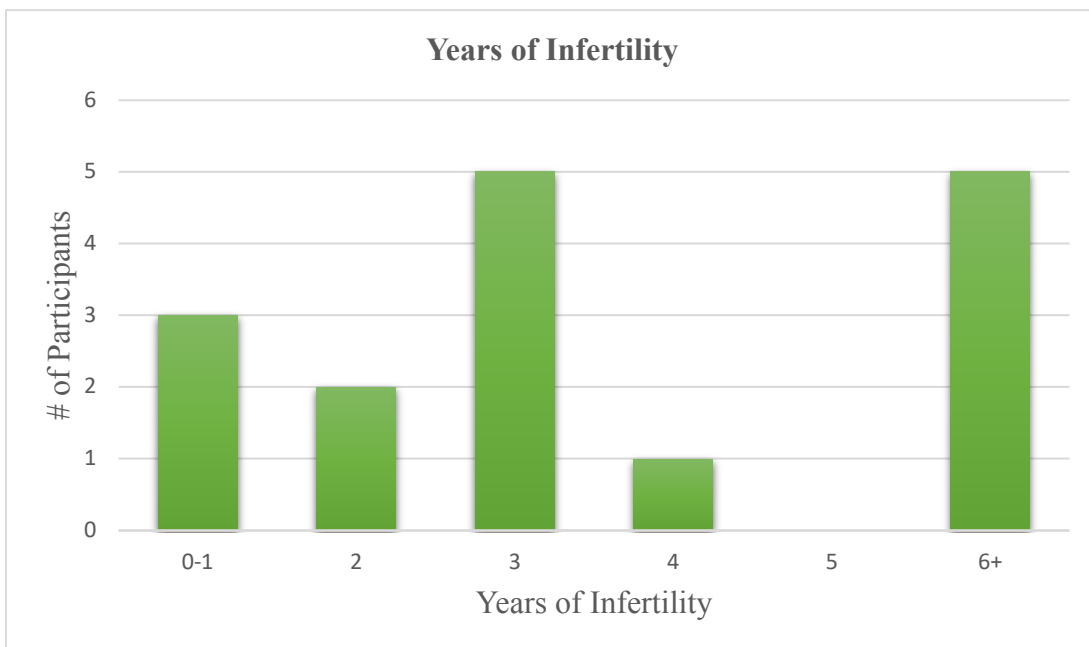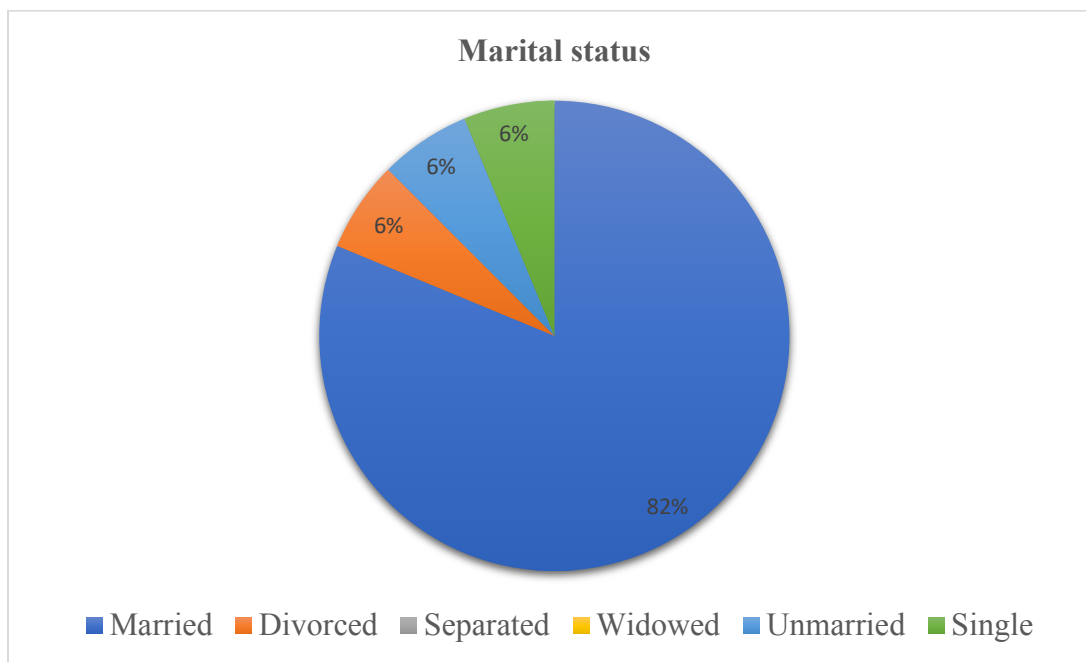
Figure 1

Figure 2

Figure 3

Marital status

Married · Divorced · Separated · Widowed · Unmarried · Single
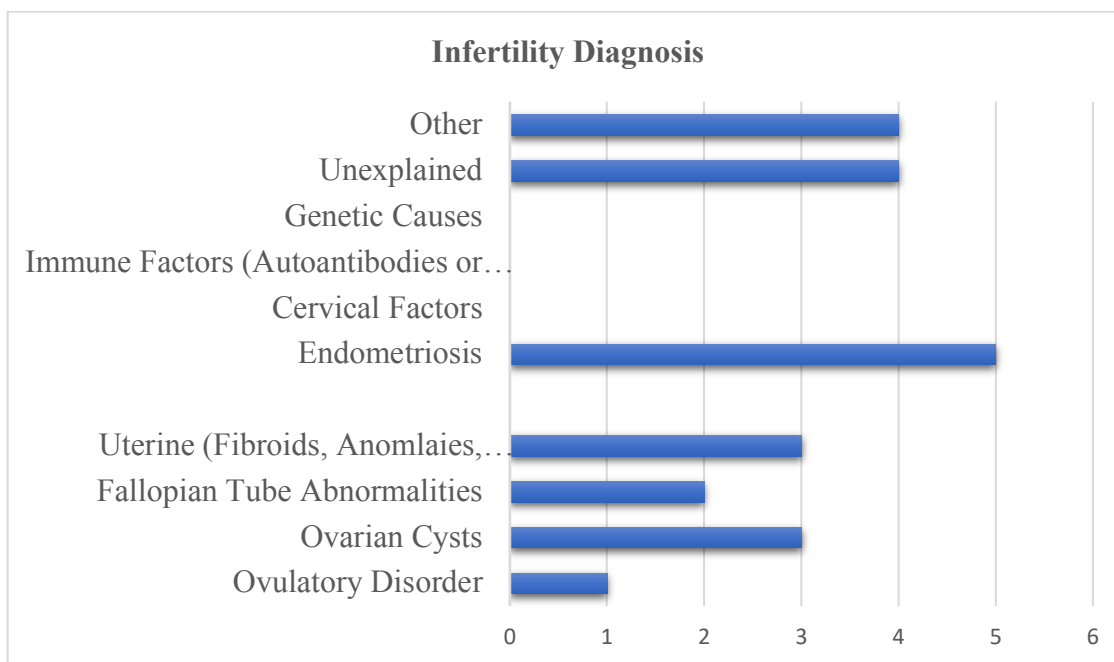
Figure 4

Infertility Diagnosis

Note. Two participants who listed 'other' as an infertility diagnosis specified with low sperm count in partner and the other with having their fallopian tubes previously removed.
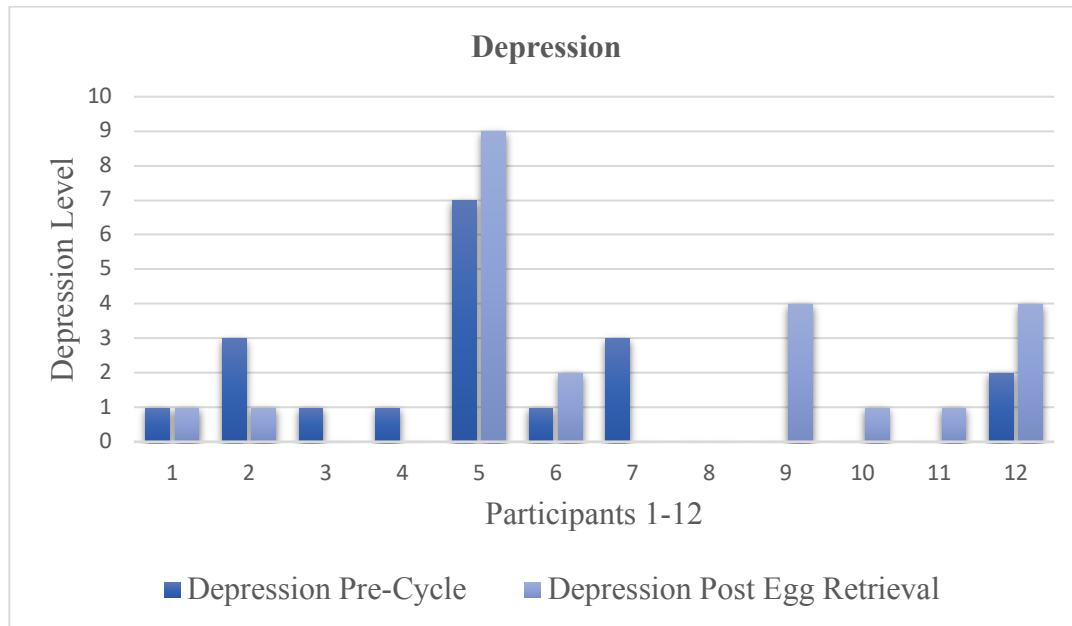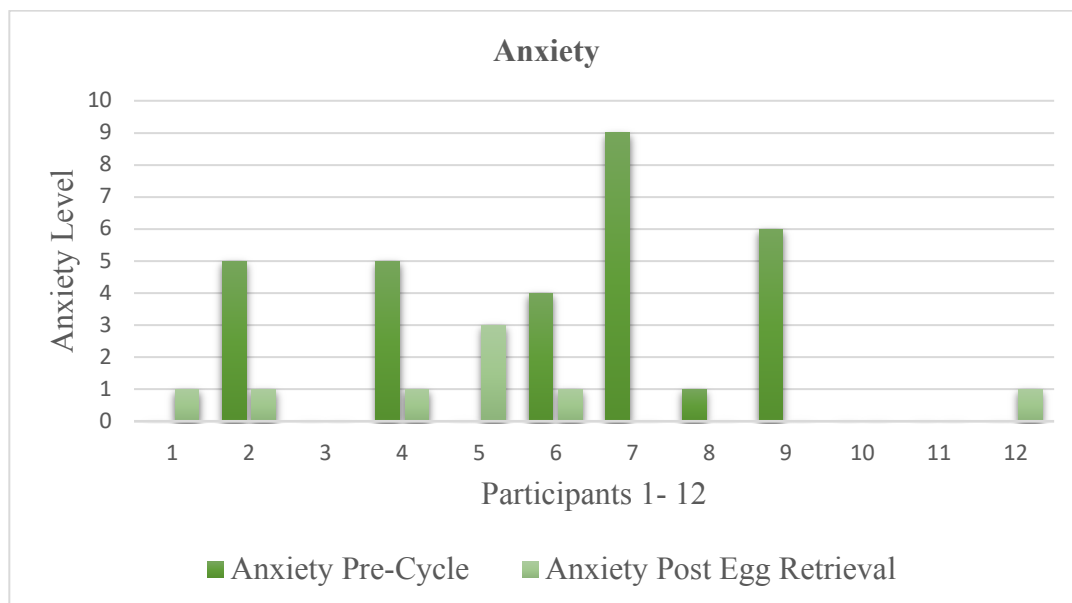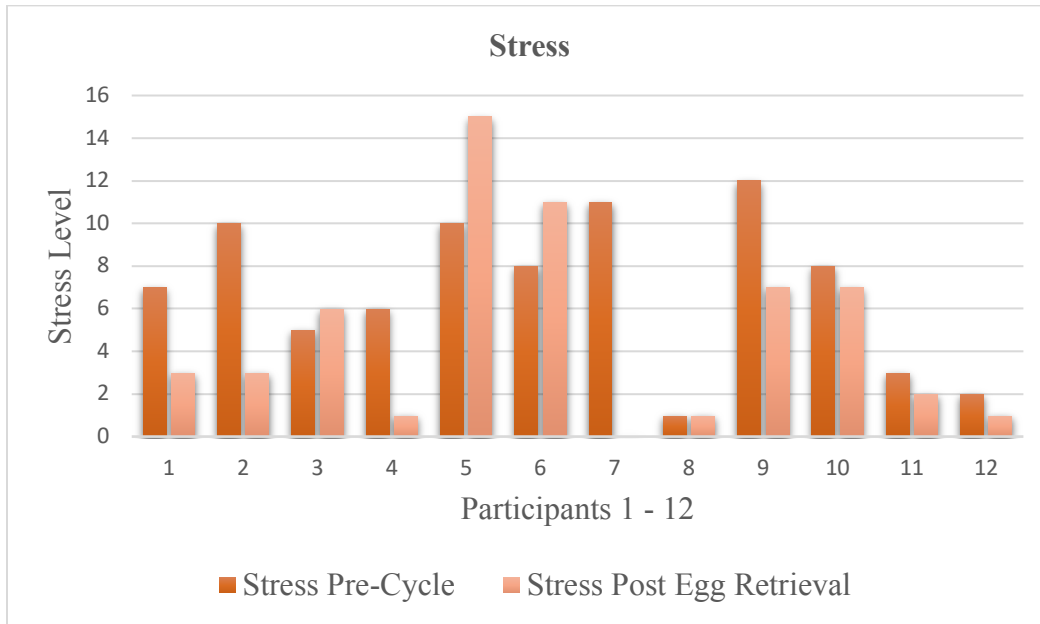
Figure 5

Depression

Figure 6

Anxiety

Figure 7

Stress

Stress Level (y-axis: 0 to 16)

Participants 1 - 12 (x-axis)

■ Stress Pre-Cycle   ■ Stress Post Egg Retrieval

Appendix B

DASS21

Name: Date:

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you **over the past week**. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0   Did not apply to me at all
1   Applied to me to some degree, or some of the time
2   Applied to me to a considerable degree or a good part of time
3   Applied to me very much or most of the time

1 (s)	I found it hard to wind down	0	1	2	3
2 (a)	I was aware of dryness of my mouth	0	1	2	3
3 (d)	I couldn't seem to experience any positive feeling at all	0	1	2	3
4 (a)	I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5 (d)	I found it difficult to work up the initiative to do things	0	1	2	3
6 (s)	I tended to over-react to situations	0	1	2	3
7 (a)	I experienced trembling (e.g. in the hands)	0	1	2	3
8 (s)	I felt that I was using a lot of nervous energy	0	1	2	3
9 (a)	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10 (d)	I felt that I had nothing to look forward to	0	1	2	3
11 (s)	I found myself getting agitated	0	1	2	3
12 (s)	I found it difficult to relax	0	1	2	3
13 (d)	I felt down-hearted and blue	0	1	2	3
14 (s)	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15 (a)	I felt I was close to panic	0	1	2	3
16 (d)	I was unable to become enthusiastic about anything	0	1	2	3
17 (d)	I felt I wasn't worth much as a person	0	1	2	3
18 (s)	I felt that I was rather touchy	0	1	2	3
19 (a)	I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)	0	1	2	3
20 (a)	I felt scared without any good reason	0	1	2	3
21 (d)	I felt that life was meaningless	0	1	2	3

DASS-21 Scoring Instructions

The DASS-21 should not be used to replace a face to face clinical interview. If you are experiencing significant emotional difficulties you should contact your GP for a referral to a qualified professional.

Depression, Anxiety and Stress Scale - 21 Items (DASS-21)

The Depression, Anxiety and Stress Scale - 21 Items (DASS-21) is a set of three self-report scales designed to measure the emotional states of depression, anxiety and stress.

Each of the three DASS-21 scales contains 7 items, divided into subscales with similar content. The depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest / involvement, anhedonia and inertia. The anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The stress scale is sensitive to levels of chronic non-specific arousal. It assesses difficulty relaxing, nervous arousal, and being easily upset / agitated, irritable / over-reactive and impatient. Scores for depression, anxiety and stress are calculated by summing the scores for the relevant items.

The DASS-21 is based on a dimensional rather than a categorical conception of psychological disorder. The assumption on which the DASS-21 development was based (and which was confirmed by the research data) is that the differences between the depression, anxiety and the stress experienced by normal subjects and clinical populations are essentially differences of degree. The DASS-21 therefore has no direct implications for the allocation of patients to discrete diagnostic categories postulated in classificatory systems such as the DSM and ICD.

Recommended cut-off scores for conventional severity labels (normal, moderate, severe) are as follows:

_NB_ Scores on the DASS-21 will need to be multiplied by 2 to calculate the final score.

	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28+	20+	34+

Lovibond, S.H. & Lovibond, P.F. (1995). Manual for the Depression Anxiety & Stress Scales. (2nd Ed.)Sydney: Psychology Foundation.

Appendix C

Participant Demographic Questions

1. What is your email? (for the purpose of sending an electronic gift card when both surveys are completed)

2. Age:
   a. 18-24
   b. 25-30
   c. 31-35
   d. 36-40
   e. 41-45
   f. 46+

3. How do you describe your ethnicity?
   a. Native American Indian or Alaska Native
   b. Asian
   c. Black or African American
   d. Native Hawaiian or Other Pacific Islander
   e. Hispanic, Latino, or Spanish
   f. White
   g. Unknown
   h. Other
   i. Don't wish to answer

4. What is your marital status?
   a. Married
   b. Divorced
   c. Separated
   d. Widowed
   e. Unmarried
   f. Single
   g. Don't want to say

5. What is your highest qualification?
   a. Less than high school
   b. High school graduate
   c. Associate's Degree
   d. Bachelor's Degree
   e. Master's Degree
   f. Doctorate Degree
   g. Professional Degree or Certificate

6. Years of infertility?
   a. 0-1
   b. 2
   c. 3
   d. 4
   e. 5
   f. 6+

7. Infertility Diagnosis?
   a. Ovulatory Disorder
   b. Ovarian Cysts
   c. Fallopian Tube Abnormalities
   d. Uterine (Fibroids, Anomalies, Adhesions, Lutea Phase Defect)
   e. Endometriosis
   f. Cervical Factors
   g. Immune Factors (Autoantibodies or Celiac Disease)
   h. Genetic Causes
   i. Unexplained
   j. Other

8. Number of IVF treatment cycles completed?
   a. 0
   b. 1
   c. 2
   d. 3
   e. 4
   f. 5+