Protocol

Understanding Emotions and Coping for Patients, Partners, and Social Supporters During In Vitro Fertilization: Protocol for a Mixed Methods Study

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Abstract

Background: Infertility and its treatment carry a substantial psychosocial burden. In vitro fertilization (IVF), the most common form of assisted reproductive technology, is a demanding medical treatment. Up to 80% of patients report that the physical, emotional, social, and financial demands of assisted reproductive technology cause high levels of distress, yet only 9% to 21% receive mental health support. This is a substantial unmet need that requires an innovative solution.

Objective: The IVF Support Study (IVFSS) aims to (1) understand how the coping strategies and emotions of female patients change across an IVF cycle and identify risk and protective factors; (2) understand the experiences of partners (male and female) and social supporters (eg, family and friends) during IVF and identify helpful strategies they can use to support themselves and the patient; and (3) use this evidence to build an online intervention for patients, partners, and social supporters that will aim to reduce the psychosocial burden of IVF.

Methods: The IVFSS is a mixed methods study that included prospective longitudinal surveys for female patients undergoing IVF treatment and interviews with partners and social supporters (family and friends). Patients completed online surveys every second day of their IVF cycle that measured emotions, coping strategies, and treatment events, with 3 longer surveys (at baseline, partway through treatment, and after results were known) to measure risk and protective factors. Partners and social supporters completed semistructured interviews or an online survey version of the interview if they repeatedly did not attend scheduled interviews.

Results: Funding commenced in June 2023, and data collection occurred between February 2024 and November 2025. In the patient arm of the study, there were 221 cycles from 179 patients. The data have been cleaned, surveys have been harmonized, and analysis has begun. Of the 179 patients, 51% (n=91) had at least one reproductive condition (eg, n=52, 29% had endometriosis), 60% (n=107) were aged over 34 years, and 76% (n=136) did not have any biological children. In the qualitative arm of the study (n=65), there were 37 partners (31 male and 6 female) and 28 social supporters (15 friends, 6 siblings, and 7 mothers). Of these, 27 participated in interviews and 38 completed the online survey. The surveys and transcripts have been checked for accuracy and deidentified, and analysis has begun. Co-design of the online intervention has begun, with an anticipated launch by the end of 2026.

Conclusions: The IVFSS takes a unique system approach by collecting novel data from patients, partners, and social supporters, and we will use this evidence to create an online interactive resource to support people during their IVF treatment.

This study aims to reduce the psychosocial burden of treatment, with the potential to influence the way psychosocial care is provided during fertility treatment.

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Introduction

Infertility and its treatment carry a substantial psychosocial burden that is not adequately addressed in current clinical care models. One in 6 people experience infertility [1], which is defined as an inability to achieve pregnancy after 12 months trying to conceive [2]. Approximately 60% will seek treatment, typically through assisted reproductive technology (ART) [3]. This impacts a large number of women, with more than 112,000 ART cycles reported in Australia and New Zealand in 2023 [4]. Up to 80% of patients report that the physical, emotional, social, and financial demands of ART cause high levels of distress [5-7]; however, only 9% to 21% receive mental health support such as counseling [8]. This is a significant unmet need that requires an innovative solution.

In vitro fertilization (IVF), the most common form of ART, is a demanding medical treatment with substantial psychological costs. An IVF cycle spans approximately 1 month and is a multistage process. A "fresh" cycle involves: (1) preparation for treatment, (2) ovarian stimulation, (3) oocyte (egg) retrieval, (4) waiting for the results of embryo development, (5) embryo transfer, (6) waiting to find out if the treatment has worked ("2-week wait"), and (7) learning about the outcome (pregnancy test). A "frozen" cycle involves the transfer of an embryo that was created in a previous "fresh" cycle and frozen for later use. Further variants include preimplantation genetic testing (PGT) cycles, where embryos are biopsied and then frozen while the patient waits for the test results; patients typically plan to transfer genetically normal embryos in a future "frozen" cycle. In "freeze all" cycles, oocytes are collected and embryos are created, but all embryos are then frozen rather than being transferred. There is a great deal of uncertainty in "fresh" cycles, as approximately 10% do not reach oocyte retrieval, and up to 25% do not proceed to embryo transfer [9]. For cycles reaching embryo transfer, only one-third or fewer result in a live birth [4].

Each stage of an IVF cycle poses unique challenges [10], and symptoms of depression, anxiety, or stress are reported by approximately 50% of men and women during treatment [6]. Emotional impacts can be exacerbated by the side effects of hormonal medications [8]. There is also a vicious circle in play, in which most couples need multiple IVF cycles to achieve a live birth [4,11,12]; however, multiple cycles increase the likelihood of developing depressive symptoms [13,14], and depressive symptoms or other psychosocial burdens increase the likelihood of discontinuing treatment early [15].

It is well accepted that positive and negative emotions fluctuate across an IVF cycle [11,16], but many studies only measure at 2 to 4 points during treatment. This does not provide the nuanced information required to build a real-time whole-of-cycle intervention. Correspondingly, several interventions have been designed to target specific stages of the treatment cycle, such as embryo transfer or waiting for results, but these may not meet the needs of people who want support at other stages, or across their whole cycle [17]. Additionally, fewer studies have assessed protective factors, which make it difficult to identify adaptive strategies for use in evidence-based interventions [18].

The most common sources of support during IVF are partners, family, and friends [13,19]. Social support is a strong protective factor that can enhance coping and reduce distress, but inadequate or unsatisfactory support can have the opposite effect [18,20,21]. Compared with women, male partners often use different coping strategies and prefer to talk less about ART, which can place strain on the relationship [20,22,23]. Supporters may not understand the medical and emotional aspects of IVF and can make unhelpful comments and suggestions [21]. Primary supports, such as parents, may be invested in the outcome (eg, becoming grandparents), and their reactions can add to the patient's psychosocial burden. Additionally, they may have little understanding of the demands of treatment, which may make it difficult to provide helpful support.

Although fertility treatment is typically a dyadic process [13], there is less research on the experience of partners, even though partners are also patients. Research on male partners has shown that this lack of information can create feelings of isolation [24,25]. Men's experience of fertility treatment is different from the patients, with different emotions and less use of social support [19,25,26]. Men's needs can be silenced as they take on traditional support roles (eg, "emotional rock") [27]. Female partners require care from a system generally set up for heterosexual couples and they can experience heteronormative information, signage, and processes [28]. Same-sex couples also need to make additional layers of decisions, such as who will undergo treatment and whether it will be shared, and most will also need to navigate the complexities, costs, and potential delays related to accessing donor sperm. Partners are underrepresented in fertility care and research, particularly female partners, resulting in little information about the support they require and prefer during IVF [24,26].

The IVF Support Study (IVFSS) aims to (1) understand how the emotions and coping strategies of female patients change across an IVF cycle and identify risk and protective factors, (2) understand the experience of partners (male and

female) and social supporters (eg, family and friends) during IVF and identify helpful strategies they can use to support themselves and the patient, and (3) use this evidence to inform the development of an online interactive resource to support patients and partners during IVF and to better equip friends and family to provide effective support.

Methods

Study Design

The IVFSS is a concurrent convergent, mixed methods study that includes (1) prospective longitudinal surveys for female patients undergoing IVF treatment, containing quantitative and qualitative questions and (2) qualitative interviews with partners and social supporters (family and friends). A mixed methods design was chosen as it best suited the needs of the 3 groups of participants and the types of content planned for the website. For patients, the longitudinal survey methodology has been demonstrated as feasible in previous studies [29] but has not been conducted within the Australian health care system or included the same range of risk and protective factors. The intensive quantitative data will enable accurate tracking of changes in the key constructs across the cycle, which is necessary for building the intended interactive intervention. Adding qualitative questions within these surveys will allow us to gain deeper insights into patients' experiences, including how they change across the cycle, help us to understand why emotions differ between patients doing similar cycles, and enable us to add the direct voice of research participants through quotes. For partners and social supporters, there is less research on their experience and well-established difficulty engaging men in fertility research [27]. Qualitative interviews will allow a less structured exploration of experiences that could inform future quantitative methods.

Co-Design

The IVFSS exists only because of the ideas and input from patients who have undergone IVF. The chief investigator (KMM) is a psychologist who has undergone fertility treatment and conceptualized the study based on support gaps identified while navigating IVF. A pilot study was conducted with 8 patients who provided feedback on the aims, critiqued the methodology, reviewed and tested the surveys, and discussed the intended outputs (ie, an online interactive website). The updated surveys were piloted with 5 patients during an IVF cycle, who provided feedback on their experience and suggested some additional changes to the survey formatting and content. After grant funding was obtained (National Health and Medical Research Council Ideas Grant number 2020020) and formal data collection began, the research team obtained feedback from the initial participants and made some final small changes (eg, adding coping strategies and adding free-text boxes in every survey).

The online resource will also be co-designed. Patients, partners, and social supporters will be recruited from the quantitative and qualitative arms of the study to be part of either (1) co-design or (2) user testing. We acknowledge that the final co-designers will depend on who is willing and available from our participant pool; however, our ideal inclusion criteria are (1) indicated on their consent form that they would like to be involved in co-design, (2) diverse demographic characteristics (eg, patients: 1 single woman, 1 regional location, 1 first IVF cycle, 1 unsuccessful treatment; partners: at least 1 female partner; social supporters: at least 1 mother, at least 1 sister, at least 1 friend), and (3) available for the co-design sessions. The co-design process will follow the principles specified by the National Health and Medical Research Council [30]: (1) inclusion at all stages of the process; (2) valuing lived experience and sharing power; (3) building trust; (4) equity and diversity by seeking diverse circumstances, providing space for differing opinions, and holding meetings online and after hours; (5) creating an emotionally safe space and supporting people to choose their own levels of personal disclosure; and (6) honest and accountable communication and decision-making throughout the process. Co-designers will be involved in reviewing the website content, testing the interactive features, providing advice on design, and highlighting any gaps. Input will be provided via online group or individual feedback sessions and also via a "think aloud" process to test the user experience of the website. Meetings will be held online via Microsoft Teams and will be automatically transcribed, with transcripts later checked for accuracy. The guiding principle is that feedback from consumers will be implemented, unless there is a practical (eg, a design feature is not possible on the web platform or is out of budget) or scientific reason (eg, suggested content is not supported by medical evidence) not to do so. Co-designers will be remunerated for every meeting at the rates recommended by Health Translation Queensland. This co-design process and its outcomes will be written up in detail in a separate paper at the conclusion of the website development process.

Participants

Quantitative: Female Patients

Inclusion criteria for patients were: (1) assigned female at birth and will be undergoing IVF treatment, (2) English-speaking, (3) reliable internet access, and (4) planning an eligible IVF cycle within the time frame of the study. Eligible cycles included creating or using embryos (ie, fresh, frozen, freeze all, or PGT cycles). Egg-freezing cycles were excluded as they cease before embryos are created, and because they involve the first part of a fresh IVF cycle, the study outcomes will cover this type of cycle. "Freeze all" cycles were included as embryos are created (additionally, this type of cycle often occurs when a planned fresh cycle is canceled before embryo transfer).

An *a priori* power calculation (using G*Power; Heinrich-Heine-Universität Düsseldorf) based on a paired *t*-test (tails=2, α=.05, power=0.80) with an effect size of 0.3736 returned a sample size of 60. Stratifying by first/repeat cycles (n=60/group) and allowing dropout from IVF (25%, n=30) and from our study (40%, n=48) brings the targeted sample size to 198.

Qualitative: Partners and Social Supporters

Inclusion criteria for partners were (1) male or female, (2) their female partner had completed at least one full cycle of IVF treatment in Australia while they were in a relationship together, (3) the treatment occurred within the last 5 years, and (4) the treatment was one of the eligible cycles. Inclusion criteria for social supporters were (1) having supported someone close to them through an IVF cycle, (2) the patient has completed at least one full cycle of IVF in Australia, (3) the treatment was within the past 5 years, and (4) the treatment was one of the eligible cycles.

Procedure

Quantitative: Female Patients

Participants were recruited nationally via fertility clinics, social media, snowball recruitment, and personal and professional networks. Participant details were received by direct email from the patient or clinic or by the patient's completion of an online expression-of-interest form (obtained by scanning a QR code on a poster or following a link in social media advertising). Each potential participant underwent a screening phone call with the study coordinator to provide more information about the study and to determine whether they met the eligibility criteria. This call was also used to exclude any bots that had completed the online expression-of-interest form. Eligible participants then completed an online consent form (in REDCap; Vanderbilt University) that included some basic demographic information. Participants who had not yet started their cycle when we spoke to them provided an anticipated start date, and we followed up at that time, or they notified us when their cycle began.

Once the cycle started, data were collected via repeated online surveys in REDCap. Emotions, coping strategies, and stress were assessed every second day from the beginning of the cycle to 1 to 3 days after the pregnancy test in short surveys that generally took less than 5 minutes to complete. Risk and protective factors were assessed in longer surveys at recruitment (generally before treatment began or at the start of the treatment cycle: long 1 [L1], during the waiting period before results: long 2 [L2], and after the pregnancy/PGT test results: long 3 [L3]). Additionally, treatment burden was assessed before oocyte retrieval (capturing the ovarian stimulation stage), near embryo transfer (capturing the stage between oocyte retrieval and embryo transfer) or PGT biopsy (capturing the stage between oocyte retrieval and cell biopsy), and approximately 6 days after embryo transfer/biopsy (capturing the waiting stage). Participants were emailed a survey link at 4 PM on the day the survey was due and were asked to complete it before going to bed that night. All participants received an Aus $50 (Aus $1 =US $0.69 as of November 4, 2026) gift voucher in recognition of their time.

Qualitative: Partners and Social Supporters

Participants were nominated by patients in the quantitative arm of the study who provided contact details for people who had supported them during IVF. Each potential participant underwent a screening phone call with the study coordinator to provide more information about the study and determine whether they met the eligibility criteria. Eligible participants then completed an online consent form (in REDCap) that included basic demographic information (state/territory of residence, age, biological sex, gender, and cultural identity). Semistructured interviews lasted between 30 and 90 minutes. We planned to collect all data via online qualitative interviews (using Microsoft Teams); however, we also developed an online survey version of the interview questions for partners and social supporters who had completed their online consent form and demographic information but repeatedly did not attend the scheduled interview. Interviews were recorded with participants' permission, and transcription was conducted via Teams and later checked for accuracy. Interviews and surveys were then anonymized. All participants received an Aus $50 (Aus $1=US $0.69 as of November 4, 2026) gift voucher in recognition of their time.

Measures

Patients

The quantitative measures used in the patient arm of the IVFSS are described in Table 1, which outlines the construct, scale name, number of items, and when the measure was administered. We have provided additional information below on the scales that were modified or devised for the IVFSS.

Table 1. Measures completed by female patients in the quantitative arm of the In Vitro Fertilization (IVF) Support Study[a].

Construct	Scale	Number of items, n	Timing
Demographics	NA (items described in text)	15	L1
Anxiety [31]	GAD-7[b]	7	L1, L2, L3
Depression [32]	PHQ-9[c]	10	L1, L2, L3
Resilience [33]	Brief Resilience Scale	6	L1
Appraisal [34]	(not named)	5	L1, day 23, L3
Helplessness [35]	ScreenIVF	6	L1
Acceptance [35]	ScreenIVF	6	L1
Social support [35]	ScreenIVF	5	L1
Quality of life [36]	FertiQoL[d] (core module)	24+2	L1, L2, L3
Emotions	Devised (items described in text)	11	All short, L2, L3

Construct	Scale	Number of items, n	Timing
Overall stress	Devised (item described in text)	1	All short, L2, L3
Daily coping	Adapted (items described in text)	10	All short, L2, L3
Typical coping [37]	COMPI[e] Coping Strategy Scale	19+1	L2
Patient-centered care [37]	COMPI Evaluation of Treatment Scales	13	L2
Treatment burden [36]	FertiQoL (treatment module)	4	Day 13, day 19, L2
Functioning	Devised (items described in text)	2	Day 13, day 19, L2

[a]L1 = long survey at study enrolment; L2 = long survey part way through cycle; L3 = long survey after outcome is known; short surveys were administered every second day of the cycle (e.g., Day 13, Day 15, Day 17 etc)
[b]GAD-7: 7-item Generalized Anxiety Disorder.
[c]PHQ-9: Patient Health Questionnaire–9.
[d]FertiQoL: Fertility Quality of Life tool.
[e]COMPI: Copenhagen Multicentre Psychosocial Infertility Coping Strategy Scale.

Demographic Information

The demographic information of patients includes date of birth, highest educational qualification, ability to manage on available income, relationship status, cause of infertility, parity, number of months trying to conceive, history of diagnosis/treatment of endometriosis, polycystic ovary syndrome (now called polyendocrine metabolic ovary syndrome), fibroids, premenstrual syndrome, depression, and/or anxiety, history of previous fertility treatments, and number of previous IVF cycles.

Emotions

The measure of emotions used in this study was adapted from the Infertility Wellbeing and Distress Scales [38] and Boivin's Daily Record Keeping Sheet [29]. Participants were asked, "Thinking about your fertility treatment, to what extent have you experienced the following emotions in the last 2 days?" The 8 negative emotions (sad, worried, disappointed, angry, frustrated, impatient, isolated, and tense) and 5 positive emotions (happy, confident, relieved, supported, and hopeful) were rated on a 4-point scale (not at all, somewhat, quite a bit, and a great deal).

Stress

To measure stress, participants were asked, "Overall, how stressed have you felt about your treatment today?" Stress was rated on a 10-point scale (1="not at all stressed," 5="moderately stressed," and 10="the most stressed you could be").

Daily Coping

The coping strategies used in the short surveys were adapted from the COMPI Coping Strategy Scales (Copenhagen Multicentre Psychosocial Infertility Research Program) [37] and Daily Record Keeping Sheet of Boivin and Lancastle [29]. We originally planned to use the full COMPI scale; however, consumer feedback during development and piloting was that it contained too many items (n=19) to include in high-frequency surveys and that some of the strategies would not be expected to change in the short term (eg, "Have grown as a person in a good way") and so were not relevant for surveys that were completed every 2 days. In response to this feedback, we grouped several of the COMPI coping strategies. Two strategies from the Daily Record Keeping Sheet were not included in the COMPI (planning and relaxing), so we added these strategies. Finally, participants asked us to include exercising as a coping strategy.

In the final version of the daily coping measure (which we call "CopeIVF"), participants were asked, "People cope with fertility treatment in different ways. What strategies have you been using in the last two days? And have they helped you to feel better?" The coping strategies were: "Avoiding (e.g., avoid being with children/pregnant women, leave when people are talking about pregnancy, avoid talking about my fertility treatment)"; "Distracting (e.g., turn to work or other activities to keep my mind off things)"; "Seeking social support (e.g., accept sympathy, ask family/friends for advice, talk about my feelings, talk about how treatment affects me emotionally or physically)"; "Seeking information (e.g., talk to someone who's done/doing fertility treatment, watch TV shows about fertility treatment, search the internet for information)"; "Exercising (e.g., engage in physical activity like walking, running, working out or dancing)"; "Hoping (e.g., hope a miracle will happen, have fantasies and wishes, think about baby names or look at baby store catalogues/websites)"; "Accepting/waiting (e.g., accept that I need to follow the process accept that the only thing I can do right now is wait)"; "Reframing (e.g., try to see things positively, look on the bright side, find something good in what is happening, focus on the benefits, not just the difficulties)"; "Planning (e.g., made a plan of action and followed it, organised medications and appointments, made practical arrangements)"; and "Relaxing (e.g., did something nice, took time out to relax or take care of myself)". Daily coping strategies were rated on a three3-point scale (no; yes, but it didn't help; yes, and it helped).

Typical Coping

The coping strategies people typically use to cope with their infertility were measured by the COMPI Coping Strategy Scales [37]. These scales are based on the Folkman and Lazarus Ways of Coping Scale and were adapted for the infertility-specific context. We used this instrument in its original format (19 items) but added one item at the end: "Talk to someone about how tests and treatment affect me physically." This was to complement the existing item, "Talk to someone about how tests and treatments affect me

emotionally." Participants were asked, "At the beginning of this survey, we asked you about the coping strategies you've used over the last 2 days. Now, we'd like you to think about the coping strategies you've used since the beginning of your current treatment cycle. People cope with fertility treatment in different ways. What strategies have you been using from the start of your current cycle to now?" Coping strategies were rated on a 4-point scale ("not used," "used somewhat," "used quite a bit," and "used a great deal").

Functioning

During consultation and pilot testing, consumers advised us that measuring the impact of fertility treatment on daily functioning was important. As we were unable to find an infertility-specific measure of functioning, we devised 2 questions based on the 36-Item Short Form Health Survey [39]. Participants were asked, "Think about the physical aspects (e.g., fatigue, pain), emotional aspects (e.g., sadness, mood swings) and logistical aspects (e.g., appointments, medication schedule) of your fertility treatment. During the last week: a) How much did your fertility treatment interfere with your normal work (including both work outside the home and housework)? b) How much of the time has your fertility treatment interfered with your social activities (like visiting friends, relatives etc.)?" Both questions were rated on 5-point scales (Question 1: not at all; a little bit; moderately; quite a bit; extremely) and (Question 2: none of the time; a little of the time; some of the time; most of the time; all of the time). Functioning was assessed during 3 key stages of treatment (stimulation, approximately day 13; transfer/biopsy, approximately day 19; and waiting period, approximately day 27), along with treatment burden (which was measured by the treatment module in the Fertility Quality of Life tool [FertiQoL]; Table 1).

The surveys also included 3 types of qualitative questions for female patients. First, every survey included a free-text box at the end that said, "What else would you like to tell us?." Second, the day 29 survey included 2 questions about support from others. The instructions for patients were: "We would like to understand more about the support you are receiving and the support you would like to receive from the people in your life (eg, partner [if you have one], friends, family, work colleagues, workplace, clinical care team [nurses, fertility specialists, psychologists, counselors]). (1) During your fertility treatment, what support has been most helpful for you? (this could be support from any source or at any point during your fertility treatment journey, not just this treatment cycle); and (2) Thinking about your fertility treatment, what kind of support would you like to have received—what else would have been helpful?" Third, the days 11, 17, 25, and 37 surveys included a question on advice/tips. It read, "What practical tips or advice would you share with other patients who are in the same phase of a cycle as you?"

Partners and Social Supporters

The interviews were semistructured, with questions informed by the literature and consumer consultation, and designed to provide the content required for the online resource (the questions are in Textbox 1). The same questions were used in the online survey for participants who could not or would not complete a scheduled interview. Where possible, we kept the questions the same for partners and for social supporters, but some questions were unique to each group. Follow-up prompts (listed below each question) may not have been used in every interview.

Textbox 1. Semistructured interview guide for the qualitative arm of the IVF Support Study (ie, partners and social supporters).

Partners

1. How did fertility treatment affect you?
   - Negative impacts? Positive impacts? (include physical, emotional, financial)
   - What feelings did you experience?
   - Did it change the way you saw yourself (your identity)?
2. How do you think fertility treatment affected your partner?
   - Negative impacts? Positive impacts? (include physical, emotional, and financial)
3. How did fertility treatment affect your relationship with your partner?
   - Negative impacts? Positive impacts?
4. How did fertility treatment affect your relationship with other people, such as family and friends?
   - Negative impacts? Positive impacts?
5. How long did all these effects last? (how long did it take you both to recover from fertility treatment)?
6. What coping strategies did you use when you were going through fertility treatment?
   - Specifics (eg, went to movies, talked to a friend, refused to think about it, and drank)
   - Which strategies helped?
   - Which strategies made you feel worse? (note that some might have had mixed effects)
   - Did you receive any helpful comments or advice from other people? (if yes, what?) (we're looking for tips on helpful things people can say)
   - Did you receive any hurtful comments or advice from other people? (if yes, what?) (we're looking for tips on what not to say)

7. How did you support your partner? (be specific; eg, went to appointments, talked about treatment impacts, shared decision-making, and cooked dinner)
    - What do you think your partner found most helpful?
8. What support would you have liked to receive but didn't? What do you wish people had done?
9. What advice would you give to other people going through something similar?
    - Can you share any practical tips or strategies for supporting themselves or supporting their partner?
10. What else would you like to tell us?

Social supporters

1. Do you have any experience yourself of fertility treatment? If yes, what type of cycles did you do?
2. What was it like for you to support someone through fertility treatment?
    - How did it affect you?
    - Negative impacts? Positive impacts?
    - What feelings did you experience?
3. How do you think fertility treatment affected your friend/family member?
    - Negative impacts? Positive impacts? (include physical, emotional, and financial)
4. How did fertility treatment affect your relationship with your friend/family?
    - Negative impacts? Positive impacts?
5. Do you have any advice on:
    - Helpful things to say to someone going through treatment?
    - What NOT to say to someone going through treatment?
6. How did you support your friend/family member? (be specific; eg, talked about treatment impact and distracted them)
    - What do you think your friend/family member found most helpful?
7. What advice would you give to other people supporting a loved one through fertility treatment?
    - Can you share any practical tips or strategies?
8. What else would you like to tell us?

Statistical Analysis

Analysis of the quantitative patient data will include data cleaning to examine missing values and data screening to check: scoring of scales and subscales, cell sizes in categorical variables, and distributions in continuous variables. Surveys will need to be harmonized across patients, as the timing of events in IVF cycles can differ between people; for example, one person may have had an egg pickup on day 13 and another on day 15 of the cycle. Harmonization will recode surveys so that they are comparable across people (eg, the egg pickup or embryo transfer survey is the same for everyone, regardless of which survey it was originally reported in). Surveys will also need to be harmonized across the 4 types of cycle, as some of the events differ; for example, a PGT cycle has an egg pickup but not an embryo transfer, and a frozen embryo transfer (FET) cycle has an embryo transfer but not an egg pickup. Initial statistical modeling will include (1) multilevel models accounting for repeated measures and nested data to investigate longitudinal change in coping, social support, and emotions; (2) latent class analysis to determine the emotions and coping strategies characteristic of each treatment stage (profiles), with follow-up multilevel models (accounting for days nested within cycles nested within participants), to investigate the association between coping profiles and stress levels, controlling for first/repeat cycle and type of IVF; and (3) linear regression, using generalized estimating equations to account for cycles nested within participants, to investigate associations between baseline protective factors (eg, social support, resilience, acceptance, and coping assessment) and treatment burden (emotional and physical) with anxiety at the end of the cycle, controlling for demographic factors (eg, first/repeat IVF and type of cycle) and cycle outcome (positive/negative).

Analysis of the qualitative data from partners and social supporters will include checking autotranscripts for accuracy and deidentifying the data (eg, removing the names of people and clinics). Analysis will follow a deductive framework analysis [40], informed by stress and coping theory [41] and guided by the content required in the online intervention (ie, case studies and quotes describing personal experiences and impact, coping strategies used, advice on what to do and not to do when supporting people through IVF, and tips on self-care). Familiarization will involve reading through the transcripts to identify recurrent themes. The themes identified from the participants will be combined with the *a priori* research questions and stress/coping theory to construct a thematic framework. The framework will be used to construct an index, and quotes from the transcripts will be copied and pasted into index categories. Mapping and interpretation will incorporate the original research questions and the themes that emerged from the analysis. Two coders will work together to construct the index, with input from the wider research team. Transcripts will be double-coded until consistency between the coders is achieved, with disagreements in coding discussed with the wider research team. Once consistency is achieved, the remaining transcripts will be split between the coders and will be single-coded. The transcripts from the interviews and surveys will be coded together in the same process, and the coders will discuss and report any differences in the levels of detail between the responses. Coders will write a positionality statement and maintain a research journal during the qualitative analysis

to document reactions, assumptions, and interpretations, including how these were tied to their own experiences and beliefs. The quantitative and qualitative data from patients will be integrated through narrative at the interpretation and reporting levels [42]. The quantitative data will be used to understand and present the emotional experience and use of coping strategies during each stage of the cycle (eg, by presenting average values for each day across the cycle in a graph). Using a weaving approach, individual quotes from the corresponding stage will be used to "unpack" these average quantitative values by conveying the nuances and differences in experience.

Ethical Considerations

Approval for the quantitative (2023/HE002167) and qualitative (2024/HE000298) arms of the IVFSS was obtained from the University of Queensland's Human Research Ethics Committee. All participants provided written informed consent.

Results

Funding commenced in June 2023 and data collection occurred between February 2024 and November 2025. For the quantitative patient arm of the study, there were 221 cycles from 179 patients (38 patients underwent repeat cycles within the study; eg, a canceled fresh cycle followed by another fresh cycle or a PGT cycle followed by an FET cycle).

Basic demographic characteristics of the 179 participants are provided in Table 2. Half (n=91, 51%) reported at least one reproductive disorder (eg, endometriosis), and almost two-thirds (n=107, 60%) were aged 35 years or older, and most (n=136, 76%) did not have biological children when they joined the IVFSS.

Table 2. Demographic characteristics of patients included in the In Vitro Fertilization Support Study (IVFSS; n=179).

Patient characteristic	Patients, n (%)
Has endometriosis	
No	128 (71.5)
Yes	51 (28.5)
Has polycystic ovary syndrome	
No	137 (76.5)
Yes	42 (23.5)
Has fibroids	
No	155 (88.1)
Yes	21 (11.9)
Has at least one listed reproductive disorder	
No	88 (49.2)
Yes	91 (50.8)
Age (y)	
Less than 30	16 (9.1)
30 to 34	55 (31.3)
35 to 39	63 (35.8)
40 or more	42 (23.9)
Has biological children	
No	134 (75.7)
Yes	43 (24.3)

Treatment characteristics of these cycles are provided in Table 3. The percentages were similar across the 4 cycle types included in the IVFSS. Approximately one-third of the cycles were first attempts at IVF. Overall, 15% of cycles were canceled and these were mainly fresh and PGT cycles (data not shown). An additional 15% of cycles were changed to a different cycle type, and these were mainly fresh cycles that became freeze all cycles (data not shown).

Table 3. Cycle characteristics of the cycles included in the In Vitro Fertilization Support Study (IVFSS; n=221).

Cycle characteristic	Cycles, n (%)
Type of cycle	
Fresh embryo transfer	55 (24.9)
Frozen embryo transfer	47 (21.3)
PGT[a]	66 (29.9)

Cycle characteristic	Cycles, n (%)
Freeze all	53 (24.0)
Cycle canceled	
No	188 (85.1)
Yes	33 (14.9)
Cycle type changed	
No	187 (86.2)
Yes	34 (14.4)
First IVF[b] cycle for patient	
No	154 (69.7)
Yes	67 (30.3)

[a]PGT: preimplantation genetic testing.
[b]IVF: in vitro fertilization.

For the qualitative arm of the study, there were 65 participants. Of these, 37 were partners (31 male and 6 female) and 28 were social supporters (15 friends, 6 siblings, and 7 mothers). Of the 65 participants, 27 participated in online interviews and 38 completed the online survey version of the interview questions. The surveys and transcripts have been checked for accuracy, deidentified, and are ready for analysis.

Discussion

Expected Findings and Implications

We expect several novel findings from the IVFSS. First, while it is well established that emotions change during a cycle as patients fluctuate between hope and anxiety across the succession of blood tests, scans, procedures, and test results [11], most studies have not measured emotions across the whole cycle and few have collected information on protective factors. We will also be able to investigate whether there are any differences in the emotional experience of different types of cycles (eg, fresh embryo transfer vs FET), as we could find only 3 studies that have investigated this, and their findings were mixed [43-45]. The findings from the IVFSS will enable us to design interventions that provide tailored support during each phase of the treatment cycle for multiple types of cycles.

Second, coping is a dynamic process influenced by multiple factors, including the way people think about their situation (attribution), the resources they have available, and the coping strategies they use [41]. We know from previous research that coping strategies do change across an IVF treatment cycle [29], but we do not know which strategies are most helpful at different times. Understanding the interaction between attributions, individual risk/protective factors, and timing during the cycle may enable us to provide suggestions on the coping strategies that may be more helpful at different points during treatment.

Third, as male partners have been underrepresented in fertility research [46], we do not have a good understanding of their experience during treatment. While previous research has established that male partners seek support from different sources (when they seek support at all) and use different coping strategies than female partners do [7], the IVFSS will provide a deep understanding of the experience of partners and clear information on the coping strategies that work for them and the types of support they would like.

Finally, friends and family are the most common source of support for patients and partners during treatment [13,19]. However, their support skills need to be optimized for an IVF context to provide effective support and avoid unintentionally making things worse [21], which can result in patients and partners not seeking social support or talking about their experiences. Providing good support is mutually beneficial, as it can ameliorate distress in patients and partners and reduce helplessness in family and friends; however, we were unable to find any evidence-based resources for family and friends to use. The findings from the IVFSS will allow us to understand the experience of family and friends and use this evidence to create co-designed resources.

In terms of progress to date, at the time of submission, data collection and cleaning have concluded, and analysis has commenced. Website development has commenced, and the co-designed online resource is expected to go live by the end of 2026.

Strengths and Limitations

The IVFSS has both strengths and limitations. First, the sample size in terms of cycles and patients is higher than in similar studies [29,47,48]. The heterogeneity of the types of cycles included in the study (first and repeat IVF, 4 types of cycle, and including canceled cycles) is advantageous because it reflects the everyday practice of fertility clinics, and this will enhance the translation of the findings. However, it will reduce statistical power for analyses exploring some subgroups. Second, attrition was extremely low, with only 5 patients dropping out of the study once they started their cycle. This may reflect a selection bias, in that the study was voluntary, and it is possible that only patients who were motivated to make a difference for others agreed to participate, but it could also reflect that the extensive co-design and pretesting of the methodology and surveys meant that they were low burden and perceived as relevant and helpful

to patients undergoing treatment. Third, the inclusion of male and female partners will help to address an important research gap [26]. However, although we had a high amount of interest from female partners in same-sex relationships, the final sample only included 6. This is mainly because lengthy delays in accessing donor sperm meant potential participants could not join the IVFSS before data collection closed. Understanding the experience of female partners is a critical area for future research. Additionally, we had a great deal of difficulty engaging male partners in interviews, despite multiple attempts to schedule and reschedule and offering flexibility regarding the day and time of the interview. We had much higher completion rates once we offered the online survey version of the interview questions, and more than 70% of male partners completed a survey rather than an interview. It can be harder to engage men than women in research, particularly in fertility [27,46], and this may reflect reluctance to discuss fertility treatment or the use of coping strategies that favor avoidance [26]. However, approximately 50% of the other groups included in the qualitative arm of the IVFSS also used surveys rather than interviews. This difficulty participating in online interviews may reflect the busyness of people's lives (ie, the convenience of completing a survey when they have time rather than attending a scheduled interview) or people's preference for privacy. Fourth, 15% (33/221) of the cycles included in the study were canceled, and 15% (34/221) were changed to another type of cycle. This is in line with industry findings that 25% of fresh embryo transfer cycles do not reach the transfer stage [9]. This will reduce the sample size for research questions investigating posttransfer/biopsy events such as the period after transfer/biopsy when people are waiting for test results. Despite this drawback, it will allow us to understand the experience of canceled cycles, as these are often excluded in other studies. Finally, using a mixed-method design will allow us to include 3 different groups of participants in a way that is most likely to be acceptable to them and to gain insights into the similarities and differences in their experience. The quantitative data will allow us to generate insights across the cycle, necessary for building an interactive intervention. The qualitative data will allow us to synthesize themes within and across groups, construct detailed case studies, and extract insightful quotes, all of which will provide deep and nuanced information for the online resource. Integrating this information will provide a unique, evidence-based resource. While it would have been useful to have identical data sources for all 3 groups, the learnings from this study will help us to formulate new research questions and methods for future research that will address these limitations.

Conclusions

The IVFSS takes a unique systems approach by collecting novel data from patients, partners, and social supporters, and we will use this evidence to create an online interactive resource to support people during their IVF treatment. All aspects of the study were co-designed, and the study outputs will also be co-designed, valuing and integrating the lived experience of patients, partners, and social supporters. This research aims to reduce the psychosocial burden of fertility treatment and has the potential to influence how care is provided to people during fertility treatment.

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Generative AI Use

Generative AI was not used for any aspect of this manuscript.

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Data Availability

The dataset is not publicly available.

Authors' Contributions

KMM, JB, KH, HH, and GDM conceptualized the In Vitro Fertilization Support Study (IVFSS), developed the methodology, conducted pilot work, and obtained funding. KMM and JF implemented the IVFSS and collected and curated the data. KMM, JF, and AR conducted the analysis, harmonization, and cleaning of the quantitative data. JF, SG, and KMM conducted the co-design. KMM drafted the manuscript, and all authors provided input.

Conflicts of Interest

None declared.

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Abbreviations

ART: assisted reproductive technology
COMPI: Copenhagen Multicentre Psychosocial Infertility Research Program
FET: frozen embryo transfer
IVF: in vitro fertilization
IVFSS: In Vitro Fertilization Support Study
PGT: preimplantation genetic testing

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