Exploring Group Psychological Interventions as a Means to Improve Anxiety, Depression, Infertility Stress, and Pregnancy for Women with Infertility Utilising Assisted Reproductive Technologies

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LIST OF ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACT	Acceptance and Commitment Therapy
AD	Antidepressant
ANZARD	Australia and New Zealand Assisted Reproduction Database
ANZICA	Australia and New Zealand Infertility Counsellors Association
ANZSREI	Australian and New Zealand Society for Reproductive Endocrinology and Infertility
APA	American Psychological Association
APP	Application
ART	Assisted Reproductive Technologies
BAI	Beck's Anxiety Inventory
BCT	Behaviour Change Technique
BDI	Beck's Depression Inventory
BPSM	Biopsychosocial Model
BT	Behavioural Therapy
CBT	Cognitive Behavioural Therapy
CCL	Cognitive Checklist
CG	Control Group
CINAHL	Cumulative Index to Nursing and Allied Health Literature
CP	Clinical Psychologist
EBMS	Eastern Body-Mind-Spirit
ESHRE	European Society of Human Reproduction and Embryology
FPI	Fertility Problems Inventory
FSANZ	Fertility Society of Australia and New Zealand
GAD-7	Generalised Anxiety Disorder 7 item scale

GHQ-28	General Health Questionnaire
GP	General Practitioner
HADS	Hamilton Assessment of Depression Scale
HREC	Human Research Ethics Committee
HFEA	Human Fertilisation & Embryology Authority
ICBI	Importance of Childbearing Index
ICMART	International Committee Monitoring Assisted Reproductive Technologies
ICSI	Intracytoplasmic Sperm Injection
IFFS	International Federation of Fertility Societies
IM	Intervention Mapping
IMB	Information-Motivation-Behaviour
IUI	Intrauterine Insemination
IVF	In Vitro Fertilisation
KMCS	Kansas Marital Conflict Scale
KMSS	Kansas Marital Satisfaction Scale
MBI	Mindfulness-Based Intervention
MBSR	Mindfulness-Based Stress Reduction
MDD	Major Depressive Disorder
MDS	Marital Dissatisfaction Scale
NISS	Newton Infertility Stress Scale
NHMRC	National Health and Medical Research Council
OI	Ovulation Induction
PBS	Pharmaceutical Benefits Scheme
PCOS	Polycystic Ovary Syndrome
PGT	Preimplantation Genetic Testing
PGWBI	Psychological General Well Being Inventory

PhDP	PhD Psychology
POMS	Profile of Mood States
PRCI	Positive Reappraisal Coping Intervention
PSS	Problem-Solving Skills Training
PT	Psychotherapist
RCT	Randomised Control Trial
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
RT	Relaxation Therapy
SCR-90	Symptom Checklist Revised
SD	Standard Deviation
SR	Stress Reduction
STAI	State-Trait Anxiety Inventory
TFR	Total Fertility Rate
VAS-A	Visual Analogue Scale – Anxiety/Uncertainty
WHO	World Health Organisation

PUBLICATIONS, PRESENTATIONS AND DISSEMINATION OF RESEARCH

PEER REVIEWED PUBLICATIONS

Warne, E., Oxlad, M., & Best, T. (2022). Evaluating group psychological interventions for mental health in women with infertility undertaking fertility treatment: A systematic review and meta-analysis. *Health Psychology Review*, 17(3), 377-401. https://doi.org/10.1080/17437199.2022.2058582

Warne, E., Oxlad, M., & Best, T. (2023). Consulting patients and providers of assisted reproductive technologies to inform the development of a group psychological intervention for women with infertility. *PEC Innovation*, 3, 100206. https://doi.org/10.1016/j.pecinn.2023.100206

Warne, E., Best, T., & Oxlad, M. (2025). Challenges Recruiting Women with Infertility to an In-Person Group Psychological Intervention Program – A Commentary Considering the Barriers to Recruitment [Ready For Submission].

CONFERENCE PRESENTATIONS

Warne, E. (2021). Utilising metaphor, imagery, and hypnotic suggestion to reduce the guilt, body doubting and distress of infertility: A how to session. *Australian Psychological Society National College of Health Psychologists Conference*, 13- 14th November, Adelaide.

Warne, E. (2025). Talk that transforms: Incorporating clinical hypnosis in supportive counselling. *Fertility Society of Australia and New Zealand Annual Conference: Conceiving Possibilities - From Research to Reproductive Care*, 6th September, Adelaide.

Warne, E., Calo, B., McLean, S., Hamersley, K., Potts, J., Monteith, A. (2025). Unlocking ANZICA's collective wisdom on complex cases*. Fertility Society of Australia and New Zealand Annual Conference: Conceiving Possibilities - From Research to Reproductive Care*, 6th September, Adelaide.

OTHER RESEARCH PRESENTATIONS

Warne, E. (2023). *ACT Infertility: Facilitator training of research facilitators*. 10th March, Adelaide.

Warne, E. (2023). ACT infertility research update. *South Australia Society of Hypnosis, Graduate Diploma of Clinical Hypnosis*, 21st October, Adelaide.

Warne, E. (2024). The language we use: Supporting our patients during ART. *Family Fertility Centre Staff Training*, June, 2024, Adelaide.

Warne, E. (2024). Clinical hypnosis and infertility. *South Australia Society of Hypnosis, Graduate Diploma of Clinical Hypnosis Training Course*, February 24th, Adelaide.

Warne, E. (2025). Clinical hypnosis and infertility. *South Australia Society of Hypnosis, Graduate Diploma of Clinical Hypnosis Training Course*, April 12th, Adelaide.

DECLARATION

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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December 2025

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This project was a passion project based on my own challenges with infertility, the impact it had on my own mental health, and the belief I had that my unique positionality of being a psychologist and a woman with infertility could help others. Early discussions with Talitha, a trusted colleague and friend, in 2017 sparked a fire in me that could not be dulled.

Fast forward to 2019 and I reached out to Melissa with an idea, a very ill-formed idea, but one filled with passion. She fortunately saw merit in my unfounded idea and so I commenced my PhD, and soon after fell pregnant with my third gorgeous child, Charlotte.

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"When passion and research meet, there is nothing that can stop you"

PREFACE

Having experienced infertility and the challenges associated with the pursuit of parenthood over a 10-year period, while working as a Clinical Psychologist supporting people with mental health difficulties, I found myself querying what skills, strategies, and clinical experience I had that enabled my ongoing pursuit. I recognised that I was in a unique position, whereby I could possibly support other women with infertility to improve their mental health and experiences of fertility treatment. I had both the lived experience and associated understanding of the challenges, both implicitly and explicitly involved in the process, and the evidence-based, scientist-practitioner model available to me. Once my twins were born, this passion project too started to take form. The more I was exposed to women with infertility in my clinical setting and personal life, the more I realised that the unique blend of lived experience and training as a psychologist placed me in a position of opportunity.

Where my initial training as a psychologist led to my facilitating, implementing and developing group psychological interventions for an offender population, another area of great passion, I realised that those skills and the benefits of group intervention could be useful for women who were going through fertility treatment. Thus, the current research opportunity arose.

OVERVIEW OF DISSERTATION

This dissertation is presented as a “dissertation by publication”, a format that allows the inclusion of publications that have been submitted, accepted or published as well as unsubmitted and unpublished work presented in a manuscript style. This dissertation format allowed the research outcomes and recommendations to be presented concisely and facilitated their timely sharing with stakeholders, such as policymakers and support organisations. Two articles have been published, and a third is currently in the final stages, ready for submission. In addition to the studies undertaken, the dissertation includes content from the group psychological intervention program developed and the facilitator training developed and facilitated, both of which comprise an overview and images of session content. Under the academic rules of The University of Adelaide, including such information in the dissertation is permitted. This information is presented within the body of the dissertation to provide context regarding the current research and its outcomes.

Chapter 1 provides a comprehensive introduction and literature review, outlining current research on the prevalence, causes, and statistics of infertility, and critically examining the impact of infertility through psychological models that consider biological, psychological, and sociocultural stressors. Thereafter, information regarding the impact of infertility is examined, with consideration to the interaction between the biological, psychological and sociocultural factors that contribute to women’s stress when undergoing fertility treatment. The process of medical treatment for infertility is described, and ‘routine care’ for this population is discussed.

Subsequently, the psychological interventions that have been utilised to support women with infertility who are going through infertility treatment are detailed, with examination of the evidence regarding the effectiveness of individual and group psychological interventions. A brief examination of the mode of intervention delivery, strengths and weaknesses of psychological interventions, and overall efficacy follows. This chapter concludes with an overview of the dissertation’s aims.

Building on this foundation, Chapter 2 details the methodological rationale for the research and explains the relevant theoretical frameworks that informed it. Namely, this chapter explains the research sequence, considers the terminology used, and discusses research reflexivity and positionality. Exploration of how the biopsychosocial model, intervention mapping framework, a person-centred approach, and behaviour change techniques are relevant is also included. Finally, a discussion of the challenges encountered in participant recruitment for *Study 3*, including the ethical amendments and practical decisions that shaped the research flow, is also detailed.

After these introductory chapters, two published articles (Chapters 3 and 4) are presented. Chapter 3, a systematic review and meta-analysis of the outcomes of group psychological interventions for women with infertility and Chapter 4, examining the preferences of women with infertility who have or are undergoing fertility treatment, and providers of ART, regarding the development of a group psychological intervention program. The references from these articles have been included in the reference list at the end of the dissertation.

Study 1 - "Evaluating group psychological interventions for mental health in women with infertility undertaking fertility treatment: A systematic review and meta-analysis" - is presented in Chapter 3. This study, published in *Health Psychology Review*, demonstrated the effectiveness of group psychological interventions for improving anxiety, depression, fertility-related stress, and pregnancy rates of women with infertility. The findings of this systematic review and meta-analysis provided valuable data supporting the use of group psychological interventions for this patient group. The results suggested that group intervention improved anxiety, depression, fertility stress, and pregnancy rates. These results and the data thereafter informed Study 2.

Study 2 - "Consulting patients and providers of assisted reproductive technologies to inform the development of a group psychological intervention for women with infertility" – is presented in Chapter 4. This study, published in *PEC Innovation*, was conducted as part of the intervention mapping model to inform the development of the group psychological intervention program. Patients' and providers' preferences regarding group content, frequency and mode of delivery,

session length, and information regarding at-home practice, including acceptability and duration, were identified. These results were incorporated into the group psychological intervention program described in this dissertation.

In Chapter 4, the focus shifts to the development of a group psychological intervention program for women with infertility undergoing ART. As mentioned, this was informed by *Study 2.* This chapter provides essential background for the group psychological intervention program. An overview of the program content is provided, along with illustrative examples of actual program content (e.g. session slides, participant manual excerpts, and the format of the hypnosis recordings and ACT at-home practice).

Chapter 5 shares information about the group psychological intervention facilitator training package. Like Chapter 4, it offers concrete examples of training materials, session content, participant feedback, and images illustrating program implementation in practice.

Chapter 6 presents a commentary that explores the approach taken to recruit women with infertility into a Randomised Control Trial (RCT) to evaluate the group psychological intervention program. It illustrates the iterative approach taken to reflexively respond to the barriers encountered in recruiting women with infertility who are also undergoing ART into an intervention. This commentary highlights the complexities and practical limitations faced in real-world settings. Based on informal feedback from women with infertility, a review of the literature, and consideration of the format of the recruitment process, the commentary offers recommendations to be considered in future research in clinical populations.

Finally, Chapter 7 synthesises the main research findings, discussing their theoretical and practical implications, and offers well-considered recommendations for the broader implementation of the group psychological intervention across Australian fertility clinics for women with infertility who are undergoing ART. This concluding chapter also reflects on the limitations of the current research, outlines future research pathways, and applies the Re-AIM model to suggest areas for

refinement in the design and delivery of future intervention programs. The dissertation ends with concluding comments.

CHAPTER 1

INTRODUCTION AND LITERATURE REVIEW

1.1. Overview

In this chapter, I provide a comprehensive exploration of infertility, its prevalence, and associated impacts on individuals and communities. I outline the clinical definitions and epidemiology of infertility, highlighting medical and social factors contributing to its incidence across various populations. Next, I examine the emotional, relational, and financial consequences faced by people with infertility, as well as the broader societal implications. I also give attention to the range of medical interventions available, including assisted reproductive technologies (ART), their definitions, and success rates. Then, I review the psychosocial impacts of infertility and ART treatment and describe evidence-based psychological interventions for women with infertility, both individual and group, with a particular focus on their delivery formats and effectiveness. After identifying gaps in routine care and establishing the rationale for further research to inform tailored support for women with infertility who are undergoing ART, I conclude the chapter with the dissertation's aims.

1.2. Desire for and Pathways to Parenthood

The path to parenthood is often not linear. Typically, individuals and couples identify their desire for parenthood, and cease contraception, or seek medical intervention. For many, this results in the conception and subsequent birth of a child. However, desire alone does not automatically result in parenthood for many individuals and couples. In fact, as many as one in four heterosexual couples in Australia have been unable to conceive within a 12-month period of unprotected sexual intercourse (Australian Bureau of Statistics [ABS], 2002). As a result, many people may require medically assisted reproduction, and some may require ART (see *Section 1.7* and Table 1.1 for further information), to assist with infertility, which will be defined in the upcoming section.

1.3. Definitions of Infertility

Definitions of infertility can vary and, notably, have evolved over time. A commonly used definition describes infertility as a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after twelve months or more of regular, unprotected sexual intercourse (Zegers-Hochschild et al., 2017). Infertility can occur when attempting pregnancy for the first time, referred to as *'Primary Infertility'*, or following the successful birth of a child, referred to as *'Secondary Infertility'* (Archetti, 2024; Bokek-Cohen, 2024). According to the commonly used definition, a couple is defined as experiencing infertility if, after 12 months of unprotected sexual intercourse, they have not become pregnant (Zegers-Hochschild et al., 2009, 2017). However, that definition has been recognised as problematic as individuals in any family constellation (i.e., single people, and people in same sex or heterosexual relationships) can experience infertility, and this definition excludes single and same-sex people and their pursuit of parenthood (Archetti, 2024; Bokek-Cohen, 2024). More recent and inclusive definitions now reference people more broadly, for example infertility is "a disease characterised by the failure to establish a clinical pregnancy after 12 months of regular, unprotected sexual intercourse or the inability to conceive due to an impairment of a person's capacity to reproduce either as an individual or with his/her partner" (Zegers-Hochschild et al., 2017, p. 401).

In Australia and New Zealand, a broader and more inclusive definition of infertility has been reached by consensus within the Australian and New Zealand Society for Reproductive Endocrinology and Infertility (ANZSREI). That definition, in line with the American Society of Reproductive Medicine, has further been endorsed by the Fertility Society of Australia and New Zealand (FSANZ) and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG). The broader definition includes single people and same sex couples (Hull et al., 2024). It has resulted in the Australian Government expanding access to government funding via Medicare (Australia's universal health insurance scheme) , which enables more Australians to claim financial support for fertility treatment. The consensus statement additionally stipulates that "Nothing in the definition should be used to deny or delay treatment to any individual, regardless of

relationship status or sexual orientation" (Hull et al., 2024, p. 1). Whichever definition researchers or healthcare providers apply, infertility impacts the individual and society, and global prevalence rates, which are somewhat consistent but may be increasing, show why infertility is a global health issue (World Health Organisation [WHO], 2023; International Federation of Fertility Societies [IFFS], 2022; Nik Hazlina et al., 2022, 2022).

1.4. Prevalence of Infertility

Infertility is a silent epidemic that often affects people, no matter their sex at birth or relationship preference. Infertility is often not spoken of due to the associated stigma (Taebi et al., 2021; Xie et al., 2023). Globally, prevalence rates suggest that infertility affects approximately one in six people (IFFS, 2022; Nik Hazlina et al., 2022), while Australian prevalence rates indicate that as many as one in four people may be affected by infertility (ABS, 2002; Choi et al., 2022). Infertility rates appear slightly higher in high-income countries (17.8%) than middle- to low-income countries (16.5%) (WHO, 2023).

Although infertility is not gender specific, it is often attributed more readily to female factors, despite there being causation from a variety of factors. Younger women are more likely to experience primary infertility, while the likelihood of secondary infertility increases with age (Duffy et al., 2020). The prevalence of infertility increases with age, particularly for women (Bala et al., 2021; Duffy et al., 2020). Women in their 30s and 40s may experience higher infertility rates due to a decline in the quantity and quality of eggs as they approach menopause (Bala et al., 2021; Sirait et al., 2023). Likewise, there is growing evidence that male factor infertility is increasing, with exposure to toxicants and age-related factors linked to that increase (Dhikhirullahi & Zhang, 2025; Eisenberg et al., 2023; Jafari et al., 2021).

Infertility rates can vary depending on several factors, including but not limited to age, socio-economic status, relationship status, medical conditions, lifestyle, and geographical location. In Australia, infertility affects approximately 1 in 9 heterosexual couples of reproductive age (ABS, 2002; Choi et al., 2022; Rice, 2023). Infertility rates for single people are similar to the global

estimates (WHO, 2023), although it is difficult to be precise given the challenges associated with tracking individuals attempting to conceive alone. Likewise, it is also difficult to measure infertility rates among same-sex couples.

The ABS (2024) reported that the Total Fertility Rate (TFR) for women in Australia has gradually decreased, with a 4.6% decline from 2022 to 2023. In October 2024, the estimated TFR was 1.50 births per non-Indigenous Australian woman and 2.17 births per Aboriginal and/or Torres Strait Islander woman (Rice, 2023). The median age of Australian parents has increased, with mothers being 31.9 and fathers being 33.8 in 2023 (ABS, 2024). The delay in childbearing age was also noted in 2020, where the fertility rate for women aged 40-44 increased nearly threefold from 2019, while the long-term decline of younger mothers continues to the present (ABS, 2002; Bagade et al., 2022; Choi et al., 2022; Connolly et al., 2025). While age is one factor, many other medical and unexplained causes contribute to infertility.

1.5. Causes of Infertility

A range of factors may cause infertility. It is a complex diagnosis, often caused by multiple factors concurrently. Importantly, it is not simply a medical condition. Infertility, as a diagnosis, can be influenced by psychological, biological and social factors (Bala et al., 2021). The biopsychosocial model (see *Section 2.5*) provides a helpful framework for understanding and treating the causes of infertility beyond the medical diagnosis (Bjornsen-Ramig et al., 2024; Bolton, 2023). For example, a woman with infertility may have a medical condition that impacts hormone production or levels (biological), be experiencing high levels of stress (psychological), and financial hardship that precludes participation in appropriate medical care (social). The interplay between these factors is both causative and reinforcing of an infertility diagnosis (Bala et al., 2021; Bolton, 2023).

While it is not always possible to definitively explain the cause of infertility, causes are typically classified as either female factor, accounting for between 20-30% (Liu et al., 2025), male factor accounting solely for 20%, yet 50% combined (Leslie et al., 2025), and no clear aetiology accounting for approximately 10%. Male and female fertility can also be affected by lifestyle diseases

(i.e., diabetes, obesity, metabolic diseases) and some medical conditions (or exposure to toxic solvents or chemicals) that may influence hormones levels (Bala et al., 2021; Hayat et al., 2025; Jafari et al., 2021). However, at other times, there is no clear medical explanation for infertility (Bala et al., 2021; Eisenberg et al., 2023). Furthermore, cultural and societal factors, as well as access to healthcare and fertility treatments, can influence infertility (Bagade et al., 2023; Njagi et al., 2023). From a medical perspective, various factors, including abnormal or suboptimal hormone levels in males or females (i.e., low follicle stimulating hormones, low testosterone, high thyroid stimulating hormones), structural abnormalities in the reproductive organs, ovulation disorders, or underlying health conditions such as polycystic ovary syndrome (PCOS), obesity, diabetes or endometriosis, can cause infertility (Bala et al., 2021; Palomba et al., 2018; Wei et al., 2025).

As mentioned, although fertility is often viewed as a female problem, male factor infertility can also lead to conception difficulties. Recent research suggests that male factor infertility diagnoses are increasing and more attention to these is warranted (Akhatova et al., 2025; Legal & Bui, 2025). Chromosomal difficulties increase with age, and as a result the sperm produced may be aneuploid. Sperm shape (morphology), volume, and concentration, movement (motility), and quality (degree of DNA fragmentation) all play a significant role in conception (Eisenberg et al., 2023; Jafari et al., 2021). Paternal age additionally impacts both the production and quality of sperm available. As men age, they are observed to produce less sperm and there is often an increase in motility difficulties and chromosomal abnormalities (Akhatova et al., 2025; Mitrakas et al., 2025). Some recent research suggests that this decline becomes more significant beyond 40 years of age (Mitrakas et al., 2025). Additionally, lifestyle factors, such as diet, weight, stress, sleep, and exercise (Akhatova et al., 2025; Eisenberg et al., 2023), genetics, anatomical conditions, and physiological considerations (Jafari et al., 2021), can all affect sperm.

Likewise, female factor infertility is often due to genetics, anatomy, and various physiological causes (Bala et al., 2021; Palomba et al., 2018). Uterine factors such as abnormalities, menstruation and ovulation disorders, obesity and insulin difficulties, or hormone levels (I.e., low FSH or high

testosterone), autoimmune difficulties can each contribute to infertility (Sirait et al., 2023). Lifestyle and environmental factors are also relevant in female-factor infertility, with diet, exercise, stress, exposure to chemicals and toxins, and endocrine disruptors all impacting fertility (Bala et al., 2021; Sirait et al., 2023). Mental health disorders, such as eating disorders, can also detrimentally affect fertility as they have a direct impact on hormones, menstruation, and the luteal phase (Bala et al., 2021). These factors can occur in isolation or more often co-occur, further complicating fertility (Bala et al., 2021; Liu et al., 2025; Wei et al., 2025). In turn, females may use contraception to manage reproductive or hormonal difficulties, which also delays attempts to conceive (Liu et al., 2025; Sirait et al., 2023)

As contraception options and educational opportunities have increased, and people delay partnering until they meet the right partner, and thereafter save for financial security, age also plays a significant role in infertility, as fertility declines with advancing years (Bagade et al., 2022; Choi et al., 2022; Sirait et al., 2023). Indeed, age appears to be a significant factor in explaining infertility (Duffy et al., 2020; Khosla & Allotey, 2025). Specifically, where parenthood is delayed for personal, relational, or medical reasons, higher rates of infertility are reported compared to circumstances where people can minimise delay and seek parenthood at a younger age (ABS, 2002; Choi et al., 2022). Research also suggests that childlessness can be related to education (Bagade et al., 2023; Bala et al., 2021, 2021; Domar et al., 2021; Wei et al., 2025). Specifically, women aged 45-49 without children typically have higher educational achievement (ABS, 2002; Choi et al., 2022). Just as infertility has diverse causes, it can have diverse, significant impacts on women and couples (Bagade et al., 2022; Boivin et al., 2011; Dube et al., 2021).

1.6. Impacts of Infertility

Irrespective of the cause, infertility can have wide-ranging and significant impacts on those affected. It can lead to decisions being made not to pursue parenthood, or conversely lead to undergoing further investigations, trialling interventions to improve fertility, or undergoing medically assisted interventions, such as ART (see *Section 1.7*).

While it impacts the individual with infertility, partners, and other family members may also experience distress (Dube et al., 2021; Duffy et al., 2020; Gameiro et al., 2015). These impacts can include challenges to relationships, mental health, financial stability, and work prospects for people with infertility (Archetti, 2024; Boivin et al., 2011; Bokek-Cohen, 2024; Cousineau & Domar, 2007; Domar et al., 2021; Rooney & Domar, 2018). In addition, infertility has broader implications for the community.

1.6.1. *Relationship Impacts*

Infertility can detrimentally affect couples' relationships, putting strain on their communication, intimacy, finances, and quality of life, as they navigate the emotional and physical challenges of infertility (Bokek-Cohen, 2024; Schmidt et al., 2005; Spoletini et al., 2022). The pressure to conceive and the disappointment of unsuccessful attempts can lead to blame (Dube et al., 2021), shame (Bagade et al., 2022; Dube et al., 2021; Galhardo et al., 2013; Taebi et al., 2021), guilt (Spoletini et al., 2022), or sadness (Dube et al., 2021; Taebi et al., 2021; Xie et al., 2023). Likewise, whether engaging in actively attempting to conceive at home by timing intercourse or when receiving medical intervention to conceive in the form of ART, pressure increases for the couple, and closeness and intimacy are often adversely impacted (Bagade et al., 2022; Bokek-Cohen, 2024; Cunha et al., 2016; Holley et al., 2015; Malekpour et al., 2023; Schmidt et al., 2005; Zhang et al., 2022).

Pursuing fertility treatment can also result in focusing solely on the pursuit of parenthood, involuntary childlessness, and sacrificing a healthy or ongoing relationship (Rozen et al., 2023). The invasiveness of ART and/or the medical factors for infertility additionally increase discord between couples, largely as the woman undergoing ART must adhere to medication regimes, self-inject daily, be scanned and blood tested, and may experience emotional dysregulation due to hormones (Nik Hazlina et al., 2022; Vioreanu, 2021). This pursuit of ART and parenthood places additional strain on a couple's intimacy, closeness and connection, and can lead to communication difficulties (Schmidt et al., 2005; Spoletini et al., 2022; Ying et al., 2016; Zhang et al., 2022).

Difficulties within a relationship can also ensue when there is an explicit or implicit attribution of blame, or there is a suggestion that infertility is due to one person's health or infertility (Spoletini et al., 2022; Taebi et al., 2021; Xie et al., 2023). These relational difficulties may arise during the initial realisation that conception is not occurring, or are mostly experienced, with increasing degrees, as the diagnosis of infertility occurs and formalised medical intervention commences (El Kissi et al., 2013; Read et al., 2014). As such, at both a relationship and individual level, infertility can adversely affect psychological well-being.

1.6.2. *Psychological Impacts*

The emotional toll of infertility can be profound (Boivin et al., 2011; Cousineau & Domar, 2007; Dube et al., 2021). Individuals may experience sadness (Bagade et al., 2022; Dube et al., 2021; Spoletini et al., 2022) and grief (Bedi et al., 2019; Vioreanu, 2021) as they encounter challenges in conceiving or carrying a pregnancy (Bagade et al., 2022; Cousineau & Domar, 2007; Nik Hazlina et al., 2022). The impact of infertility can lead to general distress or fertility-related stress (Bagade et al., 2022; Peterson et al., 2025; Spoletini et al., 2022; Vioreanu, 2021), and contribute to self-blame (Dube et al., 2021), stigma (Hayat et al., 2025; Peterson et al., 2025; Taebi et al., 2021; Xie et al., 2023), and difficulties with daily activities (Collins, 2019) when conception is not occurring. However, once a diagnosis of infertility is made, generalised distress can worsen and lead to the development of symptoms of mental health (Cousineau & Domar, 2007; Cunha et al., 2016; Dube et al., 2021; Taebi et al., 2021).

The constant cycle of hope and disappointment when attempting to conceive and receiving medical intervention due to infertility can lead to increased stress, anxiety, and depression (Bagade et al., 2022; Gdańska et al., 2017; Holley et al., 2015; Ogawa et al., 2011; Palomba et al., 2018; Purewal et al., 2018). Bagade et al. (2022) found that in an Australian population, women with primary or secondary infertility were 25% more likely to experience psychological distress than women without infertility. Women in employment reported less psychological distress, while women with infertility and other health complaints reported higher levels of distress (Bagade et al.,

2022, 2023). Further, as ART treatment progresses, these symptoms can further develop into depressive or anxiety-based disorders (Bagade et al., 2023; Cousineau & Domar, 2007; Domar et al., 2012; Gdańska et al., 2017; Ogawa et al., 2011).

Zhang et al. (2022) conducted a cross-sectional study of 1,247 couples in China exploring the prevalence and risk factors for anxiety and depression in couples with infertility. They found that 13.5% of women and 8.7% of men reported anxiety, and 9.4% of women and 7.9% of men reported depression (Zhang et al., 2022). In another cross-sectional study of 1,128 participants in Tehran, Maroufizadeh et al. (2018) found that 33.9% of women and 31.7% of males reported depressive symptoms, while 58.1% of women and 38% of men reported anxiety; females were 2.26 times more likely to have anxiety symptoms than males. They also found that patients who had been undergoing treatment for more than 5 years were 50% more likely to experience anxiety symptoms and 30% more likely to experience depressive symptoms (Maroufizadeh et al., 2018).

Other researchers have explored the prevalence of Major Depressive Disorder (MDD) in individuals undergoing fertility treatment. Holley et al. (2015) reported that 39.1% of women and 15.31% of males met the diagnostic criteria for MDD. Furthermore, they observed that having a history of MDD increased the likelihood of developing MDD during fertility treatment four-fold in women and seven-fold in men (Holley et al., 2015).

More recently, in a review of 44 studies (n = 53,300), MDD was recorded in 24.1% of women with infertility (Salari et al., 2024). Also, in a recent systematic review and meta-analysis regarding mental disorders in women with infertility, Bagade et al. (2023) considered the social determinants that mitigated symptom severity. Among women with infertility, depression, anxiety, and stress, were higher in women of lower to middle socio-economic status, indicating that employment and socio-economic status were somewhat protective regarding the development of mental health disorders. It was, however, noted in a longitudinal study of 6,582 Australian women that depression and anxiety continued to persist even if a successful outcome of a birth occurred (Bagade et al., 2022).

Further, Bagade et al. (2022) found that women with primary infertility or partnered women were more likely to experience mental health distress than women with secondary infertility or those pursuing treatment as a single person. Likewise, anxiety was experienced across both primary and secondary infertility, fluctuating over the survey periods with prevalence rates between 50-55% at the first time point to 40-50% at the final time point. Depression was more prevalent in women with primary infertility across the study periods, with prevalence rates between 20-25% initially, and between 15-20% at the final survey completion (Bagade et al., 2022). Notably, the experience of any psychological distress at time point one indicated rates between 30-40% for all groups. However, at the final time point, 45-50% of women with primary, secondary or resolved infertility were still reporting psychological distress, while those with no infertility or those who were voluntarily child-free had a 40% prevalence rate of any psychological distress (Bagade et al., 2022).

Participating in ART can affect an individual's sense of self and their identity as a woman (Cousineau & Domar, 2007; Nik Hazlina et al., 2022). Similarly, men engaged in fertility treatment reported higher levels of anxiety and depression, and lowered quality of life compared to their counterparts not engaging in fertility treatment (Peterson, 2006; Zhang et al., 2022). The impact, however, is less keenly experienced by men, and symptoms have been observed to remit sooner than in women with infertility (Zhang et al., 2022).

Infertility and fertility treatment can affect self-belief and can increase feelings of shame, guilt, fragility, insufficiency, and anger (Cunha et al., 2016; El Kissi et al., 2013; Pandya, 2024). Additionally, individuals can report feeling flawed, isolated, or alone as a result of their infertility and ART (Cousineau & Domar, 2007; Nik Hazlina et al., 2022; Vioreanu, 2021). Infertility has been likened to a diagnosis of cancer at times due to the invasive and persistent impact it has on all facets of life (Domar & Dusek, 2000). There is no certainty in outcome, no guarantees, and it takes a physical toll on those participating (Connolly et al., 2025; Lynch et al., 2014; Nagajyothi et al., 2025; Wei et al., 2025). Infertility, like cancer, does not discriminate; it impacts people of all cultural backgrounds and

socio-economic status (Domar et al., 2021; Rice, 2023; Njagi et al., 2023, 2025). Although the prevalence rates vary, it is evident that infertility impacts mental health.

The psychological impact, paired with the associated challenges that arise financially, vocationally, and within relationships, can lead to the cessation of treatment before having a child. The emotional burden and distress experienced, in some cases, is too much, with people choosing to cease fertility treatment (Boivin et al., 2011; Domar et al., 2012; Domar & Dusek, 2000; Gameiro et al., 2012; Mesquita da Silva et al., 2018; Nagajyothi et al., 2025; Njagi et al., 2025). While distress levels vary, most women report that the stress and emotional toll, paired with the financial burden and relational impact, can lead to ART being unsustainable (Archetti, 2024; Bagade et al., 2022; Boivin et al., 2011; Connolly et al., 2025; Domar et al., 2012; Rice, 2023; Gameiro et al., 2012; Sousa-Leite et al., 2022).

1.6.3. *Financial Impacts*

Around the world, ART is largely cost-prohibitive (Rice, 2023; Njagi et al., 2023, 2025). It can involve substantial expenses, especially if multiple cycles are required (Bagade et al., 2022; Rice, 2023). Often, the financial burden falls to the patient (Rice, 2022; Njagi et al., 2025). While governments may offer some support and reimbursement, the extent varies widely across countries, with some providing no financial subsidy or not offering ART at all (IFFS, 2022). Some countries fully subsidise ART, while others, like Australia, provide partial subsidisation (see *Section 1.6.4.1*. for more information) (Baker et al., 2025; IFFS, 2022).

Pursuing ART in Australia is costly, despite the centralised Medicare Benefits Scheme. Most, but not all, people living in Australia with infertility are eligible to receive a partial subsidy via Medicare (Rice, 2022). People living in Australia who do not have permanent residency, refugees, or asylum seekers may not be eligible for Medicare funding and, thus, may not receive subsidised treatment. Although there is no limit on the number of subsidised cycles in Australia, there is no Medicare or Private Health funding available when excess oocytes are retrieved and need cryopreservation (freezing), when there is elective cryopreservation of genetic material, when

assisted hatching (creating a small hole in the outer shell of an embryo before transfer) is utilised, or when genetic testing (Preimplantation Genetic Testing [PGT]) is completed to check for aneuploidy or monogenic disorders before embryos are implanted (IFFS, 2022). Likewise, prior to 2024, when donor oocytes, embryos or sperm were required, there was no subsidisation for ART for certain patients undergoing ART. For example, same sex couples or single mothers by choice were previously unable to claim Medicare subsidisation if there was no medical indication of infertility. However, with the broadening of the Australian and New Zealand definition of infertility, these Australians are now eligible for Medicare rebates (Hull et al., 2024). Despite that broadening, there are still specific treatment options, such as surrogacy, that do not receive any subsidisation. That results in the intended parent/s covering the full cost of their surrogate's treatment. A recent Senate inquiry (2023) proposed amendments, which were supported in principle; however, not all amendments have been enacted.

ART is cost-prohibitive and may preclude numerous women with infertility from accessing the required intervention (Scott, 2025). In Australia, the out-of-pocket cost for one treatment cycle of IVF can vary from AU$2,500 to AU$12,000 (Bagade et al., 2022; Choi et al., 2022; Lensen, Chen, et al., 2021; Scott, 2025), depending on the clinic and state, with Medicare reimbursing a set amount for the first cycle of the year. The Medicare scheme also has a Safety Net Threshold of AU$2,615.50 (Medicare Safety Nets - Services Australia, 2025), which once reached, results in reimbursement at 80% of out-of-pocket expenses thereafter when a diagnosis of infertility exists. People who are ineligible for Medicare are responsible for the full cost of treatment, which can exceed AU$12,400 per cycle, not including attendance at appointments, medications, or genetic screening. "Add-ons" are additional procedures that are often recommended or requested by patients undergoing ART. Examples of these include PGT, endometrial scratch, herbal supplements, assisted hatching, embryo glue, or complementary therapies such as acupuncture (Lensen, Hammarberg, et al., 2021; Olive et al., 2024). When reviewed, in a study of 40 IVF Australian and New Zealand clinic websites, these add-ons cost between AU/NZ$0- $3,700, with there being no high-quality evidence for their use

(Lensen, Chen, et al., 2021). These “add-ons” offered by ART clinics can lead to increased emotional and financial pressure (Lensen, Chen et al., 2021; Lensen, Hammarberg et al., 2021).

As a result of increased financial pressure, couples and individuals undergoing ART in Australia may seek financial support from their superannuation fund (an Australian government-mandated savings system used to funda person’s future retirement). This process involves a further financial cost of seeking contact with a psychiatrist to ascertain that infertility and the associated ART are detrimental to their mental health. Thereafter, an application to withdraw funds from superannuation places further financial burden on the person in the longer term, as it reduces their superannuation benefit (Bhatia & Porceddu, 2021). The immediate solution of accessing funds at the expense of future financial security can contribute to the stress and well-being of the individual or couple.

The financial strain of fertility treatment causes stress and impacts psychological well-being, and influences treatment decisions (Domar & Dusek, 2000; Sousa-Leite et al., 2022). Likewise, Medicare policy and funding availability can impact decision-making, including treatment cessation, perceptions of treatment benefit and success rates (Jaensch et al., 2025). As such, financial costs impact individuals, couples, and, in turn, more broadly, population rates and the community.

1.6.4. *Community Impacts*

Infertility has several impacts on the wider community, including healthcare expenditure, and employment and economic impacts. Each of the community impacts are described in turn, below.

1.6.4.1. Healthcare Expenditure. ART is costly. As noted above (see *Section 1.6.3.*), some countries, fully cover the cost of treatment, while other countries only cover the cost of a finite number of treatment cycles (IFFS, 2022; Nagajyothi et al., 2025; Nik Hazlina et al., 2022; Njagi et al., 2025). In the United States of America, there is variability in the insurance coverage available (Kawwass et al., 2021). The level of coverage also depends on the employer insurance available, and if someone is not covered for ART they need to finance it themselves (Kawwass et al., 2021; Shillings-

Barrera, 2022). These financial challenges can lead to only people with financial stability or adequate insurance coverage being able to access fertility screening and/or treatment for infertility (IFFS, 2022).

In the National Health Service in the United Kingdom, up to three 'cycles' may be covered; however, factors such as location or infertility type may preclude a person from receiving treatment or affect the number of treatment cycles available (Human Fertilisation & Embryology Authority [HFEA], 2025). In some countries with a national or regional health insurance plan, complete coverage is offered for ART services. However, the percentages of complete coverage were only 26% and 11%, respectively, and partial coverage was offered in 27% and 16% of countries (IFFS, 2022). The IFFS (2022) indicated that Canada, Chile, Kenya, New Zealand, Romania, Senegal, Tunisia, and the United Arab Emirates provide coverage for one treatment cycle, while 17% of countries that provided federal reimbursement programs did not place a limit on the number of cycles covered. The variability in financial support, reimbursement, and eligibility for ART is significant. Some countries do not base reimbursement or support on fertility status, while others only provide ART if there are two years of infertility reported or in 28% of countries reimbursement is contingent on the patient having a single embryo transfer procedure (IFFS, 2022).

In Australia, as noted previously (see *Section 1.6.3*), the federal government partially subsidises some fertility treatments for eligible people through Medicare. The government's allocation of funds towards subsidising these treatments affects the healthcare budget and resource allocation for all Australians. The estimated cost, per ART-conceived child in Australia in 2021, was AU$26,394 (Connolly et al., 2025). The government have also added measures, such as listing specific fertility medications on the Pharmaceutical Benefits Scheme [PBS] or including Medicare subsidies for some additional medical screening, into the 2025 Fiscal Budget in an attempt to absorb some more of the costs associated with infertility and ART (Australian Government Department of Health, 2025). Some states in Australia additionally have subsidies to support people with infertility, with the New South Wales Government providing fertility grants to assist with early screening and

some additional financial reimbursement for residents undergoing fertility treatment (NSW Health, 2025).

In Victoria, a Public Fertility Care initiative provides low income earners, single women, and LGBTIQA+ people, Victorian's living in a rural or regional area, or people who require fertility preservation due to a medical reason (i.e. cancer or gender reassignment) with free access to ART, with some out of pocket expenses incurred for some testing (The Women's Hospital, 2025). There are also clinics in Australia that offer a bulk-billed service to access ART, although some out-of-pocket expenses are still incurred (Bulk-Billed IVF Treatment Costs, 2025). Despite these initiatives, ART places strain on individuals and their other pursuits, such as study or employment.

1.6.4.2. Employment Impact. Balancing study or work commitments with fertility treatments is challenging (Bagade et al., 2022; Choi et al., 2022; Hunt & Swift, 2024; Nik Hazlina et al., 2022). At present, Australian state and federal governments are considering changes to workplace policies, such as improving parental leave, flexible work arrangements, and support for employees undergoing fertility treatments, named reproductive leave (Hill et al., 2024). These changes, however, are not uniform or consistently applied (Hill et al., 2024).

Individuals undergoing fertility treatment may experience a drop in productivity, may be required to use sick leave, unpaid leave, or to reduce their work hours to accommodate treatment (Connolly et al., 2025; Nagajyothi et al., 2025). Likewise, they may need to increase their work hours to manage the cost of ART, which can also impact relationships, mental health, and health (Hill et al., 2024; Nagajyothi et al., 2025). In addition, they may cease working or jeopardise promotion in favour of pursuing ART (Hill et al., 2024). The level of support afforded is variable and fluctuates from workplace to workplace, which financially impacts the individual, the workplace, and the economy. Lower birth rates additionally impact countries' economic health, with slower birth rates resulting in slower economic growth (Hunt & Swift, 2024).

Fortunately, there are various medical interventions available, such as fertility medications, ART like IVF, and surgical procedures, which can help overcome infertility challenges (Australian

Government Department of Health, 2025; Bagade et al., 2022; Gianaroli et al., 2012; Hunt & Swift, 2024).**Medical Interventions for Infertility**

There are several medical interventions to address infertility. These interventions may include ART, a diverse range of medical procedures and treatments designed to assist people experiencing infertility to conceive. Medical interventions, such as ART, are employed when people have been unable to conceive after a reasonable period or require assistance from a donor and/or surrogate. ART encompasses various procedures (see Table 1.1), each tailored to address specific infertility issues, that have revolutionised fertility treatment.

Table 1.1

Definitions of Different Infertility Treatments

Ovulation Induction (OI)	Utilises medication to stimulate the ovaries to produce and release oocytes (eggs). It is typically used for women who have infrequent or absent ovulation.
Intrauterine Insemination (IUI)	A simple and less invasive fertility treatment that is often used as the first step for individuals or couples experiencing infertility. The goal is to increase the chance of sperm reaching and fertilising an egg during ovulation. The sperm is placed directly into the woman's uterus to facilitate fertilisation.
In Vitro Fertilisation (IVF)	Involves the retrieval of oocytes from the ovaries, fertilising them with sperm in a laboratory setting, and transferring the resulting embryo(s) back into the uterus. IVF is employed for various infertility causes, including blocked fallopian tubes, endometriosis, male-factor infertility, or unexplained infertility.
Intracytoplasmic Sperm Injection (ICSI)	A specialized form of IVF in which a single sperm is directly injected into an oocyte to facilitate fertilisation. It is particularly useful in cases

	of male-factor infertility due to low sperm count, poor sperm motility (sperm that are not moving as well as expected), or abnormal sperm morphology (misshapen or oddly formed sperm).
Assisted Hatching	Involves creating a small opening in the zona pellucida (outer layer) of the embryo before it is transferred to the uterus. Assisted hatching aims to facilitate embryo implantation in the uterine lining and improve the chances of successful pregnancy, especially in cases where the embryo has a thick zona pellucida.
Embryo Cryopreservation (Freezing)	Extra embryos resulting from IVF can be cryopreserved (frozen) for future use. This allows people to preserve viable embryos for subsequent transfer cycles, reducing the need for repeated ovarian stimulation and egg retrieval.
Preimplantation Genetic Testing (PGT)	The testing of embryos for genetic abnormalities or chromosomal disorders before implantation. This technique helps identify healthy embryos, reducing the risk of transmitting genetic diseases to offspring.
Donor Gametes (Egg or Sperm Donation)	In cases of severe infertility or genetic conditions, donor eggs or sperm may be used for fertilization. This option allows people to conceive using donor gametes, expanding their possibilities of achieving pregnancy.
Donor Embryos	Embryos from other individuals or families are donated to people who have experienced significant infertility or are unable to create their own embryos.
Surrogacy	Involves a third-party (surrogate) carrying a pregnancy on behalf of intended parents. Gestational surrogacy, where the surrogate is not

	genetically related to the child, may involve IVF with the intended parents' gametes or donor gametes.

Note. Definitions contained in the above table were derived by reviewing the following references (Bosch et al., 2020; Gameiro et al., 2015; Your IVF Success Glossary, 2025; Zegers-Hochschild et al., 2009, 2017).

Fertility specialists conduct ART in accordance with ethical guidelines (Bosch et al., 2020; Gianaroli et al., 2012). Factors such as age, fertility diagnosis, medical history, and individual circumstances guide the selection of fertility treatments (Bosch et al., 2020; Gianaroli et al., 2012; Kawwass et al., 2021). Regulatory bodies and professional organisations establish guidelines to ensure the safe and ethical practice of ART, for example, the Reproductive Technology Accreditation Committee in Australia, the American Society for Reproductive Medicine or the European Society of Human Reproduction and Embryology (ESHRE). Ongoing advancements in reproductive medicine continue to expand the scope and efficacy of ART, providing renewed opportunities for people pursuing parenthood despite infertility challenges (Bagade et al., 2022; Gianaroli et al., 2012). While ART offer hope to people with infertility, it comes with ethical, emotional, and financial considerations, and success rates can vary widely from person to person (Australian Government Department of Health, 2025; Hunt & Swift, 2024).

1.7.1. *Success Rates of ART*

Global success rates of ART can be difficult to ascertain due to differences in regulation, reporting standards, and definitions (Baker et al., 2025; McMahon et al., 2024; Rienzi et al., 2021; Shingshetty et al., 2024). However, research demonstrating factors that can improve the prediction of success (Shingshetty et al., 2024) and the actual success rates for ART has improved (Baker et al., 2025). Eleven factors have been associated with successful ART outcomes: age, duration of infertility, ethnicity, body mass index, antral follicle count, previous pregnancy history, cause of infertility, sperm parameters, number of oocytes collected, morphology of transferred embryos, and day of embryo transfer (Shingshetty et al., 2024).

Success rates, or a live birth outcome, after ART have steadily improved as technology and research have advanced (Baker et al., 2025; IFFS, 2022; Rienzi et al., 2021). A cumulative delivery rate (the number of frozen embryo transfer deliveries and babies combined with those after a fresh embryo transfer, divided by the number of egg retrievals) of 36.4% per retrieval was reported for 2017 and 37.3% for 2018 across 83 countries that were evaluated in an International Committee Monitoring Assisted Reproductive Technologies [ICMART] (Baker et al., 2025). Those rates, however, excluded cycles that utilised PGT, which was utilised five times more often than reported in prior analysis of 2014 data (Baker et al., 2025). For 2017 and 2018, delivery rates following a fresh embryo transfer were 31.8% and 31.3%, respectively; following a frozen embryo transfer were 32.5% and 31.9%, respectively; and following PGT were 47.3% and 48.4%, respectively (Baker et al., 2025). A reduction in multiple transfers or births was also observed (Baker et al., 2025). Notably, in 2017 and 2018, rates of success per oocyte retrieved for autologous oocytes were 23.5% and 23.8%, respectively. Delivery rates when utilising donor oocytes, including fresh and frozen transfer, were 33.1% in 2017 and 34.3% in 2018 (Baker et al., 2025).

It is a requirement in Australia that fertility clinics provide patients with accurate and timely success rates (Australian and New Zealand Assisted Reproduction Database [ANZARD], n.d.). In the 2023 ANZARD annual report (Kotevski et al., 2025), the overall clinical pregnancy rate in Australia and New Zealand was 38.2%, with live birth rates of 14.% for fresh cycle transfers and 25.4% for frozen cycle transfers. Younger women, under age 30, had a higher live birth rate, 38.9% for autologous fresh cycles and 38.1% autologous thaw cycles, than women older than 44 years of age, who had live birth rates of 2.4% for a fresh cycle transfer and 12.9% for a frozen cycle (Kotevski et al., 2025). Overall, in 2023, the live birth rate per embryo transfer remained stable at 25.7% (Kotevski et al., 2025).

Interestingly, research examining perceptions of success among Australian women undergoing IVF found that 27% of women accurately estimated their chance of success; however, more than 50% of women overestimated their chance of success (McMahon et al., 2024). The

implications of this over-estimation of success can result in increased distress and anxiety (Cousineau & Domar, 2007; McMahon et al., 2024; Nik Hazlina et al., 2022), and perhaps could be mitigated by incorporating more information sharing (McMahon et al., 2024), access to supportive counselling or focused psychological interventions to assist during ART (Gameiro et al., 2015).

1.8. Psychological Interventions to Assist During ART

Infertility and ART can be a challenging and distressing experience, often leading to sadness, anxiety, depression and grief (Bokek-Cohen, 2024; Cousineau & Domar, 2007; Nik Hazlina et al., 2022). Psychological interventions, such as counselling or therapy, can help people to manage such emotions and develop coping strategies. Therapists may employ various approaches, including cognitive-behavioural therapy (CBT) (Abdollahpour et al., 2021; Aghaei & Atashpour, 2015; Faramarzi & Heidary, 2013; Gorayeb et al., 2012; Karaca et al., 2019; Raad et al., 2021), mindfulness-based techniques (Abedi Shargh et al., 2015; Galhardo et al., 2013; Li et al., 2016; Nery et al., 2019; Pandya, 2024; Wang & Wang, 2022), and support groups (Bedi et al., 2019; Haemmerli et al., 2010). These interventions, evaluated in feasibility, pre-post, and randomised control trials [RCT] can provide a safe space for people to express their feelings, process grief and loss, and learn effective ways to manage stress (Aghaei & Atashpour, 2015; Barkowski et al., 2020; Domar et al., 2011). Further, numerous meta-analyses exploring the overall effect of these various interventions, namely CBT (Abdollahpour et al., 2021), Mindfulness Based Intervention [MBI] (Wang & Wang, 2022; Warne et al., 2022), and psychosocial interventions (Abdollahpour et al., 2021; Barkowski et al., 2020; Frederiksen et al., 2015; Wang & Wang, 2022).

Evidence suggests that healthcare professionals and patients should view psychological interventions as a complement to medical interventions (Gameiro et al., 2015). By addressing the psychological aspects of infertility, people may experience reduced stress, improved emotional well-being, and potentially better adherence to medical treatments (Gameiro et al., 2015; Spoletini et al., 2022; X. Wang & Wang, 2022). This holistic approach may contribute to a more positive overall experience and potentially enhance the likelihood of conception (Gameiro et al., 2015; Spoletini et

al., 2022). Psychological interventions have been found to reduce stress, enhance coping mechanisms, and reduce depression, anxiety and fertility-related distress (Abdollahpour et al., 2021; Barkowski et al., 2020; Faramarzi et al., 2008).

1.8.1. *Assisting with Anxiety, Depression, and Fertility Stress*

Psychological therapies, counselling, support groups, and group interventions improve individual and couples' mental health (Koochaksaraei et al., 2023; Warne et al., 2022; Ying et al., 2016), communication (Schmidt et al., 2005), and relationship quality and intimacy (Bokek-Cohen, 2024; El Kissi et al., 2013; Vioreanu, 2021) while undergoing fertility treatment. Additionally, couples therapy can help improve communication and intimacy, strengthen relationships , and provide a supportive environment for both partners (Abdollahpour et al., 2021; Schmidt et al., 2005; Spoletini et al., 2022; Ying et al., 2016). Psychological interventions can play a crucial role in promoting emotional well-being and resilience during infertility, helping people make informed decisions about their treatment options (Archetti, 2024). Despite this, people undergoing fertility treatment in Australia are not routinely offered psychological interventions.

In Australia, routine care for people with infertility involves medicalised ART interventions and limited psychological intervention. Counselling in ART clinics is typically reactive and provided on an "as needed" basis. There is not a proactive or adjunctive approach to offering psychological support for patients, when they commence treatment or following the completion of a treatment cycle. Similarly, financial relief or strategies for managing the significant financial and employment burdens are limited. Typically, fertility clinics primarily focus on pregnancy outcomes, with limited consideration of the extraneous factors that may also be impacting this desired outcome. Researchers in Australia found that during COVID-19, 55% of patients were not offered counselling, and when professional support was offered, only 3.3% of that was provided by a counsellor (Rodino et al., 2023). Furthermore, counselling is typically reactively offered in response to a crisis or for those with high distress; a more routine, proactive care model of intervention would be appropriate. Specifically, offering counselling to all participants as part of their treatment may help reduce

women's emotional distress, improve their coping and resilience, and enable them to develop strategies that would empower them to pursue ongoing ART despite the inherent challenges (Bagade et al., 2022; Rice, 2023; Gameiro et al., 2015).

Likewise, participation in focused psychological intervention improves the mental health (Aghaei & Atashpour, 2015; Ying et al., 2016), coping (Cunha et al., 2016; Lemmens, 2004), resilience (Pandya, 2024), marital satisfaction (Abedi Shargh et al., 2015; Ying et al., 2016), acceptance (Galhardo et al., 2013, 2019; Rahimi, Abed, et al., 2018), quality of life (Li et al., 2016; Malekpour et al., 2023), fertility problems (Faramarzi & Heidary, 2013), and pregnancy outcomes for women with infertility, who are undergoing ART treatment (Domar et al., 2011; Li et al., 2016; Ying et al., 2016). Further information regarding these studies is included in Chapter 3.

Numerous meta-analyses have demonstrated the effectiveness of individual and group psychological interventions for patients with infertility who are undergoing ART. These psychological interventions have included stress management, relaxation training, cognitive behavioural strategies, mindfulness approaches, and communication approaches, all routinely explored with reference to the impact on fertility stress, anxiety, depression, quality of life, and sometimes pregnancy rates (Choi et al., 2022; Hämmerli et al., 2009; Katyal et al., 2021; Wang et al., 2022; Warne et al., 2022; Zhou et al., 2021). However, the implementation of counselling or psychological interventions is inconsistent, particularly in Australia. Also, despite their effectiveness, psychological interventions are not routinely included in ART even though the impact of ART is well known (Cousineau & Domar, 2007; Nik Hazlina et al., 2022).

Given the impacts of infertility, particularly on anxiety, depression, and fertility stress, and the demonstrated benefits of psychological interventions, Australian women with infertility undergoing fertility treatment may benefit from supportive counselling. In some cases, psychological interventions have resulted in improved pregnancy outcomes (Domar et al., 2011; Ying et al., 2016; Zhou et al., 2021). Where support is offered, it is routinely delivered individually; however, group-based psychological intervention is widely used around the world for people with infertility and has

shown promise in improving conception rates (Abedi Shargh et al., 2015; Aghaei & Atashpour, 2015; Chan et al., 2006; Gorayeb et al., 2012; Karaca et al., 2019; Lemmens, 2004; Warne et al., 2022).

1.8.2. *Addressing the Impact on Conception When Undergoing ART*

While psychological intervention may not directly improve infertility rates, it can improve anxiety, depression, and fertility stress, and potentially impact pregnancy rates indirectly through plausible physiological and endocrine mechanisms of effect (Lewiński & Brzozowska, 2022; Lynch et al., 2014). Research suggests that psychological factors, such as stress, anxiety, and depression, can adversely impact reproductive health due to increased inflammation markers, poor sleep, increased reliance on maladaptive stress management strategies, and impacts on cortisol (Abbey et al., 1992; Bagade et al., 2022; Nicoloro-SantaBarbara et al., 2018; Rooney & Domar, 2018). By addressing these psychological factors, people have experienced improved mental health and relationships, and, in many cases, higher conception rates (Domar et al., 2011; Frederiksen et al., 2015; Li et al., 2016; Schmidt et al., 2005; Ying et al., 2016). The mechanism of effect here is likely to be multifaceted and may relate to biological, psychological, and social changes that may have been indirectly influencing outcomes.

To date, studies with no randomisation (Hosaka et al., 2002) or randomisation (Domar et al., 2015; Fata & Tokat, 2021) have explored the effect of psychological interventions on conception rates. Results of these studies have explored the relationship between psychological interventions, such as CBT, MBI, and pregnancy rates in people with infertility undergoing ART (Chan et al., 2006; Domar et al., 2011; Gorayeb et al., 2012; Hosaka et al., 2002). While results may vary by study and population, some research suggests that interventions such as CBT, MBI, and relaxation techniques may positively influence fertility outcomes. To further contribute to the support for utilising psychological interventions with women with infertility undergoing ART, a review of meta-analyses suggests that across study type, there is a general improvement observed in pregnancy rates (Frederiksen et al., 2015; Gaitzsch et al., 2020; Katyal et al., 2021; Warne et al., 2022).

A meta-analysis of CBT-based interventions in four studies (n = 2,434; Katyal et al., 2021), delivered predominantly individually, with one group-based intervention, reported that CBT improved pregnancy rates in women and couples undergoing ART. In the same review (Katyal et al., 2021), MBI in four studies, three of which used group-based interventions, was also associated with improved pregnancy rates. Further, a systematic review (Gaitzsch et al., 2020) of 12 studies exploring the utility of psychosocial interventions found that pregnancy rates in the intervention group were improved, compared to the comparison groups in six studies. Two of those studies reported improved pregnancy rates among women who participated in MBI (Gaitzsch et al., 2020). These rates were observed when delivered individually or in a group (Gaitzsch et al., 2020).

While these meta-analyses have demonstrated improved pregnancy rates following the group or individual psychological intervention, the results appear to be more strongly associated with specific psychological interventions, such as CBT and MBI, with longer duration appearing to have an advantage (Abdollahpour et al., 2021; Frederiksen et al., 2015; Katyal et al., 2021; Wang & Wang, 2022). Given the aim of the current dissertation, these results are valuable and lay the foundation to guide the studies conducted, thus leading to the development a group psychological intervention program.

1.9. Specific Psychological Interventions to Assist During Infertility

As noted above, psychological interventions delivered individually or in a group setting, online or in person, have been shown to improve the mental health and pregnancy outcomes for women with infertility-related distress, often due to ART (Abedi Shargh et al., 2015; Gaitzsch et al., 2020; Li et al., 2016; Rahimi, Abed, et al., 2018; Shafierizi et al., 2023; Wang & Wang, 2022; Ying et al., 2016). The most widely accepted, evidence-based psychological interventions currently include CBT and MBI. In 2023, Koochaksaraei et al. (2023) explored the most widely used and effective psychological interventions for people with infertility, categorising them as follows: CBT, MBI, Stress Management, and others (i.e., relaxation training, yoga, positive psychology, and problem solving). Each of these will be described below.

1.9.1. *Cognitive Behavioural Therapy (CBT)*

In the context of infertility, CBT assists people in identifying and challenging negative thought patterns and beliefs related to infertility and ART. CBT improves symptoms of anxiety, depression, and stress by using developed strategies that promote healthier thinking and adaptive coping and behaviours (Abdollahpour et al., 2021; Aghaei & Atashpour, 2015; Ahmadi et al., 2017; Faramarzi et al., 2008; Gorayeb et al., 2012; Raad et al., 2021; Shafierizi et al., 2023).

CBT, delivered in a group format, has demonstrated improvements in mental health (Koochaksaraei et al., 2023; Ying et al., 2016), well-being (Szigeti et al., 2024), and, in some cases, conception rates (Abdollahpour et al., 2021; Domar et al., 2000, 2015; Faramarzi et al., 2008; Gorayeb et al., 2012, 2012; Hosaka et al., 2002; Karaca et al., 2019; Pasha et al., 2018; Raad et al., 2021; Wang et al., 2022). These group programs have been between four and 12 sessions in duration, and facilitated in person (Abdollahpour et al., 2021; Aghaei & Atashpour, 2015; Ahmadi et al., 2017; Domar et al., 2000; Raad et al., 2021; Shafierizi et al., 2023) and online (Clifton, 2016; Shafierizi et al., 2023), and in a group (Aghaei & Atashpour, 2015; Gorayeb et al., 2012; Karaca et al., 2019) or individual format (Spoletini et al., 2022).

1.9.2. *Mindfulness-Based Interventions (MBI)*

MBI teach skills of watching, observing and noticing internal and external experiences mindfully, without judgment (Abedi Shargh et al., 2015; Clifton, 2016; Gaitzsch et al., 2020; Wang & Wang, 2022). They have been associated with improvements in stress management, well-being, acceptance, and flexibility in people with infertility (Abedi Shargh et al., 2015; Li et al., 2016; Nery et al., 2019; Pandya, 2024; Wang & Wang, 2022). Among people with infertility, supporting them to observe and engage in the present moment, without judgment, promotes relaxation and reduces in self-attribution and blame (Nery et al., 2019; Pandya, 2024). Anxiety, stress and depression associated with infertility can also be reduced (Abedi Shargh et al., 2015; Frederiksen et al., 2015; Gaitzsch et al., 2020; Katyal et al., 2021; Nery et al., 2019). MBI can be facilitated effectively in individual settings, group settings, online, or in person, with all approaches yielding positive effects

(Frederiksen et al., 2015; Gaitzsch et al., 2020; Katyal et al., 2021; Li et al., 2016; Nery et al., 2019; Ying et al., 2016)

1.9.3. *Stress Management Programs*

Stress management programs may combine various techniques, including relaxation training, time management, breathing techniques, biofeedback, and problem-solving skills to help individuals manage stress more effectively (Koumparou et al., 2021; Pandya, 2024; Schmidt et al., 2005). Although each stress management program may vary in content, the overarching goal is to reduce stress associated with infertility. As infertility may increase stress and is thought to increase biomarkers thought to contribute to infertility, such as cortisol, focused strategies to reduce fertility stress have been explored (Abbey et al., 1992; Koumparou et al., 2021; Pandya, 2024; Raad et al., 2021; Schmidt et al., 2005; Vioreanu, 2021). Stress management programs that include psychoeducation and practical strategies have been shown to improve mental health, stress, and outcomes related to treatment success and conception (Abbey et al., 1992; Koumparou et al., 2021; Mousavi et al., 2019).

1.9.4. *Other Psychosocial Interventions*

Infertility and fertility treatment can be isolating and lonely, with people describing the associated feelings as debilitating and marginalising (Bagade et al., 2022; Taebi et al., 2021). There are a multitude of interventions to improve the mental health of people with infertility (Frederiksen et al., 2015; Katyal et al., 2021; Soleimani et al., 2022). Some of those interventions are grounded in psychological theory (Abbey et al., 1992; Frederiksen et al., 2015; Katyal et al., 2021, 2021; Ying et al., 2016), while others are supportive or educational in nature (Agostini et al., 2011; Bedi et al., 2019; Cousineau et al., 2008; Haemmerli et al., 2010).

Supportive therapy focuses on providing and improving the experience of emotional support and validation (Agostini et al., 2011; Cousineau et al., 2008). The goal is to assist people in expressing their feelings, coping with stress, and improving their capacity to manage the emotional challenges of infertility and ART, as well as allowing them to feel heard and connected to others who

understand (Koochaksaraei et al., 2023; Palomba et al., 2018). Supportive therapy is routinely offered in a face-to-face group format (Luk & Loke, 2016); however, various online versions (Cousineau et al., 2008) are also available for people with infertility. The major limitation of online approaches is that they can often be unmoderated or lack a structure or evidence base to direct the support provided (Gazit & Amichai-Hamburger, 2021; O'Connell et al., 2021).

Within most structured psychological interventions, techniques such as deep breathing, progressive muscle relaxation, and guided imagery can help reduce physical and emotional stress in women with infertility (Raad et al., 2021). These techniques are often used in conjunction with other psychological therapies, such as CBT, MBI, or psychosocial groups (Katyal et al., 2021; Nery et al., 2019; Shafierizi et al., 2023), although they can be delivered as standalone interventions.

Acceptance and Commitment Therapy (ACT), a third-generation CBT, has shown promise in bringing positive change for people with infertility (Cunha et al., 2016; Galhardo et al., 2013, 2019; Rahimi, Abed, et al., 2018; Rahimi, Attarha, et al., 2018). ACT assists people to alter their perspective regarding difficult thoughts and feelings (defusion), develop an ability to observe experiences (mindfulness), focus on what matters most (values), commit to actions consistent with those values (committed action), accept those things that are not changeable (acceptance), and to see themselves also from an alternate viewpoint (self as context) (Bach & Moran, 2008; Harris & Hayes, 2019). ACT employs cognitive and mindfulness-based approaches, utilises visualisation and metaphor, and reduces distress through teaching skills that foster acceptance and perspective-taking, which are beneficial for women with infertility (Bach & Moran, 2008; Forsyth, 2025; Harris & Hayes, 2019; Rahimi, Abed, et al., 2018). Each of these approaches has been facilitated in person, online, in groups, or individually, with varying effectiveness, which will be discussed in the following section.

1.10. Psychological Interventions

1.10.1. *Methods and Modes of Delivery*

Psychological interventions can be delivered in various formats, each offering distinct considerations and advantages. Interventions may be offered in individual and group settings, as well as through different modes of delivery such as in-person, online, and via mobile applications. More detail is provided about individual and group interventions below.

Traditional individual therapy, conducted face-to-face in a private setting, allows for direct, personalised engagement between the therapist and patients (Baier et al., 2020). Physical proximity assists in the development of a strong therapeutic alliance, utilising subtle non-verbal cues and immediate feedback, which enhance the depth of communication and connection (Baier et al., 2020). Patients often report feeling more connected and supported, and benefit from the safe and structured environment of individual therapy (Wang et al., 2022; Ying et al., 2016).

Individual therapy can also be offered online. Telehealth or online therapy offers accessibility and convenience, particularly for individuals facing geographical or mobility barriers (Field et al., 2019; Frye et al., 2022; Madigan et al., 2021; Meyers & Domar, 2021; Yuchang et al., 2022). Therapy conducted online can foster therapeutic alliance and maintain privacy and confidentiality, making it ideal for patients who may feel apprehensive about in-person sessions (Frye et al., 2022; Madigan et al., 2021; Yuchang et al., 2022). However, the absence of physical presence can adversely impact the establishment of rapport (Yuchang et al., 2022). Non-verbal body language may be missed, and technological issues can occasionally disrupt the session (Field et al., 2019; Kennedy, 2016; Yardley et al., 2015). While some patients and clinicians might thrive with the flexibility and autonomy that online formats offer, others may struggle with distractions or a sense of detachment (Yuchang et al., 2022).

The effectiveness of each approach will depend on multiple factors, including the nature of the therapeutic presentation, patient preferences, and individual circumstances (Baier et al., 2020; Read et al., 2014). Online therapy demonstrates comparable outcomes across many presentations and can also yield higher attendance rates (Bulkes et al., 2022; Frye et al., 2022). However, it may be less suitable for people who require intensive intervention or who find it hard to stay engaged

without the structure of a physical session (Bulkes et al., 2022; Frye et al., 2022; Greenwood et al., 2022). Ultimately, both methods have strengths and limitations, and the best results often come from tailoring the format to the patient's evolving needs and preferences (Greenwood et al., 2022).

The benefits of individual intervention that is tailored and focused for women with infertility are far-reaching and recommended by ESHRE, Australian and New Zealand Infertility Counsellors Association (ANZICA), and the WHO (Bedi et al., 2019; Domar et al., 2000; Gameiro et al., 2015; Gianaroli et al., 2012; Katyal et al., 2021; Warne et al., 2022). Although superior in many ways, individual therapy, whether in-person or online, may be cost-prohibitive and may lack the sense of connection and belonging that can be beneficial for women with infertility (Luk & Loke, 2016; Szigeti et al., 2024). Specifically, group intervention has shown marked promise at increasing connection, belonging, mental health outcomes, and reducing the stigma of infertility (Domar et al., 2000; Frederiksen et al., 2015; Gaitzsch et al., 2020; Katyal et al., 2021; Wang et al., 2022; Warne et al., 2022).

Group psychological interventions are effective in addressing a wide range of mental health concerns, including but not limited to anxiety, depression, and post-traumatic stress disorder (PTSD; Barkowski et al., 2020; McDermut et al., 2001; Schwartze et al., 2019; Yusop et al., 2020). These interventions involve bringing together people with similar challenges or goals to participate in sessions led by a trained mental health professional. The group setting provides a supportive and empathetic environment where people can share their experiences and learn from one another (Malat et al., 2023; Whittingham et al., 2021; Yusop et al., 2020).

A group setting offers a sense of belonging, validation, and social support, which can enhance self-esteem and reduce feelings of isolation (Agostini et al., 2011; Malat et al., 2023; Whittingham et al., 2021). Group interventions also provide opportunities for skill-building, problem-solving, and practising new behaviours in a safe and structured setting (Malat et al., 2023; Whittingham et al., 2021). While individual outcomes may vary, studies have consistently shown positive effects on symptom reduction, improved functioning, and increased well-being (Barkowski

et al., 2020; McDermut et al., 2001; Schwartze et al., 2019). However, factors such as group dynamics, participant engagement, and the facilitator's skill can influence the effectiveness of group interventions (Whittingham et al., 2021). Therefore, it is crucial that qualified professionals conduct group interventions tailored to the participants' specific needs (Whittingham et al., 2021).

Group therapy, whether conducted in person or online, provides opportunities for patients to share experiences and receive support from other people facing similar challenges, such as infertility (Bedi et al., 2019; Domar et al., 2000; Gorayeb et al., 2012; Karaca et al., 2019; Malat et al., 2023; Whittingham et al., 2021). During in-person group sessions, a therapist facilitates interactions among a small group, fostering an environment where patients can learn from one another and develop a sense of belonging and connection, integral for women with infertility (Bedi et al., 2019; Domar et al., 2000; Frederiksen et al., 2015; Katyal et al., 2021; Luk & Loke, 2016; Ying et al., 2016). The physical setting often supports richer communication, as nuanced body language and immediate feedback facilitate stronger interpersonal connections and help build trust within the group (Karaca et al., 2019; Malat et al., 2023; Yusop et al., 2020).

In contrast, online group therapy expands access by bringing together people from diverse locations through video conferencing or chat-based forums (Clifton, 2016; Cousineau et al., 2008; Meyers & Domar, 2021). This format can be especially beneficial for individuals who might otherwise struggle to attend in person due to geographic, mobility, or scheduling limitations (Frye et al., 2022; Madigan et al., 2021). While the convenience and reach of online groups are clear advantages, some challenges persist. The absence of physical presence may hinder the development of rapport, as subtle social cues can be lost, and patients might find it harder to engage or feel truly connected or heard by others (Field et al., 2019; Frye et al., 2022; Madigan et al., 2021; Yuchang et al., 2022).

Online group therapy for women with infertility has shown benefits regarding accessibility and also improvement in anxiety and distress (Clifton, 2016; Cousineau et al., 2008; Haemmerli et al., 2010; Meyers & Domar, 2021; Shafierizi et al., 2023). Participants have also positively received this modality; however, despite its success and acceptability, there appears to be some pushback

following the COVID-19 pandemic and the proliferation of telehealth services (Fleddermann et al., 2025; Madigan et al., 2021; Molfenter et al., 2021; Predmore et al., 2021). Specifically, although accessible, individuals appear to be seeking in-person support due to the social isolation imposed during the pandemic (Fleddermann et al., 2025; Predmore et al., 2021).

Ultimately, research suggests that the choice between in-person and online therapy—whether for individual or group formats—should be guided by the client's needs, preferences, and circumstances. While online options make psychological support more widely available, in-person formats often provide richer interpersonal dynamics and support. The most effective approach often involves tailoring the therapeutic delivery to the evolving needs of the individual, sometimes combining elements of both formats to achieve the best outcomes (Cousineau et al., 2008; Fleddermann et al., 2025; Frye et al., 2022; Predmore et al., 2021).

Both individual and group interventions have distinct advantages in addressing various facets of well-being, including mental health, relationships, parenthood decisions, and pregnancy (Domar et al., 2000, 2011; Frederiksen et al., 2015; Gameiro et al., 2015; Gianaroli et al., 2012; Katyal et al., 2021; Wang et al., 2022). The choice between individual and group interventions often depends on individual preferences, the nature of concerns, the need for personalisation, and the benefits derived from shared experiences and support systems (Bedi et al., 2019; Pappas, 2023; Rosendahl et al., 2021). Both modalities contribute significantly to enhancing psychological well-being and addressing diverse life challenges across different domains, and there is increasing evidence that the addition of psychological intervention, whether individual or group-based, can be associated with increased pregnancy rates (Domar et al., 2011; Frederiksen et al., 2015; Gaitzsch et al., 2020; Hosaka et al., 2002; Katyal et al., 2021; Wang et al., 2022; Ying et al., 2016).

1.11. Aims of the Dissertation

Infertility profoundly affects many people, often negatively influencing their psychological well-being, relationships, finances, and social experiences (Bagade et al., 2022; Bokek-Cohen, 2024; Connolly et al., 2025; Cousineau & Domar, 2007; Fisher et al., 2010; Nik Hazlina et al., 2022). Despite

these impacts, routine care often overlooks the benefit of tailored psychological support, particularly for those undergoing ART (Bagade et al., 2022; Boivin et al., 2007; Gameiro et al., 2015; Iyengar, 2023; Read et al., 2014). Thus, given the number of people who desire parenthood but experience infertility and its associated impacts, further investigation was warranted. Given the prevalence of infertility and its associated psychological distress, and the potential for psychological interventions to benefit people with infertility, it is important to explore psychological interventions for women undergoing fertility treatment.

Therefore, the current research program aimed to explore three areas in relation to women with infertility undergoing ART. For women with infertility undergoing ART, we aimed to:

1. Evaluate the effectiveness of group psychological interventions in improving mental health, fertility-related stress, and pregnancy outcomes.
2. Consult with women with infertility who were currently or had previously undergone ART and providers of ART to develop a group psychological intervention.
3. Implement the psychological intervention developed and investigate barriers to participation.

CHAPTER 2

METHODOLOGICAL RATIONALE AND CONSIDERATIONS

2.1. Overview

In this chapter, I build on the foundational concepts and key themes I introduced previously, offering a detailed account of the methodological framework underpinning the dissertation. I describe the rationale and sequence of the research program, introducing a multi-method design that incorporates a systematic review and meta-analysis, survey, intervention development, and a commentary. I give careful attention to terminology and inclusivity and discuss reflexivity and researcher positionality to ensure transparency throughout the research process. Additionally, I outline the theoretical perspectives guiding the work, such as the biopsychosocial model and intervention mapping, and explain how I integrated person-centred approaches and behaviour change techniques into the development of the group psychological intervention. By connecting these methodological and theoretical elements to the prevalence and psychological impacts of infertility discussed in the prior chapter, I establish a comprehensive context for understanding the dissertation's aims and the strategies employed to address gaps in psychological support for women undergoing infertility treatment.

2.2. Description of the Research Program and Sequence

The current dissertation comprised multiple elements, pertaining to the effectiveness of group treatment programs for women with infertility undergoing ART, including two studies, the development of a group psychological intervention program, facilitator training and a commentary. It employed a sequential multiple methods design (see Figure 1).

First, I conducted a systematic review and meta-analysis (*Study 1*, Chapter 3) to synthesise existing research on the effectiveness of psychological interventions for women with infertility undertaking fertility treatment. The review aimed to evaluate the effectiveness of in-person group psychological interventions in improving depression, anxiety, fertility stress, relationship stress, and pregnancy outcomes for women with infertility undergoing ART. The review also highlighted the

intervention modalities and their associated effectiveness to inform the development of a group psychological intervention program as part of the current dissertation. Overall, this chapter provided a foundation for later research in the dissertation, highlighting the need for effective and accessible psychological support for women affected by infertility undergoing ART.

Next, I conducted a mixed-methods cross-sectional online survey (*Study 2*), targeting women with infertility who were undergoing or had previously undergone fertility treatment, as well as ART providers. Chapter 4 details this study, outlining the survey's design, recruitment strategies, and data collection and data analysis procedures. Quantitative data were collected through structured questionnaires gathering demographic information, experiences with fertility treatment, and utilisation of support within fertility treatment and with complementary treatment providers. Qualitative insights were gathered using open-ended questions and thematic analysis, enabling a deeper understanding of personal challenges, coping strategies, and perspectives on psychological interventions. The findings revealed notable trends in the desire for psychological support in a group format, highlighted gaps in current support services, and underscored the value of person-centred psychological approaches within fertility care. These results provided essential information and context for the subsequent development of the group psychological intervention program described in later chapters (see Chapters 5 and 6).

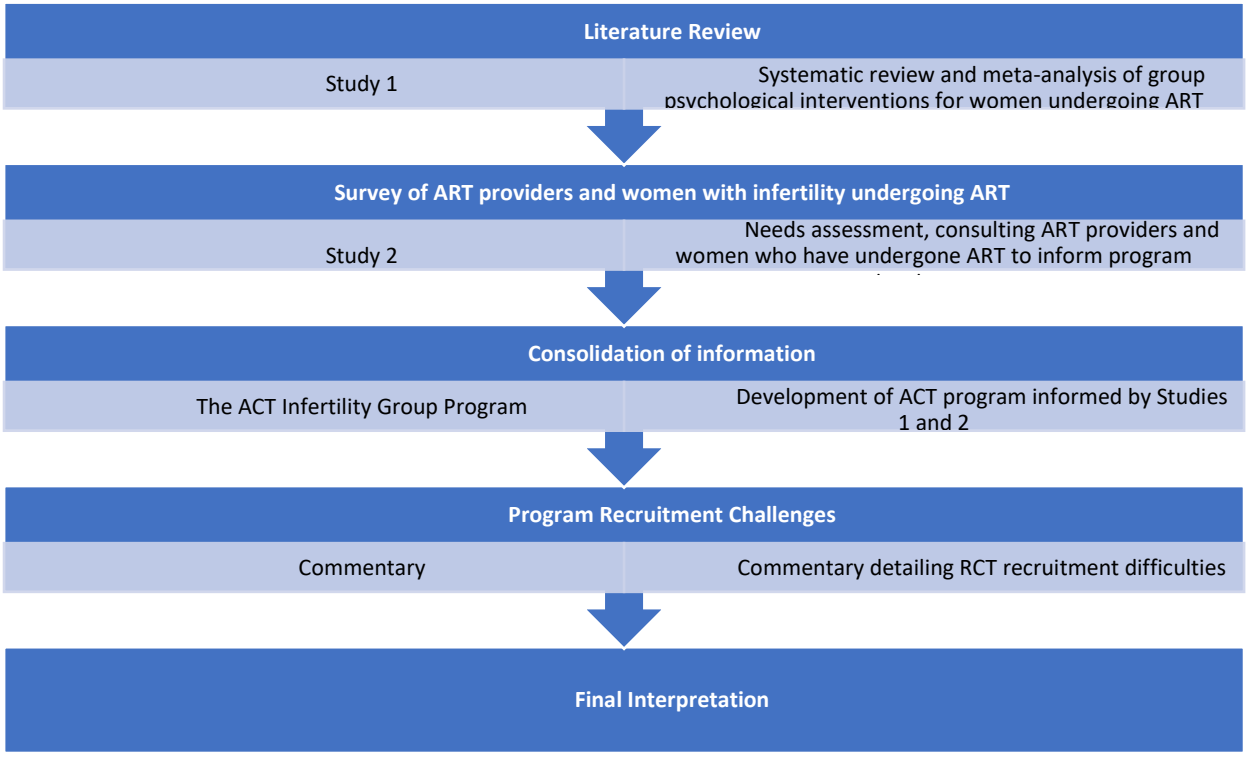
Informed by *Studies 1* and *2*, I developed the group psychological intervention program. *Study 2* informed the format, frequency, length, and content, and demonstrated that ACT was acceptable to women with infertility. The results of *Study 2* led to the development of a six-session, in-person, facilitator-led group program that included short at-home practice, held fortnightly for 60 minutes. Chapter 5 details the development of this program.

Following the development of the group psychological intervention program, I developed a facilitator training package and added the program content to *Mentimeter* to support the implementation of the group sessions. Chapter 6 describes the facilitator training.

Finally, I wrote a commentary detailing the recruitment challenges I encountered when attempting to conduct an RCT of the group psychological intervention program I had developed. The commentary describes reasons for the possible difficulties in engagement in the program and recommendations to assist other researchers in overcoming recruitment challenges in order to provide targeted psychological intervention for women undergoing ART to support improved mental health outcomes, reduce fertility-related distress and improve pregnancy rates.

Figure 2.1.

Sequential Research Design of the Dissertation



2.3. Terminology Considerations

Throughout the research program, I made efforts to use inclusive and non-biased language and terminology. ART has inherently focused on and provided treatment to cisgender and heterosexual couples. However, ART is available and utilised by all people aged 18+ who seek parenthood. To give birth to a child, a uterus is required; thus, there was an inherent bias and assumption that research would target people assigned female sex at birth. Furthermore, language

can be detrimental, pathologizing, marginalising, or stigmatising individuals; as a result, I gave careful consideration to how to refer to participants.

2.3.1. *Considering the Person*

Taking a person-centred approach, the American Psychological Association ([APA]; 2023) Inclusive language guide informed the language I utilised in the dissertation. The suggested format when referring to people living with disability or illness is to refer to the person first, then the disability (APA, 2023; *Australian Government Style Manual*, 2023; *Brief Guide to Bias-Free and Inclusive Language*, 2025; Dunn & Andrews, 2015). This approach aims to see the person first and describe the disability they are living with second. As a result, applying this person-first framework, I describe participants as *people with infertility* or *women with infertility,* and people undergoing fertility treatment or ART.

As I developed the group psychological intervention program to support women with infertility who were undergoing fertility treatment, participant eligibility criteria included being assigned female sex at birth. Given the focus, I did not invite partners of the person undergoing fertility treatment to participate. I avoided labels such as husband, wife, male, female, lesbian, homosexual, infertile woman/person/male in favour of terms such as *people* to be inclusive of all individuals with infertility and/or undergoing ART.

When considering appropriate terminology for *Study 2* respondents, potential participants for the group psychological intervention program, and the commentary, I considered a range of terms. Possible terms I contemplated included ‘patient’, ‘end user’, and ‘consumer’. Based on inclusive language guidelines, the current recommendation is to describe participants with a medical diagnosis or who receive treatment as *patients* (APA, 2023; *Brief Guide to Bias-Free and Inclusive Language*, 2025). I also sought the opinions of ART providers, including doctors, nurses, counsellors, and embryologists. To be inclusive, I used the term *ART providers;* however, if ART providers identified as a person with infertility, this was also noted. Table 2.2 details the terms used throughout the dissertation.

Table 2.2.

List of Terminology and Definitions

Term	Meaning/Including
Woman with infertility	An individual assigned female sex at birth who has/had a diagnosis of infertility
Women with infertility	Women, as a group, who were assigned female sex at birth who have/had a diagnosis of infertility
Person with infertility	Any individual who has/had a diagnosis of infertility
Patient	A person who was participating in or had participated in ART due to infertility
People with infertility	People who have/had been diagnosed with infertility
ART Providers	A person involved in the provision of ART services (doctor, nurse, counsellor, embryologist).

I made terminology decisions intending to be inclusive and respectful of all people, regardless of their gender, sexuality, culture, socio-economic status, or any other factor that may have led to marginalisation or exclusion (APA, 2023; *Brief Guide to Bias-Free and Inclusive Language*, 2025; Dunn & Andrews, 2015). As the research program focused on women with infertility who were undergoing ART, a level of exclusion arose, with women's partners excluded. The individual experience of those partners is also worthy of research; however, for the current dissertation, women with infertility were chosen as the cohort of focus, as they have been documented to experience high rates of poor mental health associated with ART (Agostini et al., 2011; Frederiksen et al., 2015; Nik Hazlina et al., 2022; Ying et al., 2016). With that in mind, the doctoral research was also informed by considering women's biological, psychological, and sociocultural contexts (Dunn & Andrews, 2015; Yardley et al., 2015). As part of this consideration, I was mindful of my own insider position on this topic given my own experience as a woman with infertility.

2.4. Reflexivity and Researcher Positionality

Reflexivity, in qualitative research, is the ongoing practice of critically examining how researchers' characteristics, perspectives, experiences, and assumptions shape every stage of the research process—from the framing of questions to the interpretation of findings (Braun & Clarke, 2024; Olmos-Vega et al., 2023). Therefore, it is essential to reflect on our positionality and acknowledge that our identities are not separate from the research, but rather actively shape its trajectory.

In undertaking this dissertation, I engaged in continuous reflexive practice. Drawing on my experiences as both a Clinical Psychologist and Clinical Hypnotherapist, and as someone with lived experience of infertility and ART, I was acutely aware that my background might influence research questions, data collection, analysis, and interpretation (Braun & Clarke, 2024; Hernández-Johnson & Bendixen, 2025; Karcher et al., 2024). To monitor these potential influences and maintain transparency, I regularly reflected on my beliefs, emotions, and responses, employing journaling and self-examination throughout the process. I also engaged in discussions with the research supervisors. These practices aimed to mitigate bias and strengthen the trustworthiness of the research, while honouring the relational and co-constructed nature of qualitative inquiry.

Positionality refers to the specific social and personal context a researcher occupies—such as race, gender, educational background, and lived experience—and how these factors shape their relationship to both the research and the participants (Olmos-Vega et al., 2023). Communicating one's positionality enhances transparency about potential influences and power dynamics in the research(Braun & Clarke, 2024; Yip, 2024).

Within this research program, my positionality was complex and multifaceted. As a cisgender White woman with direct experience of infertility, ART and subsequent parenthood, I shared key experiential and emotional commonalities with my participants. This position placed me as an 'insider', able to empathise deeply with their journeys (Yip, 2024). At the same time, my professional role, academic training, and current parental status positioned me as an 'outsider'—

someone who had moved beyond the immediacy of ART treatment and who now holds a degree of institutional authority. I remained critically aware of how this duality might shape both participant disclosures and my own interpretations.

Throughout the research, I aimed to keep patient voices at the heart of the work, grounding interpretations in participants' lived realities rather than my own projections. I acknowledged my educational privilege and access to academic resources, which may not be shared by all people with infertility, and I was vigilant to the possible impact of these power dynamics.

Ultimately, my motivation was both personal and professional: to improve psychological support for women navigating infertility. My positionality is not a neutral backdrop, but an active, interpretive lens. Embracing reflexivity, I strove to enhance the transparency and ethical integrity of this work using my own experience to ensure I adequately considered the biological, psychological and sociocultural environments of women with infertility.

2.5. The Biopsychosocial Model

While women with infertility are often viewed through a medical lens, the biopsychosocial model (Adler, 2009; Bjornsen-Ramig et al., 2024; Bolton, 2023) suggests that this diagnosis emerges from the interplay of biological, psychological, and social factors (Bjornsen-Ramig et al., 2024; Bolton, 2023). When considering women with infertility, the biopsychosocial model extends beyond medical treatments and interventions that address biological factors to include the need for emotional support and social resources, ensuring that women with infertility receive comprehensive, patient-centred care that is holistic (Bjornsen-Ramig et al., 2024).

The biopsychosocial model informed the doctoral research and the development of the group psychological intervention program, seeking to consider the whole person with infertility, not merely their diagnosis. Women with infertility may experience biological challenges, such as hormonal disorders, anatomical difficulties, genetic or chromosomal anomalies, or age-related ovarian decline (Delbaere et al., 2020; Nik Hazlina et al., 2022; Passet-Wittig & Greil, 2021; Sirait et

al., 2023). While these are biomedical factors, they are not the only factors relevant to women with infertility (Bjornsen-Ramig et al., 2024).

As described in Chapter 1, infertility can result in significant psychological distress, including anxiety, depression, stress, relationship difficulties, and reduced self-esteem (Aghaei & Atashpour, 2015; El Kissi et al., 2013). Women with infertility undergoing ART have experienced proved benefits from a range of psychological interventions. CBT, MBI, and stress-management skills have been shown to be the most frequently employed strategies by women with infertility who are undergoing ART, all showing effectiveness in improving mental health (Abedi Shargh et al., 2015; Frederiksen et al., 2015; Katyal et al., 2021; Koochaksaraei et al., 2023; Kremer et al., 2023; Warne et al., 2022).

Finally, infertility is associated with sociocultural factors. Both cultural expectations and social dynamics shape the experience of infertility and, as mentioned in Chapter 1, can lead to increased stigma and social isolation tied to childlessness, partner and family pressures that can strain relationships, and variable community support, influenced by cultural or societal norms (Archetti, 2024; Taebi et al., 2021). Undergoing ART often isolates women with infertility due to the intense nature of appointments, lifestyle adjustments, and time commitments (Cousineau & Domar, 2007; Nik Hazlina et al., 2022; Vioreanu, 2021). Therefore, addressing social factors is also relevant.

As a result, the research program was influenced by the biopsychosocial model when developing search terms and parameters for the systematic review and meta-analysis, the survey for patients and ART providers, and the group psychological intervention program. While understanding the need to consider the biological, psychological, and sociocultural context of women with infertility, I also recognised the importance of consulting with women with infertility about their needs. As a result, I employed a modified co-design, patient-centred and intervention mapping approach.

2.6. Co-Design

When commencing this research in 2020, I was interested in involving women with lived experience of infertility or resolved fertility. At the time, what was meant by co-design research was

developing and evolving. While I wanted to co-design the research with women with infertility, I took a more consultative approach, consulting with women with infertility and their fertility providers as part of *Study 2*. While *Study 2* I referred to co-design in this study, I recognise that it did not adhere to the strict requirements that are often now expected in order to label research as co-designed.

Thus, as research into co-design moved towards a co-implementation model of design, I realised that applying a strict co-designed protocol would not be well suited for this dissertation. The nuanced approach required for the co-design framework was outside of the scope of the current research, and as a result, I sought to locate a more suitable model to support my desire to involve women with infertility, their ART providers, and my own lived experience in the research design.

As such, I utilised a model that followed a similar approach to co-design, yet was more appropriate for my research. Therefore, I selected a modified intervention mapping model and applied it in the development of the group psychological intervention program.

2.7. Intervention Mapping

The intervention mapping model is a systematic and comprehensive approach used in public health, health promotion, and behavioural science to develop effective, evidence-based interventions to address health issues or promote behavioural changes (Bartholomew et al., 2016). Created by Bartholomew et al. (2016), the intervention mapping model provides a structured framework for planning, implementing, and evaluating interventions by integrating theoretical, empirical, and practical knowledge. Table 2.3. describes the six steps of intervention mapping (Bartholomew et al., 2016; Durks et al., 2017).

Table 2.3.

Steps Involved in Intervention Mapping

Step	Description
Needs Assessment	A thorough assessment of the health issue or behaviour in question. The assessment includes identifying the target population, understanding the determinants of the issue (i.e., biological, social, environmental), and analysing the context in which the intervention will take place.
Objectives Settings	Based on the needs assessment, clear and specific behavioural objectives are established. These objectives are formulated in a way that is measurable, achievable, and relevant to the desired health outcomes.
Selection of Theory-Based Methods and Strategies	Intervention mapping integrates theoretical frameworks to guide the selection of methods and strategies that are likely to facilitate behaviour change. It involves identifying evidence-based behavioural change theories and selecting intervention methods that align with those theories.
Development of Intervention Components	Involves translating theoretical methods and strategies into practical intervention components. It includes designing materials,

	activities, and interventions that are tailored to the target population and are culturally appropriate.
Implementation Planning	Intervention mapping emphasizes careful planning and organisation of the intervention implementation. This step involves identifying resources, establishing timelines, recruiting and training staff, and creating protocols for delivering the intervention.
Evaluation Planning	Intervention mapping emphasizes the importance of continuous evaluation to assess the effectiveness and impact of the intervention. Evaluation plans are developed to measure whether the objectives are met and to assess the intervention's reach, adoption, implementation, and maintenance.

The intervention mapping model is a dynamic, iterative process that emphasises collaboration among researchers, practitioners, and stakeholders throughout the intervention development cycle (Bartholomew et al., 2016). It encourages a systematic and evidence-based approach, ensuring interventions are tailored to the specific needs of the target population while considering the broader context in which they will operate (Bartholomew et al., 2016; Durks et al., 2017). Ultimately, the intervention mapping model aims to increase the likelihood of successful interventions by combining theoretical foundations with practical implementation strategies and evaluation methods (Bartholomew et al., 2016; Durks et al., 2017). Therefore, I applied intervention mapping in the current research, as it provided a clear, structured, evidence-based approach to

guide the development of an intervention for women with infertility (Bartholomew et al., 2016). Ensuring that the research considered the experience and preferences of women with current infertility and women treated in the past for infertility who were participating in treatment, and ART providers supported the ability to tailor the program development. Intervention mapping guided the development of each stage of the research, and each study was iterative and kept the women with infertility at the centre of the work.

2.8. Person-Centred Approach

In the context of health psychology and behaviour change interventions, a person-centred approach refers to a methodology that focuses on understanding and incorporating the perspectives, needs, and experiences of individuals into the design and development of interventions (Kitson et al., 2013; Santana et al., 2018; Yardley et al., 2015). Given the potentially isolating nature of infertility and ART, it was important to put women with infertility at the centre of the current research.

Yardley's work (2015), although not explicitly termed as a "person-based approach," aligns with principles of person-centred care and patient-centric interventions. Her research often emphasises the significance of understanding an individual's perspective and tailoring interventions accordingly. In doing so, the aim is to foster a more empathetic and effective approach to improving health behaviours and outcomes. The person-based approach, as advocated by researchers such as Lucy Yardley (2015), involves several key principles outlined in Table 2.4. (Santana et al., 2018; Yardley et al., 2015).

Table 2.4.

Key Principles of the Person-Centered Approach with Explanations of How it was Applied in this Dissertation

Key Principles	Explanation

Understanding the Target Population	This approach emphasises a deep understanding of the target population, including their behaviours, beliefs, cultural influences, and challenges related to the health issue at hand. *Study 1* involved considering the existing research that had been conducted regarding group psychological interventions for women with infertility. *Study 2* was conducted to explore the individual experiences and preferences of people with infertility who had/were engaged in ART, and ART providers, to ensure a clear understanding of the end user of the group psychological intervention program had been obtained.
Tailoring Interventions	Based on the gathered insights, interventions are tailored to fit the specific needs, preferences, and circumstances of the individuals within the target population. This customisation ensures that interventions are relevant, acceptable, and more likely to be effective. The results of *Study 2* informed the development of the group psychological intervention program.
Incorporating User Feedback	Throughout the development process, continuous feedback and collaboration with the target audience are integrated to refine and improve interventions. This iterative process enables adjustments based on real-world insights and feedback from individuals who will ultimately use the intervention. Once designed, the group psychological intervention program was reviewed by women with infertility who had participated in ART, and allied health professionals with lived experience of ART and knowledge of ACT.

Promoting Engagement and Adherence	The person-based approach aims to prioritise factors that enhance engagement and promote adherence to the interventions. By understanding individuals' motivations, barriers, and facilitators, interventions can be designed to increase participants' commitment and sustained engagement. *Study 2* was specifically developed to consider what the preferences of women with infertility undertaking ART. The patients and ART providers who completed the survey provided valuable information regarding possible motivators, barriers, and the content, format, and delivery mode for the group psychological intervention program.
Emphasising Empathy and Communication	Central to the person-based approach is the importance of empathetic communication and fostering a supportive environment. Healthcare providers or intervention designers strive to communicate with empathy, understanding, and clarity, ensuring that individuals feel heard and valued.

By applying this model, women with infertility were kept at the centre of the research. This approach led to a clear focus on the specific areas that would benefit from intervention, and to tailoring the strategies and methods developed, in order to accurately influence behaviour change.

2.9. Behaviour Change Techniques

Behaviour change techniques are specific strategies or methods used to modify or influence individuals' behaviours, often employed in psychology and behaviour change interventions (Abraham & Michie, 2008; Michie et al., 2013). These techniques are grounded in psychological theories and principles, aiming to facilitate positive changes in behaviours that impact health, well-being, or daily functioning (Abraham & Michie, 2008; Moore et al., 2023). These techniques were

developed in response to the lack of standardisation and clarity in describing behaviour change interventions, which previously made it challenging to compare studies, replicate successful approaches, or determine precisely what interventions entailed (Moore et al., 2023). Michie et al. (2013) introduced a systematic taxonomy to address this issue, establishing a common language and structured framework for identifying and categorising the smallest, observable components of behaviour change. By building on existing theories and frameworks, the taxonomy—comprising 93 unique techniques grouped into 16 categories—enables researchers to reliably replicate and implement interventions, enhances the synthesis of evidence in systematic reviews, and supports the development of more effective interventions. Ultimately, this comprehensive and standardised approach advances understanding of "what works" in behaviour change, facilitating evidence-based improvements across diverse populations and contexts (Moore et al., 2023).

Interestingly, the taxonomy has been further refined since *Study 2* was published, and The Behaviour Change Technique Ontology has expanded this model (Moore et al., 2023; *The Behaviour Change Technique Ontology*, 2023). The relevance of the identified behaviour change techniques that informed the research was considered within this research as part of the Re-AIM approach, which was applied to integrate new research and information gathered (King et al., 2010).

Table 2.5 outlines the key behaviour change techniques of relevance to the development of the group psychological intervention program (Michie et al., 2013; Moore et al., 2023). Each technique is accompanied by an explanation that specifically references how I integrated it to address the needs and preferences of women undergoing ART.

Table 2.5.

Behaviour Change Techniques that Informed Program Development

BCT	Definition	Relevance to Group Psychological Intervention for Women with Infertility

Goal directed	Supporting or setting goals is instrumental to behaviour change.	Helps women identify personal, meaningful goals such as improved self-care, coping with difficult thoughts and fosters a sense of agency and direction during infertility treatment.
Monitoring	Gathering or using information about performance related to a behaviour or experience.	Encourages self-reflection and accountability, allowing women to track emotional responses, home practice, or treatment adherence, which can empower change.
Social support	Taking steps to secure or deliver the support or aid of another person.	Builds a sense of community, reducing isolation, normalising emotions, and provides practical support among group members.
Guide how to perform behaviour	Provides guidance regarding how to perform the behaviour.	Offers clear strategies for managing difficult thoughts and feelings, stress management, making it easier for women to implement helpful behaviours.
Conduct a behavioural experiment	Advises on how to identify and test hypotheses about the behaviour, its causes and consequences.	Encourages women to try new strategies or defuse from unhelpful thoughts or beliefs, and reflect on outcomes, fostering learning and psychological flexibility.

Suggest different perspective on behaviour	Suggests the deliberate adoption of a new perspective on the behaviour.	Helps reframe infertility-related thoughts, feelings, and experiences, which can reduce distress and increase resilience.
Increase awareness of behaviour	Draws attention to the behaviour.	Promotes mindfulness, present moment awareness, and recognition of unhelpful patterns (e.g., negative self-talk), which can improve distress levels and agency.
Increase awareness of consequences	Draws attention to consequences of the behaviour in the normal course of events.	Highlights how certain thoughts or actions impact emotional well-being, motivating change toward healthier engagement in living.
Awareness of other people's thoughts, feelings or actions	Increases awareness of what other people think, do, or feel.	Fosters empathy, reduces feelings of isolation, and normalises experiences by sharing and hearing others' stories.
Associative learning	Involves repeated pairing of a stimulus with another stimulus or with a behavioural outcome.	Can help women associate positive coping strategies with improved outlook, mood or support, reinforcing adaptive behaviours.
Advise specific behaviour	Advises the person to perform a behaviour in a particular way to help change the target behaviour.	Provides actionable steps and strategies to be utilised to impact on infertility-related difficulties.

Manage mental processes	Advises how to manage mental processes to facilitate the target behaviour.	Teaches cognitive strategies, such as defusion, mindfulness, observing feelings, to manage distress and improve coping.
Advise how to change emotions	Suggests a method to alter emotions.	Offers emotion regulation techniques such as acceptance or mindfulness of feeling to help women distance from difficult feelings.
Restructure the environment	Alters the environment in which the behaviour is, or would have been, performed in a way that facilitates or impedes the behaviour.	Encourages changes in daily routines or physical spaces to reduce triggers and support positive behaviours, such as creating a calming space.
Prompt focus on self-identity	Prompts the person to focus on their mental representation of themself (self as context).	Helps women reconnect with aspects of their identity beyond infertility, supporting self-esteem and holistic well-being.
Behavioural consequence	Alters the consequences or promised consequences for a behaviour.	Uses reinforcement from the group setting or self-to encourage the ongoing use of adaptive coping and strategies, while demonstrating the consequences of past behavioural choices.

Note. Information within this table was derived from the following references (Michie et al., 2013; Moore et al., 2023).

The application of these techniques within the current research program aimed to enhance the mental health of women with infertility and promote positive behaviour change in the context of undergoing fertility treatment.

2.10. Summary

This dissertation was underpinned by a rigorous methodological approach that drew on established frameworks and models to ensure both theoretical and practical relevance. Central to this process was a commitment to person-centred care, recognising women with infertility as active participants whose unique experiences, needs, and preferences should guide intervention design. Intervention mapping provided a structured pathway for integrating evidence, theory, and stakeholder input, ensuring that each program element was grounded in both empirical findings and lived realities.

Informed by the biopsychosocial model, the group psychological intervention program acknowledged the complex interplay between biological, psychological, and social factors affecting women undergoing fertility treatment. This holistic perspective shaped the selection of behaviour change techniques, with strategies tailored to address cognitive, emotional, and social dimensions of adjustment and well-being. Techniques such as cognitive restructuring, skills training, social support, and the use of incentives emerged directly from an analysis of prior research, participant feedback, and best-practice guidelines, each mapped to specific intervention objectives.

Given the diversity of psychological interventions reported in the literature—and the lack of consensus regarding their efficacy in this specific population—the natural first step in the dissertation was to conduct a systematic review and meta-analysis. This study provided a comprehensive synthesis of existing group-based psychological programs for women with infertility, identifying effective components and gaps in the evidence base. By appraising and synthesising the existing research, the systematic review directly informed the subsequent phases of program development, ensuring alignment with both the dissertation's aims and the evolving needs of women engaging in ART.

CHAPTER 3

EVALUATING GROUP PSYCHOLOGICAL INTERVENTIONS FOR MENTAL HEALTH IN WOMEN WITH INFERTILITY UNDERTAKING FERTILITY TREATMENT: A SYSTEMATIC REVIEW AND META-ANALYSIS

3.1 Preamble

Most previous reviews exploring psychological interventions for infertility have examined individual and group-based interventions, combining males and females as one sample, and have not explored the effectiveness of clinical hypnosis. While these reviews offered valuable information, they did not provide information specific to women with infertility. Therefore, *Study 1* of the research program was a systematic review and meta-analysis evaluating the outcomes of facilitated group psychological interventions for women undergoing fertility treatment. This review was conducted to inform *Study 2* and the development of the group psychological intervention program.

This chapter reproduces: Warne, E., Oxlad, M., & Best, T. (2022). Evaluating group psychological interventions for mental health in women with infertility undertaking fertility treatment: A systematic review and meta-analysis. *Health Psychology Review*, 17(3), 377-401. https://doi.org/10.1080/17437199.2022.2058582

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I have only made formatting changes to align with the dissertation style. The references cited in this article are provided in the reference list at the end of the dissertation.

3.2 Statement of Authorship

Title of Paper	Evaluating group psychological interventions for mental health in women with infertility undertaking fertility treatment: A systematic review and meta-analysis
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Publication Details	Warne, E., Oxlad, M., & Best, T. (2022). Evaluating group psychological interventions for mental health in women with infertility undertaking fertility treatment: A systematic review and meta-Analysis, *Health Psychology Review*, 17(3), 377- 401. https://10.1080/17437199.2022.2058582

Principal Author

Name of principal author (candidate)	Emma Warne
Contribution to the Paper	Conceptualisation; Methodology; Investigation; Data Curation; Formal Analysis; Visualisation; Project Administration; Writing – Original Draft
Overall percentage (%)	85%
Certification	This paper reports on original research I conducted during the period of my higher degree by research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this dissertation. I am the primary author of this paper.

Signature		Date	09/12/2025

Co-author contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate stated contribution to the publication is accurate as detailed above;

ii. permission is granted for the candidate to include the publication in the dissertation; And

iii. the sum of all coauthors contributions is equal to 100% less than candidates stated contribution.

Name of Co-author	Associate Professor Melissa Oxlad		
Contribution to the Paper	Conceptualisation; Methodology; Validation; Supervision; Writing – Review and Editing		
Signature		Date	04/12/2025

Name of Co-author	Professor Talitha Best		
Contribution to the Paper	Conceptualisation; Methodology; Validation; Supervision; Writing – Review and Editing		
Signature		Date	10/12/2025

3.3 Abstract

We conducted a systematic review and meta-analysis of the published literature concerning the effectiveness of group psychological interventions in improving anxiety, depression, marital dissatisfaction, fertility quality of life and stress, and pregnancy outcomes of women with infertility, participating in fertility treatment. A search of five databases yielded 1603 studies; 30 articles met inclusion criteria, and computations of effect sizes ensued (Hedges' g and Odds Ratios (OR)). The total sample comprised 2752 participants, with 1279 participants receiving group intervention and 1473 participants in the comparison group. Group psychological interventions reduced depression (Hg_w= -1.277; 95% CI= [-1.739- -0.815]; p= 0.000), anxiety (Hg_w = -1.136, 95% CI [-1.527- -0.744]; p= 0.000), fertility stress (Hg_w = -0.250, 95% CI [-0.388- -0.122]; p= 0.000), and marital dissatisfaction (Hg_w = -0.938; 95% [CI -1.455- -0.421]; p= 0.000), and pregnancy rates improved (OR = 2.422 95% CI [2.037 – 2.879]; p = 0.000). No improvement was observed regarding fertility quality of life (Hg_w = 0. 144; 95% CI [-0.176- 0.463]; p= 0.379). Our findings highlight that participation in group psychological intervention improved the mental health, fertility stress and pregnancy rates of women with infertility.

Keywords: *infertility; women; assisted reproductive technologies; group psychological intervention; meta-analysis*

3.4 Introduction

Infertility, the failure to successfully achieve a clinical pregnancy following 12 months or more of regular unprotected sexual intercourse (Zegers-Hochschild et al., 2009), is a global health problem (WHO, 2009) that impacts one in four to one in six couples worldwide (Boivin et al., 2007; Mascarenhas et al., 2012). The burden of infertility and fertility treatment is multifaceted and can adversely impact individuals' physical, emotional, social, vocational and/or financial well-being, with these factors often not addressed during routine care provided in Assisted Reproductive Technologies (ART) (Boivin et al., 2007).

It is well documented that women with infertility are at an increased risk of developing distress or depressive symptomatology (Cui et al., 2020; Domar et al., 2000; El Kissi et al., 2013; Mascarenhas et al., 2012), increased anxiety (Gdańska et al., 2017), stress (Lynch et al., 2014), and feelings of guilt (Chan et al., 2012), failure, loss, hopelessness, and perceived lack of control (Cui et al., 2020). Experiences of unworthiness and self-blame (Bai et al., 2019), shame, inadequacy, failure, and fusion with negative cognitive scripts (Li et al., 2016) that reduce levels of acceptance and psychological flexibility (Nery et al., 2019; Rahimi, Abed, et al., 2018), have also been observed. In addition, infertility impacts couples' relationship satisfaction (Chan et al., 2006, 2012), communication (Schmidt et al., 2005), and mental health (Raad et al., 2021) and adversely impacts fertility treatment outcomes (Abedi Shargh et al., 2015; Nery et al., 2019). These impacts increase with treatment duration (Domar et al., 2000; Gdańska et al., 2017).

Given technological advances in medical treatment for infertility, people may access ART, which provides hope; however, the outcome remains uncertain. As a result, distress, anxiety and stress may develop due to the invasiveness and increased need for medical appointments (Gdańska et al., 2020). It is also uncommon for the financial and/or emotional impact to be addressed during appointments, often leaving couples without strategies to navigate uncertain outcomes associated with treatments likely to cause financial stress (Katz et al., 2011), which can exacerbate anxiety and distress.

Women with infertility experience high levels of anxiety and depression which may impact pregnancy outcomes (Boivin et al., 2011; Domar et al., 2000; Lakatos et al., 2017; Ogawa et al., 2011; Purewal et al., 2018). Thus, finding an effective way to attenuate psychological distress is a priority. Not surprisingly, several meta-analyses and Cochrane reviews have evaluated the literature concerning the effectiveness of psychological or educational interventions for individuals with infertility in diminishing distress with mixed results. For example, improvements in men and women's mental health following differing interventions, facilitated individually, self-directed or in a group format were observed in two meta-analyses (Frederiksen et al., 2015; Ha & Ban, 2021). In contrast, Hämmerli et al. (2009), in another meta-analysis, found no significant reduction in anxiety or depression for people with infertility following participation in a psychological, psychosocial or educational intervention.

In addition, previous reviews and meta-analyses have explored the efficacy of various intervention approaches on distress levels and pregnancy outcomes (Frederiksen et al., 2015; Ha & Ban, 2021; Ying et al., 2016). Purewal et al.'s (2018) meta-analysis demonstrated a relationship between lower levels of depression and anxiety in women before participating in ART, who subsequently became pregnant following ART; perhaps suggesting a relationship between anxiety and distress and pregnancy outcomes. However, two other meta-analyses (Boivin et al., 2011; Nicoloro-Santa Barbara, 2018) did not observe a relationship between distress and adverse ART outcomes. Boivin et al. (2011) attempted to control for the timing of distress assessment and conducted their analysis with first-time ART consumers and concluded that emotional distress did not appear to impact pregnancy rates in women undergoing their first round of ART. However, distress increases the longer ART treatment is pursued (Domar, 2009; Frederiksen et al., 2015). Domar et al. (2000) noted that depression levels appeared to peak within the third subsequent year of ART, which may be associated with unsuccessful pregnancy outcomes and treatment cessation. Domar (2000, 2011) further observed improvements in mental health and pregnancy outcomes for women with infertility after participating in a group psychological intervention.

Despite these noted improvements, the quality of the research conducted to date has been variable. Verkuijlen et al. (2016) noted major concerns regarding the quality of a large proportion of studies investigating interventions for individuals with subfertility and significant variability in methodology, leading them to conclude that results could not be calculated to accurately determine intervention efficacy. Additionally, while Ying et al. (2016) noted improvements in mental health and pregnancy rates following psychosocial interventions in their meta-analysis, their results were considered equivocal due to high attrition rates and the risk of bias. Ying et al. (2016) also observed that evaluations occurred at a time not often associated with high distress and that distress was seldom assessed during the two-week waiting period to confirm conception, a period typically associated with higher distress. Variability in assessment time points was also identified as a limitation in the studies evaluated (Ying et al., 2016).

Although limitations in past research have been observed, past systematic reviews and meta-analyses demonstrate that teaching Cognitive Behavioural Therapy (CBT) strategies typically focused on identifying, restructuring and challenging unhelpful thinking, behaviour change, relaxation training (progressive muscle relaxation), and emotional expression (Domar et al., 2000; Faramarzi et al., 2008; Karaca et al., 2019; McNaughton-Cassill et al., 2002) or mindfulness approaches that aimed to improve the mind body connection, acceptance, and ability to observe challenging thoughts and feelings without judgement, while employing formal and informal mindfulness practices, linked to fertility (Bai et al., 2019; Chan et al., 2006; Chan et al., 2012; Domar et al., 2011; Galhardo et al., 2013; Kalhori et al., 2020; Kim et al., 2014; Li et al., 2016; Psaros et al., 2015; Nery et al., 2019; Pasha et al., 2013; Paiva et al., 2015) can lead to improved self-mastery and the ability to manage distressing internal and external experiences (Faramarzi, Kheirkhah et al., 2008; Golshani et al., 2020; Hofmann et al., 2012). Likewise, Acceptance and Commitment Therapy (ACT), which aimed to develop psychological flexibility, and demonstrated an overlap with mindfulness-based interventions (MBI), with the addition of strategies around value recognition, defusion from thoughts, and developing acceptance of those things that cannot be changed (Rahimi et al., 2018; 2019) or stress

management (Ehsan et al., 2019; Hosaka et al., 2002) also demonstrated marked benefit for women with infertility.

To date, existing systematic reviews and meta-analyses have evaluated individual and group-based interventions collectively and included both males and females with infertility. Existing studies have not examined the impact of group-based interventions only with women alone nor included results regarding the effectiveness of clinical hypnosis, which is documented to amplify the effect of psychological therapy (Yapko, 2001; 2006). Therefore, we aimed to identify, appraise the quality, and evaluate studies examining the outcomes of facilitated group psychological interventions for women undergoing fertility treatment. Specifically, we aimed to identify whether group psychological interventions improved depression, anxiety, infertility stress, marital satisfaction, and pregnancy rates of women with infertility going through fertility treatment, while identifying the areas requiring improvement, including the timing of assessments and retention rates to be applied in our future research.

3.5 Method

The current study followed PRISMA recommendations for systematic reviews and meta-analyses (Page et al., 2020), and an apriori study protocol guided the research [PROSPERO Registration - CRD42020171956]. The reporting standards for quantitative research in psychology were followed (Appelbaum et al., 2018; Supplementary Table 1: PRISMA 2020 Checklist). A systematic search was conducted of five databases (CINAHL, Embase, PsychINFO, PubMed and Web of Science) from January 2000 to April 2020 to identify facilitated group psychological interventions delivered to women with infertility undertaking fertility treatment, to improve psychological well-being and pregnancy outcomes (see Supplementary Table 2 for our search strategy). Database alerts applying the same systematic search strategies were also set to capture any additional articles published until March 2021; no new studies meeting the inclusion criteria were identified. In addition, the reference lists of included studies were manually searched to identify any other relevant articles. During the review process, we updated the protocol to specify the outcome

variables of interest more clearly; rather than psychological well-being, outcomes were specified as depression, anxiety, fertility stress or well-being, fertility quality of life, marital satisfaction, and pregnancy outcomes.

3.5.1 *Selection Criteria*

As outlined in our pre-registered study protocol [PROSPERO registration - CRD42020171956], eligible studies were required to report results for a facilitated group psychological intervention for women undergoing fertility treatment and to include results of psychometric testing of depression, anxiety, fertility stress or well-being, marital satisfaction, or pregnancy outcomes. Studies with any (i.e., control group, waitlist control, treatment as usual) or no comparison group were included if they met the inclusion criteria. Studies were excluded if they did not report sufficient psychometric data, provided individual psychological intervention, or did not report separate results for women. Only original studies published in English in a peer-reviewed journal were eligible.

3.5.2 *Data Extraction*

The first author extracted data from the final cohort of studies, including age; gender; infertility type; country of study origin; year of publication; intervention type, length and modality; facilitator information; and baseline and post-treatment outcome data (i.e., means, mean differences, standard deviations (*SD*)). The second author checked the data extraction.

Data were entered into Comprehensive Meta-analysis Software (CMA; Version 3: Englewood, NJ; Borenstein et al., 2013) to calculate Hedges' g for group psychological intervention versus other, where other included support groups, antidepressant medication, gratitude groups, and control groups (waitlist control or treatment as usual). Hedges' g was selected over Cohen's d, as it considers differences in sample size and utilises a measure of standard deviation in the calculation and therefore assists with upward bias and small samples sizes (Ellis, 2010). A random effects model was applied, allowing for variation in the "true" effect size between each study due to potential differences in sampling, methodology, and random error. Where multiple measures for the same outcome were used, an average Hedges' g was calculated and reported. Rosenthal's (1993)

recommendation of using a conservative estimate (r = 0.7) in cases where correlations between the pre- and post-treatment measures were unavailable in within-group designs was employed.

Estimates of between-study heterogeneity were calculated via three indices: The *Q* statistic, which analyses the ratio of observed variation compared to within-study error (where a significant *Q* suggests that true effect sizes vary); *T*, equivalent to a *SD* for the overall weighted g effect; and the I^2 statistic, a proportional estimate of true effect variance over observed sampling error (Borenstein et al., 2017). Publication bias was examined by calculating Orwin's (1983) Failsafe (*Nfs*) for each average effect estimate to determine how many hypothetical unpublished studies would be required to reverse an overall weighted g value to a statistically unimportant effect size (i.e., g = 0.2). A fail-safe *N* value was considered adequate if it exceeded the overall number of studies included in this review (*Nfs* > *N*).

Hedges' g was calculated for the primary outcomes of depression, anxiety, fertility stress, fertility quality of life, and marital dissatisfaction, and Odds Ratios (OR) were calculated for the secondary outcome of pregnancy for the 26 studies (including the three combined datasets of the seven identified articles). Only the construct of state anxiety was included in the calculations of Hedges' g given the static nature of trait anxiety. Seven studies utilised the same participant data set (Domar, 2000a; 2000b; Faramarzi, 2008a, 2008b, 2013; Rahimi, 2018, 2019), so results were averaged to represent the three data sets to ensure results were not inflated due to those participants being included multiple times (see Table 1: Characteristics of Included Studies).

Hedges' g effect sizes are grouped into small (0.2), medium (0.5), and large (> 0.8) (Cohen, 1988). Findings were considered meaningful if an effect size was medium (Hedge's $g \geq 0.50$) to large (Hedge's $g \geq 0.80$), was statistically significant (i.e., 95% CIs ≠ 0; $p < 0.05$), and the *Nfs* was greater than the number of studies that contributed to the pooled effect size (Hedges' g>0.05; CIs ≠ 0; *Nfs* > *N*).

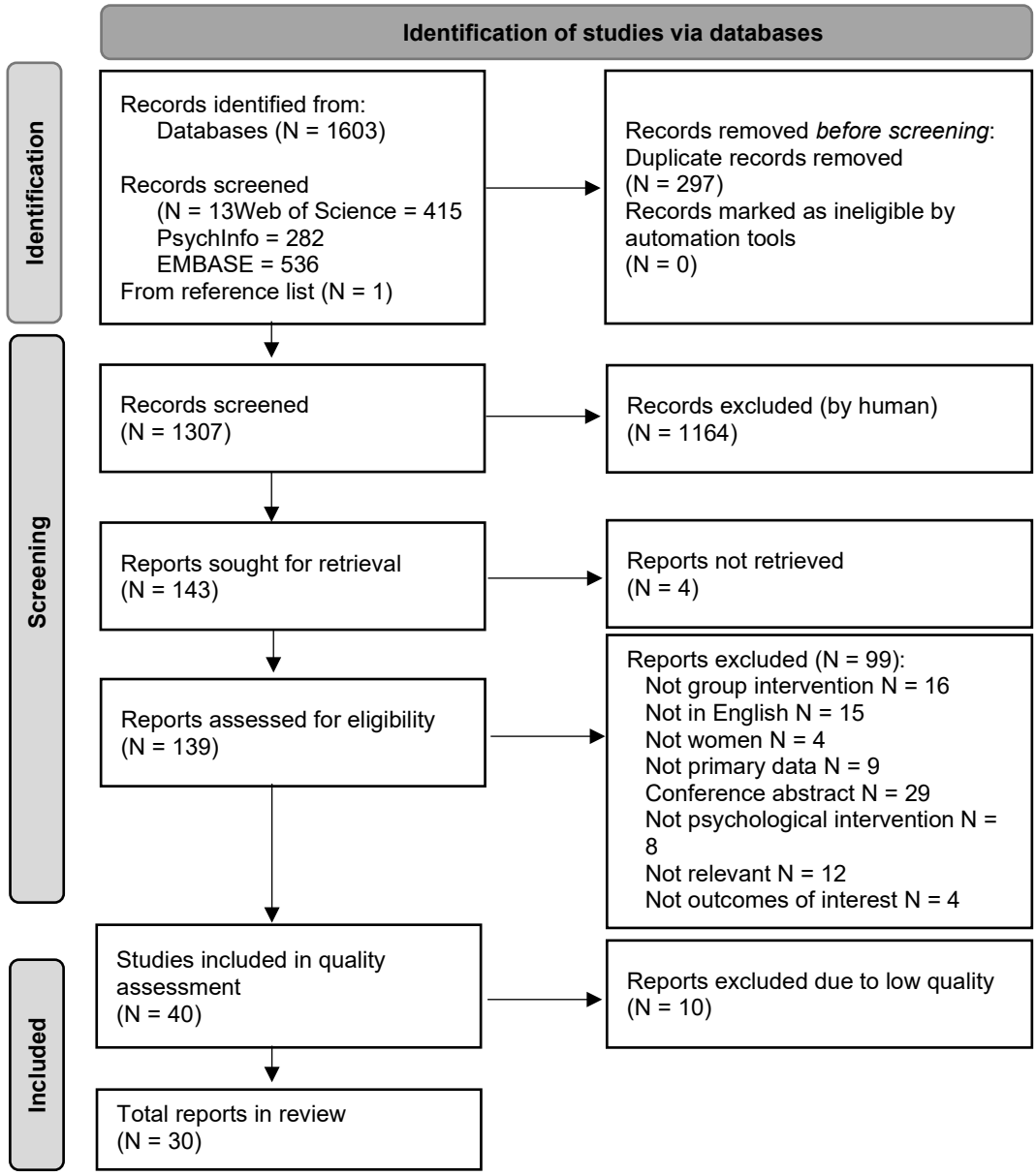
3.6 Results

3.6.1 *Study Identification*

Our initial search yielded 1603 potential articles, with one additional article identified from reviewing reference lists, resulting in 1311 articles remaining after removing duplicates. Applying the selection criteria to the titles and abstracts reduced this to 147 articles. A random selection of 20% of potentially eligible studies was co-screened by the first and second authors to minimise selection bias; inter-rater agreement was high (100%, $K = .98$, $p < .05$). Of the 147 articles, four could not be obtained despite contacting authors. Therefore, the full text of 143 articles was subsequently assessed against the selection criteria. Authors of two articles were emailed for further information; one author responded. This resulted in a sample of 40 papers being assessed for quality and possible inclusion in the review (see Figure 3.1.).

Figure 3.1.

PRISMA Flow Chart

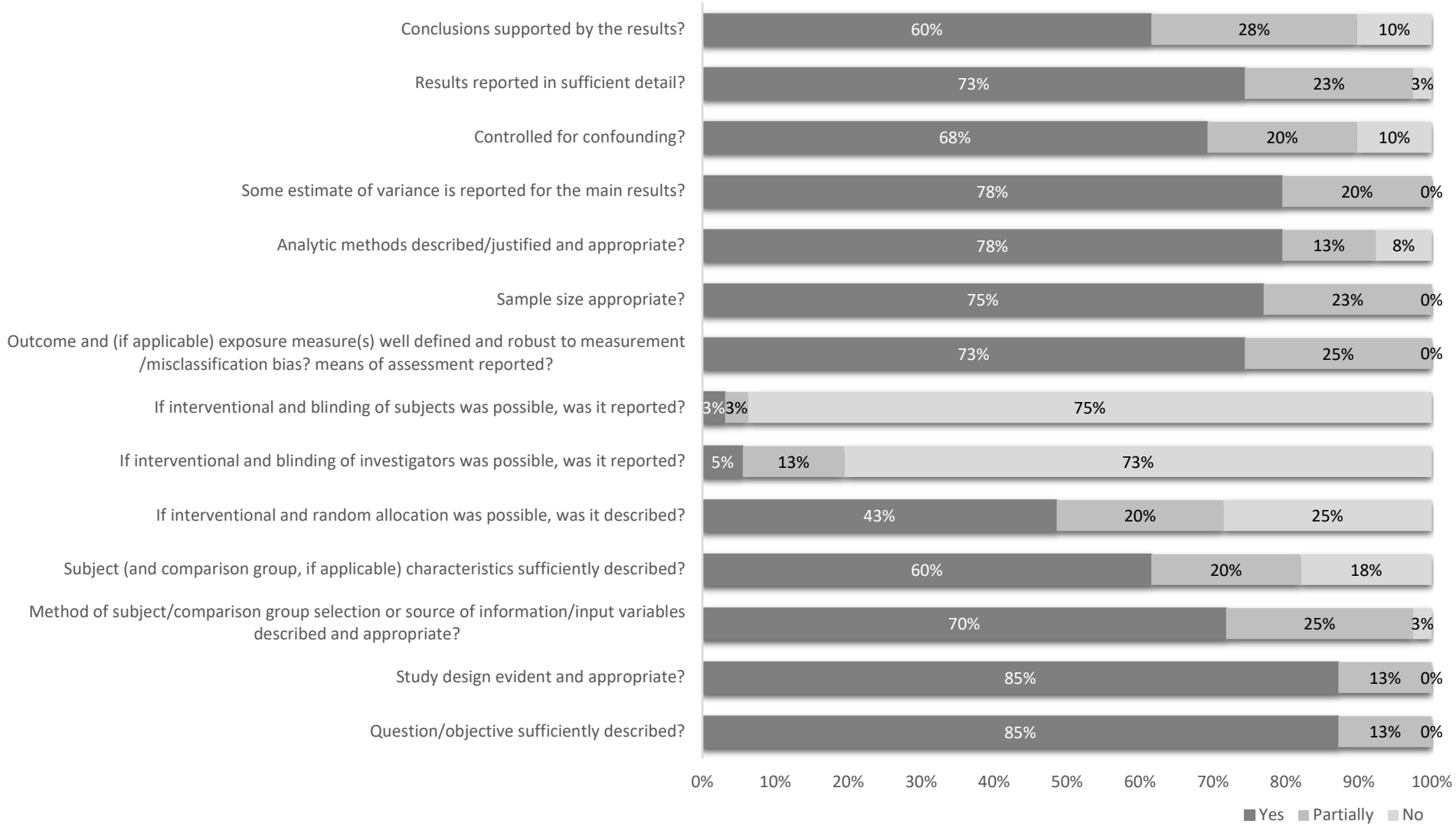


The QualSyst checklist (Kmet et al., 2004), a system that enables assessment of the methodological rigour of qualitative and quantitative research designs across several areas considered central to study validity, was utilised to assess the reporting quality of articles. Following independent quality assessment using QualSyst (Kmet et al., 2004) criteria by multiple authors, of the 40 studies that met the inclusion criteria and were assessed for quality, 10 studies were excluded due

to low quality (QualSyst scores <.55), leaving a final sample of 30 studies included in the systematic review and meta-analysis (see Supplementary Table 3 – Evaluation of Reporting Quality of Potentially Eligible Studies, for the detailed assessment of each potentially eligible study).

The quality of the included studies was largely high, with particular strengths observed in defining the research question and study objectives, and in reporting the study design. Limitations were observed around blinding of subjects and investigators, and the nature of random allocation was described infrequently (See Figure 3.2).

Figure 3.2
Reporting Quality of Included Studies using the QualSyst Assessment Checklist (Kmet et al., 2004)



3.6.2 *Study Characteristics*

Of the 30 articles of sufficient quality for inclusion, 13 studies were conducted in Iran, five in America and China respectively, three in Brazil, and one study in Korea, Portugal, Japan, and Turkey, respectively. Intervention approaches included Mindfulness-Based Interventions ($N_{studies}$=13), CBT ($N_{studies}$=10), ACT ($N_{studies}$=2), and Positive Psychology ($N_{studies}$=1). Behavioural Therapy ($N_{studies}$=1), Problem Solving ($N_{studies}$=1), and relaxation and stress reduction training ($N_{studies}$=2) were also applied. Stress reduction, relaxation training, or principles of ACT ($N_{studies}$=2) were applied in addition to the primary treatment modality in four studies (see Table 3.1.).

Table 3.1.

Characteristics of Included Studies

Randomised Control Trials										
First Author; Year; Country	Intervention Type [a]	N: Total Sample Size IG: Intervention C: Control	Pre-Assessment conducted	Post-treatment Assessment conducted	No. of Sessions (session length minutes)	Facilitator [b]	Manualised Program (Yes, No, Not Reported)	Assessment Measures IS: infertility stress D: depression A: anxiety M: marital satisfaction	Outcome : pregnancy (+/-)	QualSyst score
Ahmadi; 2019; Iran	BT	n= 24 (couples) CG=12 IG = 12	N/R	10th session	10 (90)	N/R	No	D: GHQ-28 A: GHQ-28 M: KMCS	-	.71
Bai; 2019; China	MBI or G	n= 234 CG= 78 IG1 = 78 IG2 = 78	Day 1 of IVF cycle	30 days	4 (60)	N	N/R	D: PHQ-9 (subscale) A: GAD-7 IS: FPI	+	1
Chan; 2012; China	MBI, SR	n = 339 IG= 172 CG= 167	Recruitment (3 months prior to commencement of IVF)	Day 1 IVF	4 (180)	SW/O	N/R	A: STAI M: KMSS;		.86
Chan; 2006; China	EBMS/MBI	n = 227 IG = 69 CG = 115	Recruitment	Day 1 (2 months)	4 (180)	SW	Yes	A: STAI;	+	.82
Domar; 2000; America	CBT/SG	n = 184 IG1 = 56 IG2= 65 CG= 63	Randomisation	6 months	10 (120)	CP	Yes	D: BDI, POMS (subscale); A: STAI, POMS (subscale); M: MDS;	-	.86

	CBT/SG	n = 184 IG1 = 56 IG2 = 65 CG= 63	Randomisation	6 months	10 (120)	CP	Yes	D: BDI, POMS; A: STAI, POMS (subscale); M: MDS;	+	.86
Domar, 2011; America	MBI	n = 97 CG = 46 IG = 51	Prior to randomisation	βHcG	10 (120)	P	Yes	P: βHcG and U/S at 7 weeks gestation	+	.82
Ehsan; 2019; Iran	SR/R	n = 80 CG= 40 IG= 40	Pre-intervention	1 month after intervention	5 (90)	N/R	N/R	IS: FPI	-	.79
Faramarzi: 2008 (a, b); Iran	CBT/AD	n = 124 IG1 = 29 IG2 = 30 CG = 30	Week 1 of intervention/CG at interview	Week 10 of intervention /3 months after interview	10 (120)	P	N/R	D: BDI A: CAI	-	.79
					10 (120)	P	Yes	D: BDI, GHQ (subscale) A: GHQ (subscale)	-	.86
Faramarzi: 2013; Iran					10 (120)	P	N/R	IS: FPI D: BDI	-	.89
Galhardo; 2013; Portugal	MBI/ACT	n = 61 IG = 55 CG = 37	Pre-intervention	10 weeks	9 (120), 1 (day)	CP	Yes	D: BDI A: STAI	-	.81
Gojani; 2018; Iran	PRCI/PSS	n = 108 IG1 = 34 IG2 = 35 CG = 34	Pre-intervention	Day 10 of waiting period	3 (PRCI) or 2 (PSS)	N/R	N/R	D: BDI	-	.82

Gorayeb; 2012; Brazil	CBT	n = 188 IG = 93 CG = 95	Pre-intervention	N/R	5 (120)	P	N/R	N/A	+	.82
Hosaka; Japan; 2002	CBT & RT	n = 74 IG = 37 CG = 37	Pre-intervention	After 5th session	5 (90)	N & P	Yes	D: HADS, POMS (subscale) A: HADS, POMS (subscale)	+	.75
Kalhori: 2020; Iran	MBI	n = 90 IG = 45 CG = 45	Pre-intervention	Day 3 -7 before ET	8 (90)	R	Yes	D: BDI	-	.75
Karaca; 2019; Turkey	CBT	n = 107 IG = 55 C = 52	First session	Last session	11 (120)	N	N/R	F: FPI D: CCL & GHQ-28 subscale A: CCL & GHQ-28 subscale	-	.86
Kim; 2014; Korea	MBI	n =50, IG = 26 CG = 24	1st day of 2nd IVF cycle	After ET	5 (120) 2 individual 3 group	N/R	N/R	A: STAI, VAS-A Uncertainty	+	.92
Nery: 2019: Brazil	MBI	n = 99 IG = 62 CG = 37	1 week prior to MBP sessions	1 week post MBP sessions	10 (120)	N/R	N/R	D: BDI; PGWBI subscales	-	.96
Rahimi, 2018; 2019: Iran	ACT	n = 40 IG = 20 CG = 20	Prior to randomisation	1 month post program completion	11 (90)	N/R N/R	N/R N/R	A: BAI IS: FertiQoL	- -	.82 .82
Pasha; 2018; Iran	MBI/AD	n = 93 IG1 (PST) = 31 IG2 (AD) =31 CG = 31	Prior to randomisation	End of study	8(120)	N/R	N/R	D: BDI	-	.82
Pasha; 2017; Iran	MBI/AD	n = 105 IG1 (PST) = 35 IG2 (AD) = 35 CG = 35	Baseline	End of study	8 (120)	PT	N/R	A: STAI	-	.85

Pasha; 2013; Iran	CBT/AD	n = 89 IG1 (CBT) = 29 IG2 (AD) = 29 CG= 30	Recruitment	End of study	10 (120)	P	N/R	D: BDI	-	.79
Zahra; 2019; Iran	CBT	n = 50 IG1 = 25 CG = 25	Pre-intervention	Two weeks after intervention	10 (90)	PhDP/ R	N/R	IS : NISS	-	.75
Zhang; 2019; China	PP	n = 200 IG= 100 CG= 100	Before intervention	After intervention	8 (60)	N	N/R	D: SCR-90 (subscale) A: SCR-90 (subscale)	+	.71
Non-Randomised Pre-Post										
First Author; Year; Country	Intervention Type [a]	N: Total Sample Size IG: Intervention C: Control	Pre-Assessment conducted	Post-treatment Assessment conducted	No. of Sessions (session length minutes)	Facilitator [b]	Manualised Program (Yes, No, Not Reported)	Assessment Measures IS: infertility stress D: depression A: anxiety M: marital satisfaction	Outcome : pregnancy (+/-)	QualSyst score
Li; 2016; China	MBI	n = 108 IG = 58 CG = 50	After consent	Following final session	6 (120-150)	CP	Yes	IS: FertiQoL	+	.79
McNaughton-Cassill; 2002; USA	CBT	n = 80 IG = 43 CG=37	Beginning of treatment cycle	End of treatment cycle	6 (90)	CP	N/R	D: BDI A: BAI	-	.64
Pilot/Feasibility Studies										

First Author; Year; Country	Intervention Type [a]	N: Total Sample Size IG: Intervention C: Control	Pre-Assessment conducted	Post-treatment Assessment conducted	No. of Sessions (session length minutes)	Facilitator [b]	Manualised Program (Yes, No, Not Reported)	Assessment Measures IS: infertility stress D: depression A: anxiety M: marital satisfaction	Outcome : pregnancy (+/-)	QualSyst score
Psaros: 2015; USA;	MBI	n = 51	Pre-intervention	Post-intervention	10 (120) + 240	NP	Yes	D: BDI	-	.86
Paiva; 2015; Brazil	MBSR	n = 25	Before MBSR	Immediately after MBSR	12 (120)	N/R	Yes	WB: PGWBI (subscale of depression and anxiety)	-	.67

Therapeutic Intervention [a]: ACT – Acceptance and Commitment Therapy; AD – antidepressant; BT – Behavioral Therapy; CBT – Cognitive Behavioral Therapy; EBMS - Eastern Body-Mind-Spirit (MBI Based); G – Gratitude; MBI – Mindfulness Based Intervention; MBSR – Mindfulness Based Stress Reduction; PP – Positive Psychology; PRCI - Positive reappraisal coping intervention; PSS - Problem-solving skills training; RT – Relaxation Therapy; SR – Stress Reduction

Facilitator [b]: C- Coach; PS – Psychologist; CP – Clinical Psychologist; G – Gynaecologist; MS – Masters Student; N/R – Not Reported; N – Nurse; NP – Nurse Practitioner; O – Obstetrician; PhDP – PhD Psychology; P – Psychiatrist; PT – Psychotherapist; R – Researcher; SW – Social Worker; T – Teacher

Assessment Measures [c]: BAI – Beck's Anxiety Inventory; BDI – Beck's Depression Inventory; CAI – Cattell Anxiety Inventory; CCL – Cognitive Checklist; FertiQoL – Fertility Quality of Life; FPI – Fertility Problems Inventory; GAD-7 – Generalised Anxiety Disorder 7 item scale; GHQ-28 – General Health Questionnaire; HADS – Hamilton Assessment of Depression Scale; ICBI - Importance of Childbearing Index; KMCS – Kansas Marital Conflict Scale; KMSS – Kansas Marital Satisfaction Scale; MDS – Marital Dissatisfaction Scale; NISS - Newton Infertility Stress Scale; PHQ-9 – Patient Health Questionnaire; POMS – Profile of Mood States; PGWBI - Psychological General Well Being Inventory; STAI – State-Trait Anxiety Inventory; SCR-90 – Symptom Checklist Revised; SRT - Symptom Rating Test; VAS-A – Visual Analogue Scale – Anxiety/Uncertainty

3.6.3 *Outcome Measures*

The Beck Depression Inventory ($N_{studies}$=12) was the most widely used psychometric measure to assess depression, the State Trait Anxiety Inventory for anxiety ($N_{studies}$=7), and the Fertility Problem Inventory to assess infertility stress ($N_{studies}$=4). Marital satisfaction or dissatisfaction was assessed via the Marital Dissatisfaction Scale or the Kansas Marital Conflict Scale or Satisfaction Scale. Subscales of depression, anxiety and marital satisfaction or conflict were also extracted from full-scale psychometrics and used to calculate effect sizes.

We extracted data for State Anxiety only as it was anticipated that State Anxiety may be impacted by psychological intervention, whereas Trait Anxiety is a static factor that is not amenable to change with intervention. Also, the inclusion of Trait Anxiety in the results may confound the effect sizes calculated. Our review aims to inform the development of an evidence-based psychological group intervention to reduce anxiety, depression, and fertility stress while improving marital satisfaction and pregnancy rates.

3.6.4 *Participant Characteristics*

2752 participants were included, with 1279 participants receiving group psychological intervention and 1473 participants in the control group or other condition, which included participants allocated to a support group (Domar et al., 2000), antidepressant group (Faramarzi, Kheirkhah et al., 2008; Faramarzi, Alipor et al., 2008; Faramarzi et al., 2013; Pasha et al., 2013; 2017; 2018), gratitude journaling (Bai et al., 2019) or problem-solving skills training (Gojani et al., 2018; see Supplementary Table 4: Intervention Overview, for more information about the components of each therapeutic approach). The control group and other interventions were combined, given that our review aims to inform the development of a group psychological intervention for women with infertility. As a result, we were interested in whether these group programs improved women's mental health and pregnancy outcomes superior to all other conditions.

Table 3.2.

Participant Characteristics

		Psychological Intervention group				Range		Comparison Group				Range	
		Studies	N	Mean	SD	Min	Max	Studies	N	Mean	SD	Min	Max
	Total n		1279						1473				
Age		19	954	32.65	4.42	28.30	37.40	19	1050	31.21	4.84	27.58	37.00
Age	Range	1	32						33				
	20-30		15						14				
	31-40		15						17				
	>40		2						2				
Marital duration	Years	9	436	7.36	6.51			9	499	6.70	3.63	5.70	8.16
	Months	1	26	58.00	27.50			1	24	53.33	24.70		
Education History		4	169	12.48	3.38	9.40	16.29	4	285	12.28	8.10	9.40	16.98
Primary vs Secondary		6	348					6	376				
	Primary		290						309				
	Secondary		58						67				
Primary vs Secondary			93						95				
	Primary (%)			80.60						75.80			
	Secondary (%)			19.40						24.20			
Infertility duration	Years	11	545	5.04	3.25	2.00	7.50		869	5.72	3.47	2.50	9.10
	Months	3	133	23.68	9.87	18.68	27.00	2	152	19.92	5.63	17.44	26.25
	Range	3	265			1.00	20.00	3	277			1.00	18.00

Infertility Type		12	683			11	831		
	Female factor		255				260		
	Both		106				124		
	Male factor		179				229		
	Unknown		127				137		
	Other		44				4		
Infertility Type	%	1	93			1	95		
	Female factor			0.74				0.72	
	Both								
	Male factor			0.12				0.74	
	Unknown								
	Other							0.00	
Treatment type	n reported	2	133			2	193		
	IUI		0				3		
	IVF		124				63		
	IVF & ICSI		0				21		
	ICSI		55				36		
	Other		2				23		
	Waiting		29				26		
Completed cycles		1	45	4.73	5.45	1	45	6.80	12.55

The age range of the psychological intervention group was 28.3 - 37.4 years (M=32.65, SD=4.42), and the comparison group was aged 27.58 - 37 years (M=31.21, SD=4.84; see Table 3.2.). The average marriage duration was 7.36 years (SD=6.51) in the psychological intervention group and 6.70 years (SD=3.63) in the comparison. The mean education in the psychological intervention group was 12.48 years (SD=3.38) and 12.28 years (SD=8.1) in the comparison group.

Infertility duration was reported in years ($N_{Studies}$=11), months ($N_{Studies}$=3), or range ($N_{Studies}$=3), with the average duration 5.04 years (SD=3.25) in the intervention group and 5.72 years (SD=3.47) in the comparison group. The average number of months for infertility duration was 23.68 months (SD=9.87) and 19.92 months (SD=5.63) in the intervention and comparison groups, respectively. Infertility type was reported in 12 studies (n=1562), with female factor reported for 255 participants (16.5%) in the intervention group and 260 (16.6%) in the comparison group. Male factor infertility was reported for 179 (11.4%) participants in the intervention group and 229 (14.6%) in the comparison group.

Primary versus secondary infertility rates were recorded in seven studies. A total of 290 participants were experiencing primary infertility in the intervention group and 309 in the comparison group. Fifty-eight and 67 participants were recorded as experiencing secondary infertility in the intervention and comparison groups, respectively. Treatment type was reported in two studies, and only one study provided information regarding the number of previously completed treatment cycles (McNaughton-Cassill et al., 2002). There were no significant differences observed between the intervention group and comparison group at baseline measurement on age (p=0.78), marriage duration (years p=0.83, months p=0.81), years of education (p=0.66), or infertility duration (years p=0.74, months p=0.89).

3.6.5 *Meta-analysis: Primary Outcomes*

3.6.5.1 Depression. Depression results were reported in 15 studies. Three studies (Domar, 2000a; Faramarzi, 2008; & Hosaka, 2002) reported multiple measures of depression. An average effect size per study was calculated with the results of each scale shown separately in Table 3.3. The

total effect size estimate highlighted a meaningful improvement in depression scores for participants that received group psychological intervention compared to the comparison group ($g_{weighted}$ -1.277, 95% CI [-1.739- -0.815]; p= 0.0000; Nfs > $N_{studies}$; Q = 241.06, p = 0.000, I_2= 94.19%, T= 0.87; $N_{studies}$=15). The sample demonstrated considerable heterogeneity; however, the *Nfs* of 111 suggests that the result was somewhat robust, and a large number of studies with insignificant results would be required to impact the meaningfulness of the finding.

Table 3.3.

Effect Sizes – Depression

				Depression								
Lead Author	**Measure (*italics subscale*)$_a$**	**n**	**Intervention$_b$**	***g***	**95% CI**		**p**	***N fs***	**Heterogeneity**			
					Lower	**Upper**			**Q**	**p**	**I_2**	**T**
Domar, 2000a	BDI	184	CBT	-2.96	-3.96	-2.224	0.0000					
Faramarzi, 2008, 2008, 2013		124	CBT	-1.048	-1.514	-0.582	0.0000					
Galhardo, 2013		61	ACT	-0.822	-1.252	-0.392	0.0000					
Gojani, 2018		108	CBT	-0.614	-1.03	-0.197	0.0040					
Kalhori, 2020		90	MBI	-1.935	-2.433	-1.438	0.0000					
McNaughton-Cassill, 2002		80	CBT	-0.05	-0.485	0.385	0.8220					
Psaros, 2015		51	MBI	-6.118	-7.062	-5.175	0.0000					
Pasha, 2018		93	MBI	-0.913	-1.36	-0.466	0.0000					
Pasha, 2013		89	MBI	-1.124	-2.365	0.117	0.0760					
Nery, 2019		99	MBI	-0.557	-1.083	0.031	0.0380					
	BDI $g_{(pooled)}$			**-1.56**	**-2.8**	**-0.32**	**0.0020**	**88**	**178.28**	**0.0000**	**94.95%**	**1.16**
Bai, 2019	*PHQ*	156	MBI	-0.291	-0.563	-0.019	0.0360					
Karaca, 2019	*CCL*	107	CBT	-1.653	-2.09	-1.217	0.0000					
Domar, 2000a	HRSD	184	CBT	-1.796	-2.406	-1.185	0.0000					
Domar, 2000a	*POMS*	184	CBT	-2.323	-2.985	-1.66	0.0000					
Hosaka, 2002	*POMS*	174	CBT	-0.231	-0.683	0.222	0.3170					
Hosaka, 2002	*HADS*	174	CBT	-0.375	-0.83	0.08	0.1070					
Paiva, 2015	*PGWBI*	25	MBI	-2.065	-2.597	-1.533	0.0000					
Zhang, 2019	*SCL*	200	PP	-0.477	-0.757	-0.197	0.0010					
Faramarzi, 2008, 2008, 2013	*GHQ*	124		-0.81	-1.318	-0.303	0.0020					
Domar, 2000a	$g_{(average)}$	184		-2.334	-2.986	-1.682	0.0000					
Faramarzi, 2008	$g_{(average)}$	124		-0.939	-1.283	-0.596	0.0000					
Hosaka, 2002	$g_{(average)}$	174		-0.302	-0.623	0.019	0.0650					
	Depression $g_{(weighted)}$			**-1.277**	**-1.739**	**-0.815**	**0.0000**	**111**	**241.06**	**0.0000**	**94.19%**	**0.87**

Measure$_a$: BDI – Beck's Depression Inventory; CCL – Cognitive Checklist; GHQ-28 – General Health Questionnaire; HADS – Hamilton Assessment of Depression Scale; PHQ-9 – Patient Health Questionnaire; POMS – Profile of Mood States; PGWBI - Psychological General Well Being Inventory; STAI – State-Trait Anxiety Inventory; SCL – Symptom Checklist Revised
Therapeutic Intervention$_b$: ACT – Acceptance and Commitment Therapy; BT – Behavioral Therapy; CBT – Cognitive Behavioral Therapy; MBI – Mind Body Intervention; PP – Positive Psychology
Statistics: $g_{(average)}$ = Hedges' g average effect size (95% CI); $g_{(pooled)}$ = Hedges' g of one measure; $g_{(weighted)}$ = overall Hedges' g for a construct; Italics denotes subscale

3.6.5.2 Anxiety. Thirteen studies provided data about anxiety. Five studies (Domar, 2000; Faramarzi, 2008; Hosaka, 2002; Karaca, 2019; Kim, 2017) assessed anxiety with multiple measures. An average effect size per study was calculated, with results of the individual scales and subscales reported in Table 3.4. The weighted effect size was considered meaningful, suggesting that psychological group interventions significantly improved anxiety scores for women with infertility, as compared to the comparison group ($g_{weighted}$ -1.136 95% CI [-1.527- -0.744]; p= 0.0000; Nfs > $N_{studies}$; Q = 242.62, p = 0.000, I2= 94.64%, T= 0.81; $N_{studies}$= 14). The sample demonstrated considerable heterogeneity; however, the Nfs of 97 suggests that the result was somewhat robust, and a large number of studies with insignificant results would be required to impact the findings meaningfulness.

Table 3.4.

Effect Sizes – Anxiety

Anxiety												
Lead Author	**Measure[a]**	**N**	**Intervention[b]**	***g***	**95% CI**		**p**	***N fs***	**Heterogeneity**			
					Lower	**Upper**			**Q**	**p**	**I_2**	**T**
McNaughton-Cassill, 2002	BAI	80	CBT	-0.139	-0.575	0.296	0.5300					
Rahimi, 2018	BAI	40	ACT	-1.789	-2.512	-1.066	0.0000					
Faramarzi, 2008, 2008, 2013	Cattell Anxiety Inventory	124	CBT	-1.074	-1.541	-0.607	0.0000					
Karaca, 2019	*CCL*	107	CBT	-2.152	-2.626	-1.678	0.0000					
Bai, 2019	*GAD*	234	MBI	-0.313	-0.627	0.002	0.0510					
Faramarzi, 2008, 2008, 2013	*GHQ*	124	CBT	-0.964	-1.426	-0.502	0.0000					
Karaca, 2019	*GHQ*	107	CBT	-2.44	-2.943	-1.945	0.0000					
Hosaka, 2002	*HADS*	74	CBT	-0.145	-0.596	0.307	0.5300					
Paiva, 2017	*PGWB*	25	MBI	-5.529	-6.752	-4.306	0.0000					
Domar, 2000a*	*POMS*	184	CBT	-2.536	-3.222	-1.85	0.0000					
Hosaka, 2002	*POMS*	74	CBT	-0.014	-0.465	0.437	0.9520					
Zhang, 2019	*SCL-90*	200	PP	-0.468	-0.748	-0.188	0.0010					
Kim, 2014	*Visual Analogue Scale*	50	CBT	-0.778	-1.345	-0.211	0.0070					
Chan, 2012	STAI	339	MBI	-0.49	-0.706	-0.274	0.0000					
Chan, 2006	STAI	184	MBI	-0.44	-0.743	-0.142	0.0040					
Domar, 2000a	STAI	184	CBT	-3.519	-4.326	-2.711	0.0000					
Galhardo, 2013	STAI	61	ACT	-0.405	-0.822	0.012	0.0570					
Kim, 2014	STAI	50	CBT	-1.951	-2.618	-1.285	0.0000					
Pasha, 2017	STAI	105	MBI	-1.237	-1.744	-0.73	0.0000					
	STAI $g_{(pooled)}$			**-1.25**	**-2.49**	**-0.01**	**0.0090**	**102**	**73.14**	**0.0000**	**93.16%**	**0.74**

Hosaka, 2002		$g_{(average)}$	74	-0.079	-0.398	0.24	0.6270					
Kim, 2014		$g_{(average)}$	50	-1.351	-2.501	-0.202	0.0210					
Karaca, 2019	$g_{(average)}$		107	-2.291	-2.634	-1.947	0.0000					
Domar, 2000a	$g_{(average)}$		184	-3.003	-3.965	-2.041	0.0000					
Faramarzi, 2008, 2008, 2013	$g_{(average)}$		124	-1.018	-1.347	-0.69	0.0000					
	ANXIETY $g_{(weighted)}$			**-1.19**	**-1.97**	**-0.41**	**0.0001**	**97**	**242.62**	**0.0000**	**94.64%**	**0.81**

Measure$_a$: BAI – Beck's Anxiety Inventory; CAI – Cattell Anxiety Inventory; CCL – Cognitive Checklist; GAD-7 – Generalised Anxiety Disorder 7 item scale; GHQ-28 – General Health Questionnaire; HADS – Hamilton Assessment of Depression Scale; POMS – Profile of Mood States; PGWBI - Psychological General Well Being Inventory; STAI – State-Trait Anxiety Inventory; SCR-90 – Symptom Checklist Revised; VAS-A – Visual Analogue Scale

Therapeutic Intervention$_b$ ACT – Acceptance and Commitment Therapy; BT – Behavioral Therapy; CBT – Cognitive Behavioral Therapy; MBI – Mind Body Intervention; RT – Relaxation Therapy

Statistics: $g_{(average)}$ = Hedges' g average effect size (95% CI); $g_{(pooled)}$ = Hedges' g of one measure; $g_{(weighted)}$ = overall Hedges' g for a construct; Italics denotes subscale

3.6.5.3 Fertility Stress and Fertility Quality of Life. Six studies provided results regarding fertility problems/stress, while two studies investigated fertility quality of life. The combined effect size for fertility stress suggested that women in the intervention group experienced improvements when compared to the comparison group ($g_{weighted}$ -0.250 95% CI [-0.388- -0.122]; p= 0.000; Nfs > $N_{studies}$; Q = 26.41, p = 0.000, I_2= 81.00%, T= 0.38; $N_{studies}$=6) (see Table 3.5). Although statistically significant, this result was not considered meaningful as one condition was not met (i.e., the effect size was < 0.5). Noteworthy heterogeneity was observed; however, the *Nfs* of 14 suggests the result was somewhat robust.

Table 3.5.

Effect Sizes: Fertility Stress and Fertility Quality of Life

Lead Author	Measure[a]	n	Intervention[b]	*g*	95% CI		p	N_{fs}	Heterogeneity			
					Lower	Upper			Q	p	I_2	T
Fertility Stress												
Bai, 2019	FPI	234	MBI	-0.021	-0.333	0.292	0.8970					
Ehsan, 2019	FPI	80	RT	-0.205	-0.64	0.23	0.3560					
Faramarzi, 2008, 2008, 2013	FPI	124	CBT	-0.518	-0.964	-0.072	0.0230					
Karaca, 2019	FPI	107	CBT	-0.379	-0.759	0.001	0.0500					
Chan, 2012	*ICBI*	339	MBI	-0.242	-0.456	-0.029	0.0260					
Zahra, 2019	Newton Infertility Stress Scale	50	CBT	-0.407	-0.959	0.144	0.1480					
	Fertility stress $g_{(weighted)}$			**-0.25**	**-0.388**	**-0.112**	**0.0000**	**14**	**26.41**	**0.0000**	**81.00%**	**0.38**
Fertility Quality of Life												
Li, 2016	FertiQOL	108	MBI	0.14	0.516	-0.236	0.466					
Rahimi, 2019	FertiQOL	40	ACT	0.153	0.76	-0.455	0.6220					
	Fertility QOL $g_{(weighted)}$			**0.144**	**-0.176**	**0.463**	**0.3790**	**1**	**0**	**0.972**	**0**	**0**

Measure[a]: FertiQoL – Fertility Quality of Life; FPI – Fertility Problems Inventory; ICBI - Importance of Childbearing Index; NISS - Newton Infertility Stress Scale
Therapeutic Intervention[b] - ACT – Acceptance and Commitment Therapy; BT – Behavioral Therapy; CBT – Cognitive Behavioral Therapy; MBI – Mind Body Intervention; RT – Relaxation Therapy
Statistics: $g_{(average)}$ = Hedges' g average effect size (95% CI); $g_{(pooled)}$ = Hedges' g of one measure; $g_{(weighted)}$ = overall Hedges' g for a construct; Italics denotes subscale

Two studies (Li, 2016; Rahimi, 2019) reported FertiQOL results, with the effect size considered small and insignificant ($g_{weighted}$ 0. 144 95% CI [-0.176 - 0.463]; p= 0.3790, Q = 0, p = 0.972, I_2 = 00%, T = 0.00; $N_{studies}$=2). The finding should be interpreted with caution given the low number of studies and the N_{fs} of 1 being less than the number of studies included in the analysis, indicating that this finding may change when further studies use this measure. Additionally, any heterogeneity may not have been detected due to the low number of studies in the analysis.

3.6.5.4 Marital Dissatisfaction/Satisfaction. Marital dissatisfaction/conflict was reported in seven studies (Ahmadi, 2019; Chan, 2006; Domar, 2000a, Ehsan, 2019; Faramarzi, 2008a, 2008b, 2013; Karaca, 2019; Zahra, 2019), while one study reported results for marital satisfaction (Chan, 2012). A large weighted effect size was calculated, indicating that participating in a group psychological intervention program meaningfully improved marital dissatisfaction or conflict in contrast to the comparison group ($g_{weighted}$ -0.94 95% CI [-1.72- -0.15]; p = 0.003; Nfs > $N_{studies}$; Q = 35.47, p = 0.000, I_2 = 83.03%, T = 0.60; $N_{studies}$=7) (see Table 3.6.). Considerable heterogeneity was observed; however, the N_{fs} of 40 was indicative of a robust finding. The result for marital satisfaction (Chan, 2012), from only one study, was small and insignificant ($g_{weighted}$ 0.067 95% CI [-0.145- 0.280]; p= 0.5360; $N_{studies}$=1).

Table 3.6.

Effect Sizes - Marital Dissatisfaction and Marital Satisfaction

Marital Dissatisfaction												
Lead Author	**Measure$_a$**	**n**	**Intervention$_b$**	***g***	**95% CI**		**p**	***N$_{fs}$***	**Heterogeneity**			
					Lower	**Upper**			**Q**	**p**	**I_2**	**T**
Ahmadi, 2019	KMCS	24	BT	-1.645	-2.547	-0.743	0.0000					
Chan, 2006		184	MBI	-0.13	-0.422	0.173	0.412					
Domar, 2000a	MDS	184	CBT	-3.019	-4.485	-1.554	0.0000					
Ehsan, 2019	*FPI*	80	RT	-0.183	-0.618	0.252	0.4090					
Faramarzi, 2008, 2008, 2013	*FPI*	124	CBT	-1.176	-2.125	-0.22	0.0150					
Karaca, 2019	*FPI*	107	CBT	-1.031	-1.431	-0.63	0.0000					
Zahra, 2019	*NISS*	50	CBT	-0.87	-1.442	-0.298	0.0000					
	Marital dissatisfaction $g_{(weighted)}$			**-0.94**	**-1.72**	**-0.15**	**0.0030**	**40**	**35.47**	**0.0000**	**83.08**	**0.6**
Marital Satisfaction												
Chan, 2012	KMSS	339	MBI	0.067	-0.145	0.28	0.5360					

Measure$_a$: FPI – Fertility Problems Inventory; KMCS – Kansas Marital Conflict Scale; KMSS – Kansas Marital Satisfaction Scale; MDS – Marital Dissatisfaction Scale; NISS - Newton Infertility Stress Scale
Therapeutic Intervention$_b$: BT – Behavioral Therapy; CBT – Cognitive Behavioral Therapy; MBI – Mind Body Intervention; RT – Relaxation Therapy;
Statistics: $g_{(average)}$ = Hedges' g average effect size (95% CI); $g_{(pooled)}$ = Hedges' g of one measure; $g_{(weighted)}$ = overall Hedges' g for a construct; Italics denotes subscale

3.6.6 *Meta-analysis: Secondary Outcome*

3.6.6.1 Pregnancy.

Seven studies reported the incidence of pregnancy for participants (Chan, 2006; Domar, 2000; Domar, 2011; Gorayeb, 2012; Hosaka, 2002; Kim, 2014; Li, 2016). Pregnancy rates significantly improved in eight of the nine primary studies where participants received group psychological intervention compared to the comparison group (see Table 3.7.). Overall, the pooled effective size for pregnancy suggests that women who participated in a group psychological intervention program were 2.422 times more likely to conceive than the comparison group (OR = 2.422 95% CI [2.037 – 2.879]; p = 0.000; Nfs > $N_{studies}$; Q =3.01, p = 0.854, I_2 = 0.00%, T = 0.00; $N_{studies}$ = 7). The N_{fs} of 10 suggested that the current findings were somewhat robust.

Table 3.7.

Effect Sizes – Pregnancy

			Pregnancy Rates								
				95% CI				Heterogeneity			
Lead Author	**n**	**Intervention type$_a$**	**Odds Ratio**	**Lower**	**Upper**	**p**	***N fs***	**Q**	**p**	**I_2**	**T**
Chan, 2006	184	MBI	2.206	1.025	4.732	0.000					
Domar, 2000	184	CBT	2.189	1.542	3.105	0.000					
Domar, 2011	97	MBI	2.005	0.477	8.419	0.342					
Gorayeb, 2012	188	CBT	2.189	1.542	3.105	0.000					
Hosaka, 2002	74	CBT	3.894	1.986	7.635	0.000					
Kim, 2014	50	CBT	2.237	1.199	4.172	0.011					
Li, 2016	108	MBI	2.31	1.464	3.645	0.000					
		Pregnancy Odds Ratio$_{(average)}$	**2.422**	**2.037**	**2.879**	**0.000**	**10**	**3.01**	**0.854**	**0.0%**	**0**

Intervention type$_a$: CBT - Cognitive Behavioural Therapy; EBMS - Eastern Body-Mind-Spirit; MBI - Mindfulness Based Intervention

3.7 Discussion

Our systematic review and meta-analysis showed that facilitated group psychological intervention significantly improves depression, anxiety, infertility stress, and marital satisfaction in women undergoing fertility treatment. Further, following group intervention, women are approximately twice as likely to become pregnant than comparison groups. The effect sizes of group-based interventions are diverse, and our study highlights key effects across psychological functioning, relationships and pregnancy outcomes.

Our results are consistent with previous systematic reviews and meta-analyses that explored psychosocial or psychological interventions (group and/or individual) and their impact on improving the mental health, fertility stress, marital satisfaction in couples, and pregnancy rates of women undergoing fertility treatment (Boivin, 2004; Frederiksen et al., 2015; de Liz & Strauss, 2005; Domar & Prince, 2011; Hämmerli et al., 2009; Ogawa et al., 2011). Notably though, in their review of couples' outcomes, Ying et al. (2016) did not report improvements in depressive symptoms or fertility stress, only improvements in anxiety, pregnancy rates, and marital functioning. Frederiksen et al. (2015) combined psychological outcome measures and found that the effectiveness of psychological interventions was generally larger for women than men, with the Hedges' g ranging between 0.51-0.73 for women compared to 0.13–0.34 for men, while Golshani et al. (2020) demonstrated that CBT significantly reduced anxiety among Iranian women undergoing fertility treatment. While our review did not differentiate between treatment modalities, we observed more pronounced impacts on depression and anxiety. Our results indicated a significant improvement for women who completed a facilitated group psychological intervention compared to the comparison group (waitlist control or other conditions). Furthermore, our results demonstrated a small and significant effect size for facilitated group psychological intervention improving fertility stress. However, it is unknown whether the small effect size was due to group intervention impacting change or an insufficient number of studies and participants leading to low power. A large and meaningful effect size was observed for marital dissatisfaction, indicating that facilitated group

psychological intervention resulted in improvements compared to a control group or other interventions.

Group psychological interventions did not result in a significant change in women's fertility quality of life or marital satisfaction. The reasons for this are unknown; they may be related to construct measurement, the intervention not sufficiently addressing these domains, or the small number of studies in the analysis may be insufficient to detect a statistical improvement. While similar results have been observed in a previous meta-analysis (Hämmerli et al., 2009), further research into the impact of psychological intervention on fertility quality of life and marital satisfaction is recommended.

We found that effect sizes were more pronounced for group psychological interventions of more than six weekly sessions, with a total duration of more than nine hours. The level of detail included would have increased with the increased program duration and allowed for additional practice and the development of multiple skills to address the plethora of challenges associated with infertility. Programs focusing on developing strategies to manage thoughts and feelings, while addressing the uncertainty of fertility treatment had a significant impact on women's mental health and pregnancy rates while undergoing fertility treatment. Outside of MBI, CBT group programs were the most widely implemented approach and showed promise in all areas evaluated (depression, anxiety, marital dissatisfaction, fertility stress, and pregnancy rates). MBI appeared to improve depression effectively and improved pregnancy rates significantly, such that participants were more than twice as likely to conceive than the comparison group. For anxiety, more widely researched with women with infertility, CBT appeared to outperform other psychological interventions, and ACT demonstrated promising results as a third wave CBT intervention. Overall, CBT group programs are effective for women with infertility undertaking fertility treatment, with group interventions generally having a positive impact on mental health and pregnancy outcomes. Of note, no studies evaluating the utility of clinical hypnosis were identified for inclusion in our review.

A strength observed in the current systematic review and meta-analysis was that the quality of the included studies was higher than documented previously, perhaps suggesting the impact of infertility is becoming a focus of research in reproductive health and that researchers are employing greater methodological rigour. The group psychological interventions reviewed demonstrated promise regarding the benefits for participants and strengths in the methodology applied. However, marked variation existed concerning the information contained in the demographic information and psychometric evaluations. In contrast, Verkuijlen et al. (2016) noted significant concerns regarding the quality of research and suggested that effect sizes could not be presented due to a high level of bias (e.g., poor methodological standard and variability of the studies identified). As a result, although our findings were promising and only included studies deemed of sufficient quality, they should be viewed with consideration to the potential variability in methodology between the included studies and the possibility that the effect sizes may over estimate outcomes.

Further limitations observed in the included studies were the use of various self-report measures that may be open to manipulation (including desirability or impression management) and which may have measured different aspects of a construct; participant self-selection into the studies may mean they are not representative of all women with infertility undergoing fertility treatment; significant attrition levels may have impacted the computed effect sizes; and the significant variation in the study design and quality may have resulted in an inflation of the effect sizes observed. Finally, our decision to compare the group psychological intervention participants to a combined other control/intervention group that included all other interventions that were not psychologically based may have confounded the results and removed a level of specificity.

3.8 Clinical Implications and Conclusions

Facilitated group psychological interventions, particularly CBT and MBI, appear effective in improving the mental health and pregnancy outcomes of women with infertility undergoing in fertility treatment. Depression and anxiety were particularly improved, and women who participated in the evaluated group psychological interventions were twice as likely to become pregnant than

control groups or other interventions such as support groups, antidepressants, gratitude journaling or problem-solving groups. Group programs longer than nine hours in duration and facilitated for more than six weekly sessions demonstrated larger effect sizes, likely due to multiple, rather than single strategy development and increased experiential practice during the sessions. MBI and CBT-based programs were more widely researched and effective overall. Our findings have clinical implications for future program development, suggesting intervention types, duration and frequency that may lead to the best outcomes when group interventions are utilised with women undergoing infertility treatment. As more research emerges in this area that employs different therapeutic modalities, future reviews may include different treatment modalities and explore possible amplification effects arising from combining therapeutic approaches.

CHAPTER 4

CONSULTING PATIENTS AND PROVIDERS OF ASSISTED REPRODUCTIVE TECHNOLOGIES TO INFORM THE DEVELOPMENT OF A GROUP PSYCHOLOGICAL INTERVENTION FOR WOMEN WITH INFERTILITY

4.1. Preamble

This chapter reproduces: Warne, E., Oxlad, M., & Best, T. (2023). Consulting patients and providers of assisted reproductive technologies to inform the development of a group psychological intervention for women with infertility. *PEC Innovation*, 3, 100206. https://doi.org/10.1016/j.pecinn.2023.100206 © The Author(s) 2024. Licensed under the Creative Commons Attribution 4.0 International (CC BY 4.0) https://creativecommons.org/licenses/by/4.0/.

I have only made formatting changes to align with the dissertation style. The references cited in this article are provided in the reference list at the end of the dissertation.

As *Study 1* indicated that group psychological interventions demonstrate positive outcomes for women's psychological well-being and pregnancy outcomes, *Study 2* was a survey of ART patients and providers conducted to inform the development of the group psychological intervention. As part of the modified intervention mapping/person-centered approach utilised in the dissertation, *Study 2* assisted in identifying the behaviour change techniques to be included in the group psychological intervention and ensured the intervention approach would be acceptable to the end users and their treating teams.

4.2. Statement of Authorship

Title of Paper	Consulting patients and providers of assisted reproductive technologies to inform the development of a group psychological intervention for women with infertility
Publication Status	Published

Publication Details	Warne, E., Oxlad, M., & Best, T. (2023). Consulting patients and providers of assisted reproductive technologies to inform the development of a group psychological intervention for women with infertility. *PEC Innovation*, *3*, 100206. https://doi.org/10.1016/j.pecinn.2023.100206

Principal Author

Name of principal author (candidate)	Emma Warne		
Contribution to the Paper	Conceptualisation; Methodology; Investigation; Data Curation; Formal Analysis; Visualisation; Project Administration; Writing – Original Draft		
Overall percentage (%)	85%		
Certification	This paper reports on original research I conducted during the period of my Higher Degree by Research Candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this dissertation. I am the primary author of this paper.		
Signature		Date	09/12/2025

Co-author contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate to include the publication in the dissertation; And

iii. the sum of all coauthors contributions is equal to 100% less than candidates stated contribution.

Name of Co-author	Associate Professor Melissa Oxlad		
Contribution to the Paper	Conceptualisation; Methodology; Validation; Supervision; Writing – Review and Editing		
Signature		Date	04/12/2025

Name of Co-author	Professor Talitha Best		
Contribution to the Paper	Conceptualisation; Methodology; Validation; Supervision; Writing – Review and Editing		
Signature		Date	10/12/25

4.3. Abstract

Objective: To consult providers and women patients of Assisted Reproductive Technologies regarding their preferences for the format, duration and content in the development of a group psychological intervention.

Methods: Providers and current and past women patients of Assisted Reproductive Technologies completed an online cross-sectional survey comprising items about session content, number, frequency, timing, format, delivery mode and inclusion of experiential practice of psychological strategies to promote well-being.

Results: Eight providers, 51 current women patients and 51 women who previously underwent Assisted Reproductive Technologies participated. Sixty-two percent of participants indicated a group psychological program would be helpful; and 34% thought it may be helpful. Face-to-face was the preferred delivery mode (42%). Seventy-one percent preferred 60-minute sessions held fortnightly

(64%), with six sessions most acceptable (24%). Most respondents (74%) felt group participants would likely complete at-home practice. Detailed thematic content from participants highlighted a complex range of consumer challenges. Relevant behavior change techniques were verified, with those to be included identified as: feedback and monitoring, regulation, self belief, reward and threat, natural consequences, identity, support, shaping knowledge, and comparison of outcomes. **Conclusion:** Providers and patients were supportive of the development of a group psychological intervention to provide support for women undergoing Assisted Reproductive Technologies. **Innovation:** The results of this study provide insight informing the co-design of a group psychological program for women with infertility.

Key words: infertility; assisted reproductive technologies; group psychological intervention; behavior change techniques; women

4.4. Introduction

Infertility affects approximately 15% of the global population of reproductive age (Sun et al., 2019), including approximately 7% of women in Australia (Australian Bureau of Statistics [ABS], 2002) and one in four couples worldwide (WHO [WHO], 2012). The WHO (2009) defines infertility as the inability to conceive following 12 months or more of regular, unprotected sex. The burden associated with infertility can be emotional (Boivin et al., 2011; Ogawa et al., 2011), social, relational (Schmidt et al., 2005), and financial (Njagi et al., 2023), and is often experienced most significantly by the person who is required to undergo treatment via Assisted Reproductive Technologies (ART) (Taebi et al., 2021). People undergoing fertility treatment often receive medical advice, financial options, and routine medical care; however, targeted emotional support is not routinely provided (Boivin & Gameiro, 2015).

It is well-documented that infertility and the associated medical treatment adversely impact participants' well-being and stress levels (Dube et al., 2021; Duffy et al., 2020; Fisher et al., 2010),

and some research has identified a relationship between distress levels and pregnancy rates (Boivin et al., 2011; Domar et al., 2012; Domar et al., 2000; Domar & Dusek, 2000; Lakatos et al., 2017; Ogawa et al., 2011; Purewal et al., 2018). In contrast, other studies have failed to identify a relationship between distress and pregnancy rates (Boivin et al., 2011; Nicoloro-SantaBarbara et al., 2018). However, despite these equivocal results, improvements in mental health and pregnancy rates are routinely observed following psychological intervention (whether group-based, educational-based or individually facilitated) compared to treatment as usual or waitlist controls (Warne et al., 2022).

Despite these benefits, a recent meta-analysis (Warne et al., 2022) found no evidence-informed, group-based psychological interventions evaluated in Australia or New Zealand for women undergoing ART. The absence of such interventions is disappointing, given that the same review highlighted noteworthy improvements in mental health and pregnancy outcomes following the completion of a group-based psychological intervention. They also highlighted that group mindfulness-based interventions and Cognitive Behavioral Therapy approaches were the most efficacious and that promising results exist for Acceptance Commitment Therapy.

Further, the results of Warne et al.'s (2022) meta-analysis highlighted that group programs longer than nine hours demonstrated better outcomes for women's key change objectives of improved mental health and pregnancy outcomes. Effective approaches target negative thinking and feelings, develop present moment awareness, acceptance and defusion-like strategies, and utilise visualisation, relaxation or mindfulness training exercises. Participants also describe the group support as beneficial. However, inconsistencies exist when assessing outcomes, and behavior change techniques (BCTs) employed are seldom reported consistently across studies (Warne et al., 2022).

BCTs should be key considerations when designing interventions and should be reported to enhance understanding of interventions. Categorising and identifying the techniques utilised in an intervention improves replicability and offers insights into mechanisms of change (Abraham & Michie, 2008; Michie et al., 2013). Michie and colleagues (2013) developed a list of 93 BCT clusters,

which offer value in designing interventions. Within Warne et al.'s (2022) meta-analysis, studies that demonstrated improvements in depression, anxiety, fertility stress, and if reported, pregnancy outcomes utilised BCTs from the following clusters: goals and planning; feedback and monitoring; social support; shaping knowledge; regulation; associations; identity; self-belief; and covert learning. In order to ensure the quality and feasibility of the group psychological intervention we are developing, in the current study, we aimed to clarify the acceptability of these identified BCTs and explore additional content areas to include. Further, our intervention development will be guided by a modified intervention mapping (IM: Bartholomew et al., 2016) approach to improve intervention quality and acceptability.

As part of a person-centred and modified IM approach to intervention development, consultation with those who will undertake an intervention is recommended. Limited research in Australia has sought to ascertain the psychosocial supports that ART people treated with ART might need. In a preliminary study, Read et al. (2014) found that psychological support to cope with relationship issues, stress, understanding and sharing experiences, and practical information were valued. Further, several couples indicated that social engagement or mentorship with other people who had completed ART might be useful. Read et al. (2014) further recommended consulting ART participants about whether they needed support and, if so, what type of psychosocial support would be most useful. This advice was given beyond that recommended by ESHRE (Gameiro et al., 2015) which provided 120 recommendations to guide staff at clinics in recognising and responding to psychosocial needs of people undertaking ART. However, given the changing social, political and economic climate of ART due to the progress of medical knowledge, as well as the impact of the COVID-19 pandemic since those recommendations, we aimed to consult women treated with ART and ART providers and clarify the outcome determinants, performance objectives, and perspectives about our proposed group psychological intervention.

The current survey was designed to inform the development of a group psychological intervention program that may improve the mental health, well-being and outcomes of women

undergoing ART. Therefore, we only consulted women who have or were being treated with ART, as they are the target audience for the group psychological intervention under development. Further research will likely consider developing a program for all parties participating in ART; however, the current survey was interested in the acceptability, feasibility, and content to be included in a group program for women receiving ART.

4.5. Methods

Our study employed a mixed method cross-sectional design involving purposive sampling of Australian women treated with ART (past and current) and ART providers. We were interested in the perceived acceptability and usefulness of various aspects of skill development and preferences regarding program session content, number, frequency, timing, format, and delivery mode (individual, group, face- to-face, or online). We applied a modified six-step IM approach, where the current survey served as a needs assessment, Step 1 of the model, while the survey results were utilised to inform Step 2 of the model, defining the behavioural determinants for change. In addition, the results were utilised to inform an intervention framework that could be assessed and replicated.

The current research drew on a person-based (Yardley et al., 2015), modified IM framework and Information-Motivation-Behavior (IMB) approach to intervention development (W. A. Fisher et al., 2003). Namely, *elicitation*: conducting a needs assessment, stating outcomes and performance objectives; *intervention*: utilising theory-based intervention methods, developing an intervention program in consultation with patients adopting and implementing the program, and *evaluation:* statistically evaluating the program and its effectiveness.

We utilised BCTs as per Michie et al.'s (Michie et al., 2013) taxonomy to explore the acceptability of previously identified BCTs and categorise the types of BCTs that would be preferred in a group psychological intervention. We decided to apply this taxonony to improve the quality of our research as the BCTs were pre-defined, can improve the standardisation, reporting, and replicability of the group intervention being developed, and may provide information to illustrate

the mechanisms associated with change (Michie et al., 2013). The information gained enabled us to form a logic model to be applied in developing the psychological group intervention.

Participant eligibility criteria included Australian women treated with ART (past and current) and ART providers. Women experiencing infertility who had not previously or were not currently receiving treatment (i.e., their partner underwent treatment) and male patients treated with ART were excluded.

Following ethical approval (HREC-2021-047), we distributed information about the study and a link to the online survey to fertility clinics and fertility support organisations, asking them to share the information about the study with relevant parties. Recruitment also occurred through social media and passive snowball sampling.

The voluntary survey was hosted on Qualtrics from April 2021 until April 2022. After reading the study information in the survey preamble, potential participants responded to consent questions; those who provided consent progressed to the survey, while those who did not consent were directed to an exit page.

The study-specific survey, using a mixture of Likert-scale and open- text responses, was designed to canvas the perspectives of women treated with ART (past or current) and ART providers regarding content to be included in a group psychological intervention, program duration (including session length and number), and delivery mode (including group, individual, face-to-face or online). The survey comprised questions under the headings of background information including demographic information, consultation regarding psychological group program development canvassing acceptability, type, frequency, duration, and format of exercises to be utilised in a group intervention, consultation regarding psychological group program content including specific evidence-based skill development activities of relevance based on individual experience, and feedback clarifying participant willingness to be contacted for future consultation/research. Demographic in- formation for women treated with ART included relationship status, educational background, sexual orientation, ethnicity, diagnosis, length of infertility, time since commencing

treatment, and coping strategies. For ART providers, information regarding educational background, time within the ART field, ethnicity, and relationship status was gathered.

Quantitative data were analysed utilising SPSS version 27. Descriptive statistics were reported with 95% confidence intervals, and a *p*-value < 0.05 was considered statistically significant. Categorical data were expressed as percentages. Normally distributed continuous data were reported as means, with standard deviations reported. Comparisons were made between women treated with ART (past and current) and ART providers.

Qualitative open-text response data were analysed manually using directed content analysis (Hsieh & Shannon, 2005). This approach was employed to directly explore, confirm or expand categories identified by women patients. The first author read, coded and developed categories. Then, the second and third authors reviewed and verified the data obtained by cross-referencing the identified content with the qualitative responses.

4.6. Results

One hundred and seventeen people commenced the survey, with 102 women treated with ART (51 past and 51 current) and eight ART providers completing the survey (a completion rate of 94%; See Tables 4.1. and 4.2.). Among the eight ART providers, five were female, and three were male; 25.0% were specialist doctors, 12.5% were nurses, 50.0% were counsellors, and 12.5% were embryologists. Also, one provider had previously undergone fertility treatment. On average, the providers had been employed in ART for 15 years (range 5–30 years; SD = 8.02).

Table 4.1.

Participant Demographic Characteristics

	n (%)		
	ART Consumer		ART Provider
	Current	Past	
Ethnicity			
Oceania (Australian, New Zealand, South Pacific)	39 (73.6%)	46 (85.2%)	4 (50.0%)
European	11 (20.7%)	4 (7.4%)	2 (25.0%)
Asian	2 (3.8%)	1 (1.9%)	0.0%
People of the Americas	1 (1.9%)	1 (1.9%)	0.0%
Africa	0.0%	1 (1.9%)	
Other[a]	0.0%	0.0%	2 (25.0%)
Sexual Orientation			
Heterosexual	42 (82.4%)	49 (96.1%)	-
Homosexual	6 (11.8%)	1 (2.0%)	-
Bisexual	2 (4.9%)	0.0%	-
Pansexual	1 (2.0%)	0.0%	-
Other[b]	0.0%	1 (2.0%)	-
Educational Level			
Less than year 12 or equivalent	3 (5.9%)	3 (5.9%)	0.0%
Year 12 or equivalent	5 (9.8%)	2 (3.9%)	0.0%
Trade/apprenticeship/Certificate	6 (11.8%)	5 (9.8%)	0.0%
Diploma	11 (21.6%)	9 (17.7%)	0.0%
University	24 (47.1%)	31 (60.8%)	6 (75.0%)
Other[c]	2 (3.9%)	1 (2.0%)	29 (25.0%)
Employment			
Part time	14 (24.0%)	19 (37.3%)	
Full time	32 (64.0%)	27 (52.9%)	
Unemployed	4 (8.0%)	1 (2.0%)	
Some of the time (time off due to ART treatment)	-	4 (7.8%)	

Note: [a] Italian/British/Australian; Central European; [b] lesbian; [c] postgraduate; honours; FRANZCOG CREI

Table 4.2.

ART Consumers' Fertility Treatment Details According to Treatment Status

	n (%)	
	Current	Past
Infertility Type		
Combined/Both female and male factor difficulties	5 (10%)	10 (19.6%)
Unexplained	14 (28%)	10 (19.6%)
Other[a]	8 (16%)	2 (3.9%)
Complementary Therapies utilised (multiple responses provided)		
Acupuncture	22 (23%)	24 (28%)
Naturopathy	9 (9%)	5 (6%)
Nutritionist	5 (5%)	8 (9%)
Hypnosis	2 (2%)	4 (5%)
Massage	16 (16%)	8 (9%)
Counselling	12 (12%)	9 (11%)
Supplements	23 (24%)	16 (19%)
Relaxation	8 (8%)	9 (11%)
Other[b]	0 (0%)	2 (2%)

Note. [a]Not specified; [b] homeopathy; reflexology

The average duration of ART participation was 18 months (SD = 13.8 months; range 1–72 months) for current and 29 months (SD = 31.3; range 2–120 months) for past women treated with ART ($F(1,99) = 4.977$, $p = .028$). While the average time to conception was 3.6 years (SD = 2.49; range 1–15 months) and 4.8 (SD = 3.14; range 0.5–0.17 months) for current and past women treated with ART, respectively ($F(1,99) = 5.363$, $p = .023$). Among women treated with ART, 80.0% reported primary infertility (73.0% and 86.0% among current and past women treated with ART, respectively). In comparison, 21.0% of women treated with ART reported secondary infertility (27.0% and 14.0% in current and past women treated with ART, respectively; $F(1,101) = 2.966$, $p = .088$). Only 56% of women treated with ART had received a specific infertility diagnosis; 37% were unsure of their

diagnosis. Female factors were the predominant cause of infertility (45.0%); 24.0% reported unexplained infertility. Many women treated with ART (56.0%) accessed complementary therapies while trying to conceive, with 23.7% of women currently receiving ART using supplements and 28.2% of women treated with ART in the past having used acupuncture. For 72.0% of women treated with ART, the treatment had strained their finances.

Women treated with ART had also experienced mental health difficulties (see Table 4.3.), with 39.2% of current and 51.0% of past women treated with ART reporting a mental health diagnosis (Depression, Anxiety, Post Traumatic Stress Disorder or Personality Disorder; $X^2(1, N = 102) = 1.425$, $p = .23$). Only 25.0% of current patients and 50.0% of past women treated with ART reported their mental health condition had resolved ($X^2(1, N = 46) = 2.966$, $p = .09$). Twenty percent of current and 34.6% of past women treated with ART reported experiencing onset during ART treatment. Current and past women treated with ART who had experienced mental health difficulties had consulted a psychologist (80.0% and 76.9%, respectively). Just over half of women (54.3%) had received counselling during their fertility treatment, with most accessing support within their fertility clinic (48.4%) or from a psychologist in the community (42.0%).

Table 4.3.

Mental Health Status of Current and Past Consumers of ART

	n (%)			
	Current Consumer		Past Consumer	
	Yes	No	Yes	No
Diagnosed with a mental health disorder	20 (39.2%)	31 (60.8%)	26 (51.0%)	25 (49.0%)
Occurred during ART treatment	4 (20.0%)		9 (34.6%)	
Occurred before or after ART treatment	16 (80.0%)		17 (65.4%)	
Depression	11 (55.0%)		19 (73.1%)	
Anxiety	17 (85.0%)		21 (80.8%)	
Personality	0		2 (7.7%)	
Other	3 (15.0%) [a]		0	
Sought treatment from a psychologist	16 (80.0%)		20 (76.9%)	
Sought treatment from a psychiatrist	4 (20.0%)		5 (19.2%)	
Sought treatment from other (counsellor)	4 (20.0%)		5 (19.2%)	
Did not seek treatment	1 (5.0%)		2 (7.7%)	
Other	1 (5.0%)[b]		2 (7.7%)[c]	

Note. [a]PTSD; ADHD [b]As a teenager [c] GP; Social Worker

4.6.1. *Perspectives on Group Intervention Content, Duration and Delivery Mode*

Regarding intervention content, all participants provided multiple responses and identified skill development for managing difficult feelings (13.0%) and unhelpful thoughts (12.9%) as important. Women treated with ART preferred that content also included skills that taught them to "let go of those things that cannot be controlled" (12.4%), while ART providers preferred strategies to "focus on the things that can be controlled" (12.1%) and providing information around physical health and how it relates to mental health (12.1%; see Table 4.4.). Overall, addressing present moment awareness (6.3%), identifying what matters most (4.3%), developing skills to separate from the fertility diagnosis (6.3%) and staying committed to goals (7.8%) were viewed as less important

for inclusion in the intervention.

Table 4.4.

Psychological and Emotional Difficulties to be Addressed

	N (%)				
	Current Consumers	Past Consumers	Providers	Overall	BCT
How to manage difficult feelings	**34 (11.4%)**	**38 (12.4)%**	**5 (15.2%)**	**77 (12.0%)**	Feedback and monitoring; Regulation
Skills to keep in the moment	20 (6.7%)	19 (6.2 %)	2 (6.1%)	41 (6.4)%	
How to manage unhelpful/difficult thoughts	**35 (11.7%)**	**36 (11.7)%**	**5 (15.2%)**	**76 (11.9)%**	Feedback and monitoring; Self belief; Regulation
How to identify what matters most	16 (5.4%)	14 (4.6%)	1 (3.0%)	31 (4.9%)	
Stepping outside of the fertility experience	26 (8.7%)	27 (8.8%)	3 (9.1%)	56 (8.8)%	
Skills to help in separating from the fertility diagnosis	25 (8.4%)	23 (7.5%)	1 (3.0%)	49 (7.7)%	
How to keep focussed on the things that can be controlled	26 (8.7%)	33 (10.8%)	**4 (12.1%)**	**63 (9.9%)**	Reward and threat
How to let go of those things that cannot be controlled	**37 (12.4%)**	**38 (12.4%)**	3 (9.1%)	**78 (12.2%)**	Identity; Self belief
How to stay motivated and committed to goals	22 (7.4%)	21 (6.8%)	3 (9.1%)	46 (7.2%)	
Gaining more information about the psychological impact of infertility	31 (10.4%)	29 (9.5%)	2 (6.1%)	62 (9.7)%	
Information about physical health and how it is related to mental health/well-being	27 (9.0%)	29 (9.5%)	**4 (12.1%)**	**60 (9.4%)**	Shaping knowledge; Natural consequences

*Note***.** Multiple responses permitted; BCT – behaviour change technique cluster; **bold** = all consumers and providers' preference; **bold and underlined:** current and past consumers' preference; ***italics and bold*** = providers' preference

Table 4.5. reports participants' preferences for the group intervention format. Group leader-led discussions with group involvement was the most preferred format (41.5%), followed by opportunities to share personal experiences with infertility in small groups (25.6%). BCTs relevant to these preferences included Shaping knowledge; Comparison of outcomes; and Social support.

Most participants responded favourably to a group intervention for women undergoing infertility treatment, with 62.0% indicating it “would be” and 37.0% indicating it “may be” helpful; only one participant believed it would not be helpful. Participants' preferences about session delivery mode and frequency are reported in Table 4.6, session duration in Figure 4.1., and the number of sessions in Figure 4.2. Regarding the number of sessions, ART providers suggested four sessions (33.3%), women currently receiving ART seven sessions (23.8%), and women who received ART in the past six sessions (28.6%). Overall, the preferred mode of delivery across the three groups was face-to-face (41.5%), with six (25.0%), 60-min sessions (70.2%), held fortnightly (63.0%).

Table 4.5.

Participants' Group Intervention Format Preferences (Consumers and Providers Combined)

	Most Preferred				Least Preferred	
	1	2	3	4	5	6
Group leader led discussions with group involvement	**41.46%**	18.29%	18.29%	9.76%	10.98%	1.22%
Opportunities to share regarding personal experience with infertility in small groups	25.61%	**30.49%**	24.39%	10.98%	8.54%	0.00%
Group leader led education and teaching	19.51%	18.29%	13.41%	**32.93%**	14.63%	1.22%
Examples and shared stories of other women's experiences	10.98%	26.83%	**25.61%**	25.61%	9.76%	1.22%
Take home practice exercises	2.44%	6.10%	17.07%	19.51%	**53.66%**	1.22%
Other[a]	0.00%	0.00%	1.22%	1.22%	2.44%	**95.12%**

Note. Bold and shaded % highlights the order of ranking preferences; [a]Not specified

Table 4.6.

Preferences Regarding Session Delivery Mode and Frequency

	n (%)			
	Recipients of ART			
	Current	Past	Providers	Overall %
Delivery Mode				
Online (self-directed, individual chapters/worksheets that are completed at your own pace)	5(11.9%)	5(10.6%)	0.0%	10.6%
Online (group format, with facilitator presenting and participant engagement (sessions are run and attendance is required by the participant so they can contribute to discussions)	13(31.0%)	9(19.2%)	1(20.0%)	24.4%
Mobile phone App (individual, self-paced)	8(19.1%)	3(6.4%)	1(20.0%)	12.8%
Face-to-Face	**10(23.8)%**	**27(57.5%)**	**2(40.0%)**	**41.5%**
Audio format	1(2.4%)	0.0%	0.0%	1.1%
Other	5(11.9%)[a]	3(6.4%)[b]	1(20.0%)[c]	9.6%
Frequency				
Weekly	11(26.1%)	4(8.5%)	**2(40.0%)**	18.1%
Fortnightly	**22(52.4%)**	**35(74.5%)**	**2(40.0%)**	**62.8%**
Bi-weekly	7(16.7%)	1(2.1%)	0.0%	8.5%
Other	2(4.8%)[d]	7(14.9%)[e]	1(20.0%)[f]	10.6%

Note. **Bold** and shaded highlights the preferred choice; [a]both online formats; online but face-to-face would be best; face-to-face or online; group work does not suit sensitive topics like surrogacy [b] both

online and face-to-face; face-to-face and option for online; online/self directed, with option to join face-to-face [c]online and face-to-face would have balanced benefits; [d]Monthly; [e] Three weekly; Fortnightly or Monthly; Monthly; depends on the individual; Weekly or fortnightly [f]group decides

Figure 4.1.

Preferences Regarding Duration of Sessions

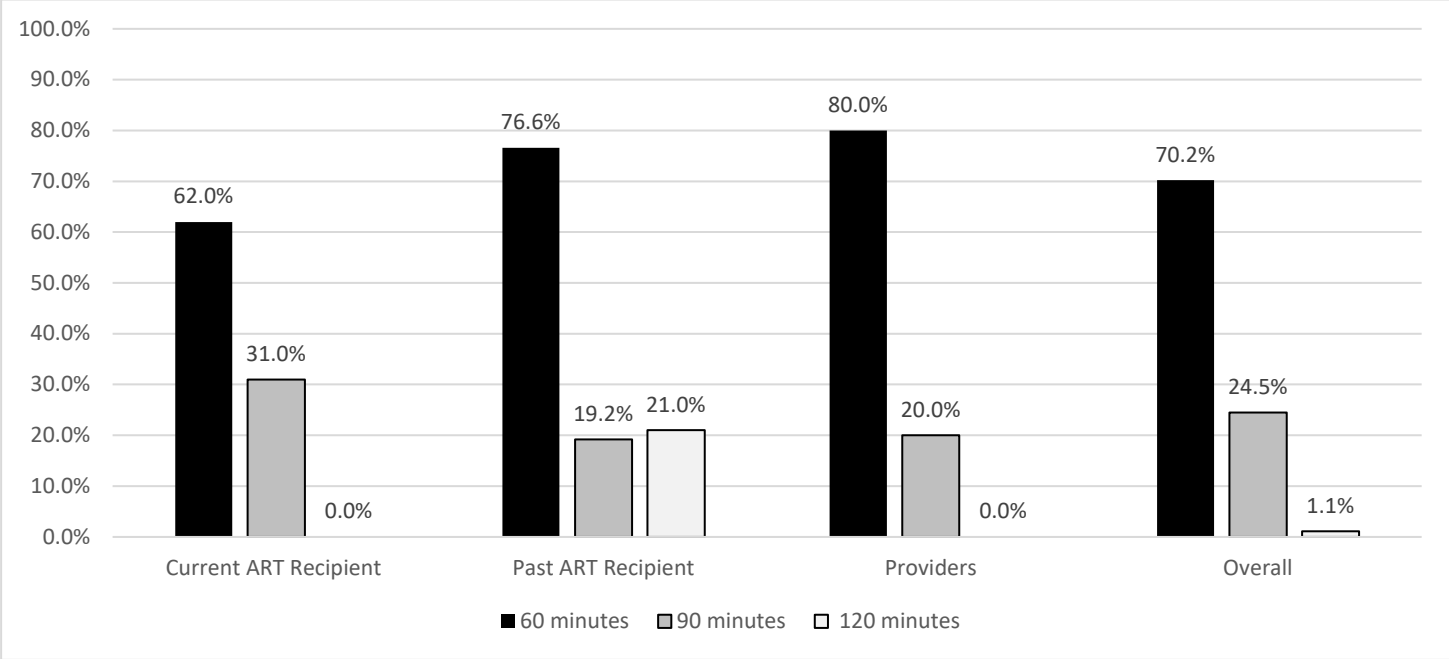
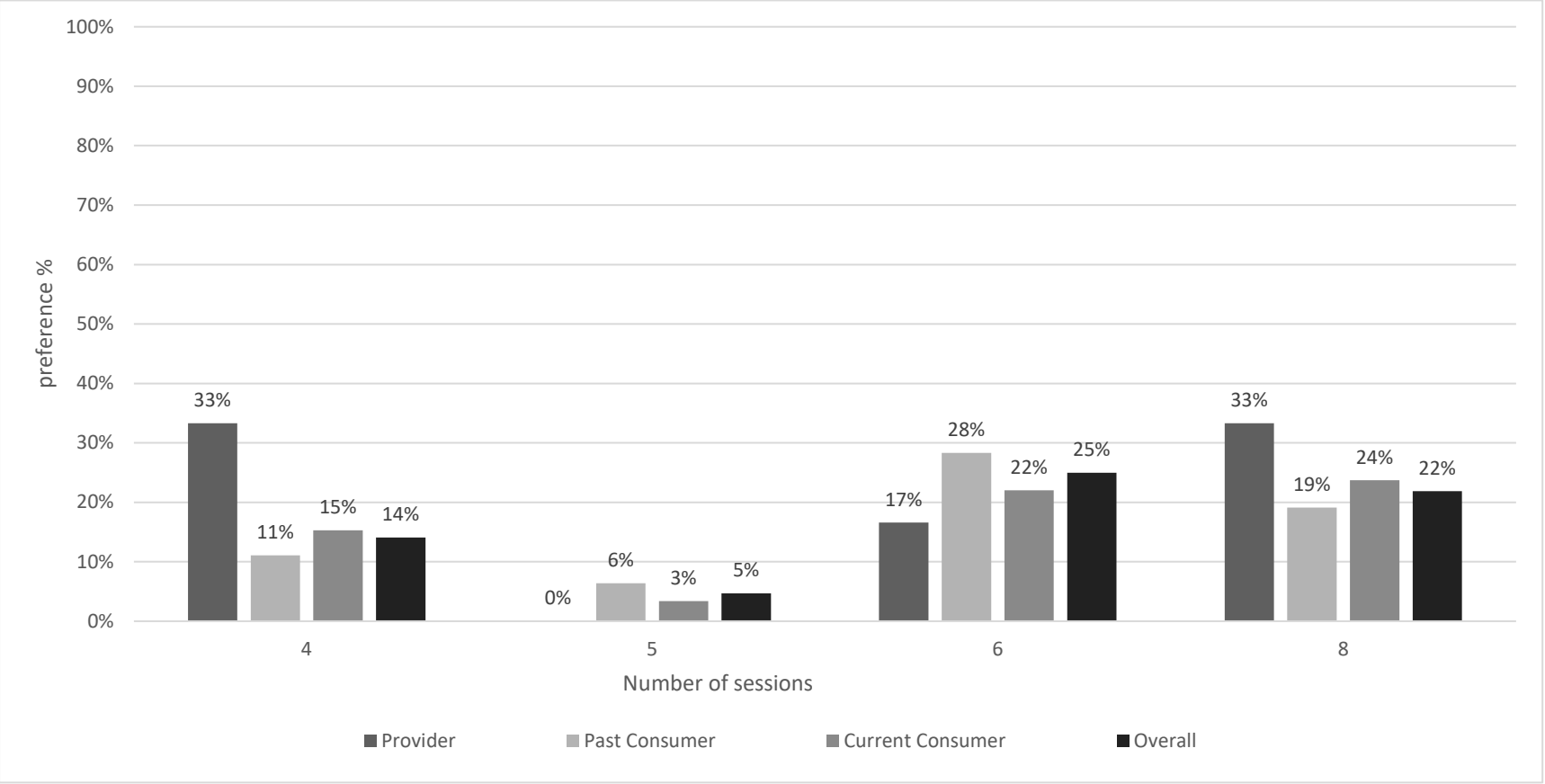


Figure 4.2.

Preferences Regarding Number of Sessions



*Note***.** Other # continuous; open ended; indeterminant; with ongoing check ins; depends on the individual; 12; 4-6; before, during and after; not specified

4.6.2. *Perspectives on At Home Practice Completion*

Most participants (80.0%) reported that women would be likely to utilise at home practice, would find including audio files useful (57.0%), and suggested that women would listen to those files (65.0%). Most participants (73.0%) also suggested that women would commit to daily practice (see Table 4.7.).

Table 4.7.

Perceptions Regarding Women's Likely Engagement in at Home Practice and Its Perceived Benefit

Questions	Participant Type	Extremely likely	Somewhat likely	Neither likely or unlikely	Somewhat unlikely	Extremely unlikely
How likely would women be to complete practice at home?	Current	9%	**69%**	-	13%	0%
	Past	4%	**75%**	-	9%	0%
	Providers	0%	**100%**	-	0%	0%
	Overall	6%	**74%**	-	11%	0%
Would women listen to daily audio files?	Current	19%	**47%**	19%	6%	2%
	Past	13%	**51%**	15%	11%	0%
	Providers	17%	**50%**	0%	17%	0%
	Overall	16%	**49%**	16%	9%	1%
Will women commit to daily practice?	Current	9%	**61%**	23%	5%	0%
	Past	10%	**66%**	14%	8%	0%
	Providers	0%	**80%**	20%	0%	0%
	Overall	9%	**64%**	18%	6%	0%

Questions	Participant Type	Extremely useful	Very useful	Moderately useful	Slightly useful	Not at all useful
Would audio files be useful?	Current	26%	**38%**	24%	7%	5%
	Past	19%	34%	**36%**	11%	0%
	Providers	0%	**40%**	40%	20%	0%
	Overall	21%	**36%**	31%	10%	2%

Note. **Bold** and shaded represents overall preference

4.6.3. *Content Analysis*

4.6.3.1. Categories of Fertility Treatment Experiences. Participants provided open-text responses to questions concerning what was helpful, unhelpful or would likely be helpful for women undergoing ART treatment. The common categories are described below.

4.6.3.2. Mental Health. Mental health included reports of isolation, anxiety, depression, stress, poor coping, feeling out of control, experiencing unhelpful comparisons or comments, and overall lowered quality of life. The notion of "putting things on hold" and "feeling like it's a taboo topic" was raised by one provider and numerous women treated with ART. Further, the "lack of validation of feelings particularly those related to grief" was often reported by ART providers and women. ART as an "emotional roller coaster" was also commonly referenced regarding mental health.

4.6.3.3. Lowered Self-esteem. Women reported comparing themselves to others without infertility as unhelpful for their mental health. They highlighted feelings of guilt, self-blame, shame, and stigma associated with fertility treatment contributing to anxiety, depression, and loneliness which were frequently reported as being ineffectively addressed by fertility clinics. In addition, women reported feeling "isolated, alone, unprepared", and that fertility treatment is "taboo" or "not spoken about". Finally, women reported difficulties regarding the burden of treatment falling to them and medical care not being patient-centric nor considering mental health.

4.6.3.4. Clinical Coldness or Detachment from Health Practitioners. Treatment also was described as "impersonal", "cold, clinical", with an over-emphasis on "medical language" or the "business" side of infertility. One woman expressed that "being looked at as a uterus/egg/hormone/blood test" impacted her significantly, and women generally noted an overfocus on the medical side of treatment, reportedly leading to feeling that "they (health practitioners) almost forget about mental health". Health practitioners "lack of empathy" or validation of the emotional impact of treatment was noted as problematic; many women indicated that such approaches contributed to negative self-talk, blaming statements, guilt, and "feeling like

we need to keep it a secret". One woman described "dismissive and unkind medical professionals" as particularly unhelpful and another articulated "being treated as a number or statistic rather than an individual" and "professionals trying to reduce anxiety/worry by withholding or minimising information".

4.6.3.5. Feeling Unsupported. Women described feeling unsupported, "isolated", alone, ill-informed or under-prepared for treatment. They additionally identified that health practitioners' language often did not consider the emotional experience of infertility treatment. The two week wait was commonly reported as particularly isolating; one consumer reported feeling "alone really from the practice for those two weeks". Waiting times for appointments, treatment, counselling or outcomes were also commonly described as unhelpful. Participants also highlighted a "lack of support (access or availability), lack of strategies to manage thoughts and feelings… social isolation, stigma against asking for help for mental health" as challenging and unhelpful. In support of that, one provider additionally identified difficulties in establishing therapeutic rapport with their clinician as unhelpful, while another similarly highlighted challenges with the "patient/doctor relationship" and the "clinic/client relationship", whereby a "partnership" is not encouraged.

4.6.3.6. Insensitivity. Women and providers identified "insensitive comments" from family, friends, acquaintances, or ART staff as unhelpful. These included sub-categories such as:

Positive thinking: *"everything will be okay;" "you are young"*

Relax: *"relax and it will happen"* or *"relax and have a holiday and you will become pregnant!"*

Fate/patience: *"it is what it is"* or *"you will have kids when the time is right"*

Opinions: *"IVF will work"; "eat well, exercise, stay positive"; "have you held your legs in the air after intercourse?"*

Dismissal of feelings: *"Use of medical language versus compassionate language by fertility staff (Referring to a loss as 'not a real miscarriage' because the fetus didn't reach a certain milestone etc)"*

4.6.3.7. Financial Burden. Women frequently referenced "the financial burden that comes with" treatment. They described experiencing a push to continue treatment when a cycle was

unsuccessful, with limited support from clinics regarding the emotional impact of the unsuccessful cycle on their mental health. One woman provided the following response: the “clinic assuming there is capability for patients to undertake more rounds. Clinics only looking at the physical numbers or results from a patient not the holistic aspect to patient care. Patients feeling like a number on a factory conveyor belt.” Another woman articulated the financial burden impacting on their ability to seek additional support for their mental health: the “financial impact that means it’s hard to get extra support as it is expensive” and another stating the “cost of services” and “managing that cost amongst general life costs” as problematic.

4.6.3.8. Support. Conversely, women indicated that they had found support groups, moderated online forums, and check-in emails or support beneficial for their mental health and well-being. Talking with other women who had been through infertility treatment and access to counselling timed with treatment were also reported as useful or likely to be useful. For example, women indicated value in “programmed access to counsel- ling… schedule counselling as they do blood tests and scans” and timing these sessions in line with “possible failure points”.

4.6.3.9. Strategy Development. Specific areas to be addressed included support around uncertainty, normalising feelings, strategies to manage people’s questions concerning pregnancy and how to separate infertility and ART from other aspects of one’s life, ways of coping, techniques to separate negative feelings/anxiety from life. Participants also noted a need to have access to mental health support networks and knowledge about where to access support in times of need – both “when things go wrong but also when things go right”.

4.6.3.10. Proactive Actions. Participants additionally indicated that meditation, yoga, sharing the emotional load with others, outside interests or hobbies, hypnosis, and finding a knowledgeable and kind doctor were helpful.

Table 4.8. highlights the BCT clusters and categories identified in the open-text responses of women treated with ART. Women noted distraction/avoidance (Antecedents) and activities that resulted in an alternative reward behaviour (Scheduled consequences) as effective strategies when

managing infertility distress.

Table 4.8.

Identified BCTs and Associated Planned Interventional Approach

BCT Cluster	Behaviour Change Technique	Potential Approach to Include in the Group Intervention
Feedback and monitoring	Self monitoring of outcomes of behaviour Discrepancy between current behaviour and goal Commitment	Value identification Committed action Visualisation Hypnosis Acceptance Sitting with distress Managing difficult thoughts and feelings - defusion
Regulation	Reduce negative emotions	Acceptance Distress tolerance/sitting with distress Mindfulness of feelings Present moment focus Hypnosis – imagery - visualisation
Self belief	Mental rehearsal of successful performance Self-talk	Visualisation Hypnosis Defusion Acceptance
Reward and threat	Incentive (outcome)	Acceptance

	Reward (outcome)	Sitting with distress Letting go of those things outside of one's control
Natural Consequences	Monitoring of emotional consequences Information about emotional consequences	Mindfulness of feelings Present moment awareness Sitting with distress Observing self Values Committed action

4.7. Discussion

Our study identified Australian women treated with ART and ART providers' preferences regarding a group psychological intervention to support women undergoing ART. There was a balance between women currently and previously treated with ART, with limited heterogeneity between these groups. The delineation between women currently and previously treated with ART provided a unique insight into this group's experiences and needs, with those treated in the past providing information to consolidate the needs of those who will be treated in the future. While we achieved a good response rate from women treated with ART, we achieved limited responses from ART providers. Therefore, our results regarding ART providers' preferences may not be representative due to the low completion rate. Another possible limitation and possible future area for research related to potentially attracting a subset of women treated with ART who were receptive to psychological intervention, more psychologically flexible or had positive experiences of psychological support. Data gathered regarding participants' perceptions about the psychological and emotional difficulties that would be useful to address in the group psychological intervention may have been enhanced by using a Likert scale or asking participants to rank responses, rather than simply allowing section of multiple responses, to better gauge the most desired content. Such data may provide valuable information to guide intervention development.

Despite that, we gained valuable information regarding the preferred content, duration, delivery mode, and the likelihood of women completing home practice. Our results also contained qualitative information regarding how best to support women's mental health and well-being while undergoing treatment. For example, common unhelpful categories noted, such as mental health (anxiety and depression); feeling lost, alone and experiencing lowered self-esteem; feeling unsupported; experiencing insensitive comments or interactions; and experiencing clinical coldness or detachment, were consistent with past research (Boivin et al., 2011; Dube et al., 2021; Duffy et al., 2020). Women also reported details about helpful categories of support, strategy development, and proactive action which will be applied in developing a suitably acceptable group intervention

program for women with infertility.

The preferred and most acceptable intervention format was six, fortnightly, 60-min face-to-face sessions, with audio files of 19 min (average) to support at-home practice. Group leader-led discussions were preferred, with opportunities to share personal experiences also desired, along with skill development targeting managing difficult thoughts and feelings and learning how to let go of things beyond one's control. Key BCTs to include in the intervention program identified in our current study included Feedback and monitoring; Regulation; Self- belief; Reward and threat; Natural consequences; Support; Shaping knowledge; and Comparison of outcomes.

Of note, to date, no group psychological intervention for women undergoing ART has been reported in Australia, leading to the exploration of Australian women treated with ART and ART providers' needs and preferences in line with IM and behavioural change approaches to intervention development. Further, it appears that co-design and implementation with women with infertility has not been widely documented.

4.7.1. *Innovation*

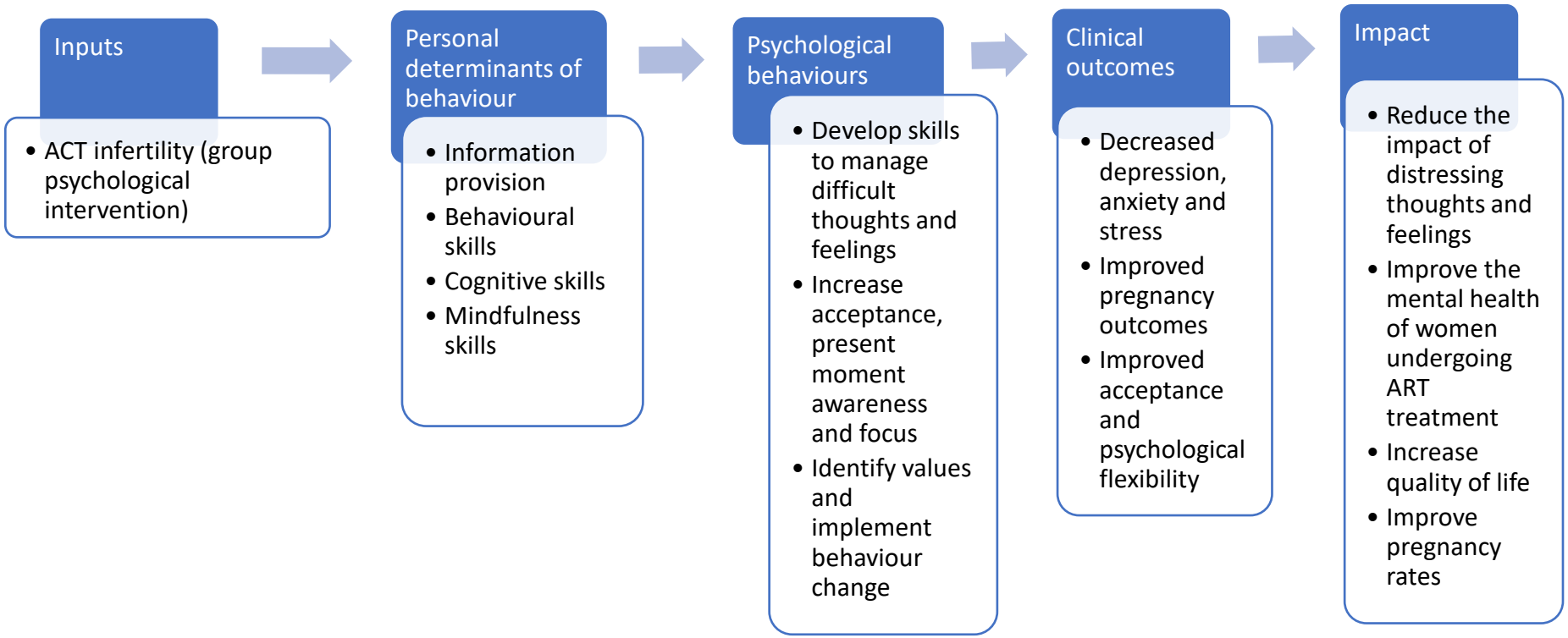
Given that the increased burden of infertility has been reduced following psychological intervention, with group interventions specifically demonstrating improvements in mental health and pregnancy rates (Domar et al., 2011; Katyal et al., 2021; Warne et al., 2022), our current results innovatively inform the development of a group program for Australian Women with infertility. Our results informed the BCTs and change determinants to include when developing that group intervention as part of the intervention stage of IMB and Step 4 and 5 of the modified IM framework. Seeking detailed information from the end user of the intended program under a co-design model of research also aimed to improve the acceptability of the program and the applicability of the strategies included. Applying the RE-AIM framework (King et al., 2010), the co-designed group intervention will be reviewed by women treated with ART before it is piloted and modified as required, and it is likely that we will follow a co-implementation phase in order to acknowledge the importance of lived experience in treatment.

4.8. Conclusion

In considering the results of our current study, which has clarified women treated with ART and ART providers' needs and opinions regarding a proposed group psychological intervention, we developed a logic model (Figure 4.3.). This logic model aimed to illustrate the outcome determinants and the BCTs identified currently and in past research, and the desired impact of the ACT (Acceptance and Commitment Therapy) Infertility program. This approach follows a modified IM model of intervention development, applies a co-design approach, and is replicable and transparent.

Figure 4.3.

Logic Model for Group Psychologuical Intervention



Applying the above logic model, future research will employ a person-centred approach and pilot the intervention with Australian women with infertility undergoing ART. The intervention, incorporating the information gained in this study will be evaluated in a randomised-controlled trial to determine its feasibility and effectiveness in improving the mental health, fertility stress and pregnancy rates of women with infertility undergoing ART.

CHAPTER 5

DEVELOPMENT OF A GROUP PSYCHOLOGICAL INTERVENTION PROGRAM

5.1. Overview

In this chapter, I describe how I used the results of *Study 1* and *Study 2* to inform the development of a group psychological intervention program. First, I provide a brief introduction to ACT and clinical hypnosis, as *Study 1* highlighted promising results for ACT, and *Study 2* provided support for strategies central to ACT. Given these findings, I developed the program with ACT as the primary intervention modality. I also explain the adjunct of clinical hypnosis. Following that, I explain how I used key elements of ACT and clinical hypnosis within the group psychological intervention program. Thereafter, I provide an overview of the program and associated content. I provide examples to illustrate the program, including information about the hypnosis sound files. Finally, I conclude with more nuanced detail about program facilitation.

5.2. ACT: A Brief Introduction

ACT is a contemporary form of psychotherapy that integrates mindfulness strategies and behavioural change techniques to enhance psychological flexibility (Bach & Moran, 2008; Forsyth, 2025; Harris & Hayes, 2019; Hayes & Smith, 2005). ACT is based on the premise that suffering is a natural part of the human experience, and the goal of therapy is not to eliminate discomfort but to learn to live with it while pursuing a meaningful life (Bach & Moran, 2008; Harris, 2009; Harris & Hayes, 2019). Central to ACT is the hexaflex model, which comprises six interrelated processes: Cognitive Defusion, Acceptance, Present Moment Awareness, Self as Context, Values Clarification, and Committed Action. Each of these components, which play a crucial role in helping individuals achieve greater psychological flexibility and well-being, is described below, with reference to how they were employed in the group psychological intervention program developed (see Table 5.1.).

5.2.1. *Cognitive Defusion*

Cognitive defusion is a core process in ACT that focuses on altering the way individuals relate to their thoughts (Forsyth, 2025; Harris, 2009). In traditional cognitive therapies, clients are often encouraged to challenge and change negative thoughts. In contrast, ACT teaches clients to observe their thoughts without getting entangled in them. Techniques such as "thought labelling," where individuals learn to recognise thoughts as mere words or images, empower clients to detach from the content of their thinking (Harris, 2009, 2019; Harris & Hayes, 2019; Hayes & Smith, 2005). For example, instead of saying "I am a failure," a person with infertility might learn to say, "I am having the thought that I am a failure." This shift allows individuals to recognise thoughts as transient mental events rather than fixed truths, reducing their influence on behaviour and emotional state (Harris, 2019).

In the group psychological intervention program developed as part of this dissertation, defusion from difficult or self-blaming thoughts is included, aiming to improve overall mood, lower anxiety, and support an approach of stepping back from fertility as being attached to the person (Gaitzsch et al., 2020; Harris & Hayes, 2019; Rahimi, Abed, et al., 2018). Defusion also promotes acceptance of things outside of one’s control, which will be explained in the next section.

5.2.2. *Acceptance*

Acceptance involves embracing uncomfortable thoughts and feelings rather than avoiding or suppressing them. In ACT, clients are encouraged to welcome their internal experiences, recognising that struggling against them can lead to increased distress (Forsyth, 2025; Rahimi, Abed, et al., 2018). Acceptance does not mean resignation or passive submission; rather, it is an active process of acknowledging reality as it is (Forsyth, 2025). This approach can be particularly beneficial for individuals dealing with anxiety, depression, or trauma, as it encourages them to face rather than flee from their emotional pain (Bach & Moran, 2008; Harris, 2009). By fostering an attitude of openness, clients can experience a reduction in the intensity of their emotional suffering and cultivate a sense of peace amidst discomfort (Rahimi, Abed, et al., 2018).

The aim of developing acceptance in the group psychological intervention program is to reduce fusion with negative emotions and distress, and to allow the women to sit with the experience, without judgement, allowing them to focus more on the present moment. This focus will be explored in the following section.

5.2.3. *Present Moment*

Present moment awareness, often referred to as mindfulness, is the practice of fully engaging with the current moment without distraction or judgement (Harris & Hayes, 2019; Hayes & Smith, 2005). In ACT, mindfulness is not merely a technique; it is a way of being that enhances awareness of thoughts, feelings, and bodily sensations as they arise (Harris & Hayes, 2019). Clients are guided through exercises such as mindful breathing, body scans, or mindful observation of their surroundings, which help anchor them in the present (Forsyth, 2025; Hayes & Smith, 2005). This heightened awareness enables individuals to recognise automatic reactions and habitual patterns, providing them with the opportunity to respond more thoughtfully rather than reactively. By cultivating present moment awareness, clients can enhance their emotional regulation and develop a deeper appreciation for their lived experiences (Rahimi, Abed, et al., 2018).

Patients participating in the group psychological intervention program will practice these skills in session and during home practice, enabling them to apply this focus in their lives. The concept of observing the present moment as the main area of focus will provide the opportunity to move to a space of observing the self from a distance, without judgement or attachment to fused thoughts or feelings, inherent in women with infertility who are undergoing fertility treatment (Gaitzsch et al., 2020; Rahimi, Abed, et al., 2018).

5.2.4. *Self as Context*

The concept of self-as-context encourages individuals to shift their perspective from identifying with their thoughts and feelings to viewing themselves as the observer of these experiences (Harris, 2009; Hayes & Smith, 2005). This process helps clients differentiate between their self-concept and their internal experiences, fostering a more resilient and flexible sense of self

(Forsyth, 2025; Harris, 2019; Rahimi, Abed, et al., 2018). In practice, this might involve exercises that help individuals visualise themselves as a sky, with thoughts and feelings as passing clouds. This metaphor illustrates that while thoughts and emotions may come and go, the self remains constant and unaffected. By adopting this perspective, clients can reduce the impact of negative thoughts and develop a more balanced view of their identity, enhancing their overall psychological resilience (Harris, 2019; Rahimi, Abed, et al., 2018; Rahimi, Attarha, et al., 2018).

Applying this skill recognition will assist the patients participating in the program to view themselves as separate from their infertility. The goal will be to assist women with infertility undergoing ART to improve their sense of self, promote flexibility, and impact their internal experiences so that they can turn their focus to the attributes, actions and things that they value most. Moving away from a fixed view of the self as infertile, identifying values and focusing on those will assist these patients to clarify what matters outside of their 'infertility diagnosis'.

5.2.5. *Values Clarification*

Values clarification is a critical component of ACT that helps individuals identify what is truly meaningful to them (Harris, 2019; Harris & Hayes, 2019). Clients engage in exercises that prompt them to reflect on their core values, aspirations, and what gives their lives purpose. This process often involves exploring questions such as: What do I want to stand for in my life? What brings me joy and fulfillment? Understanding one's values acts as a guiding compass, directing behaviour and decision-making (Bach & Moran, 2008; Forsyth, 2025). When individuals clarify their values, they are better equipped to make choices that align with their true selves, fostering a sense of integrity and purpose. This alignment with personal values is essential for motivation and commitment to change (Harris, 2019).

Supporting the patients in the program to clarify their values and focus on areas of their lives that are often neglected during ART will be beneficial in many ways. It will support women in increasing social connectivity, focusing on the things that matter alongside the goal of having a baby, and helping them focus their attention on activities, attributes, values, or behaviours, that are

amenable to change. Committing to focus on these values once clarified will support their mental health and social connections (Forsyth, 2025; Harris, 2009; Rahimi, Abed, et al., 2018; Rahimi, Attarha, et al., 2018).

5.2.6. *Committed Action*

Committed action involves taking concrete steps toward living in accordance with one's values (Bach & Moran, 2008; Forsyth, 2025; Harris, 2009; Hayes & Smith, 2005). In ACT, clients are encouraged to set specific, actionable goals that reflect their identified values and to commit to pursuing these goals despite challenges or discomfort (Harris, 2019). This process may involve developing an action plan, identifying potential barriers, and creating strategies to overcome them. By fostering a proactive approach to life, committed action empowers individuals to take charge of their lives and promotes a sense of agency. This process is not about achieving perfection but rather about making consistent efforts toward a meaningful life, and in the case of these patients, even in the face of infertility.

The group psychological intervention program aims to support patients in acting consistently with their values, moving towards a life worth living without the struggle. By committing to specific action following each group session, women will be supported to gain momentum in filling their lives with value-based actions, alongside, not in spite of, ART.

Table 5.1. summarises the core ACT processes explained above with direct reference to the applicability to the program. The relevant BCTs identified in *Study 2* will be linked more directly in *Section 5.4.1*.

Table 5.1.

ACT Core Processes: Applicability to the Program

Core Process	Explanation	Applicability to Program (Example Skills Addressed)
Cognitive Defusion	Learning to observe thoughts as transient mental events, rather than absolute truths. Patients practice detaching from the content of their thinking, reducing the influence of unhelpful thoughts on emotions and actions.	Skills: Thought labelling ("I am having the thought that…"), distancing from self-critical or infertility-related worry thoughts, using imagery to reduce the power of negative thoughts about fertility outcomes.
Acceptance	Actively embracing uncomfortable feelings and internal experiences rather than avoiding or suppressing them. It involves acknowledging reality as it is, which can decrease emotional distress and resistance.	Skills: Allowing emotions related to infertility (e.g., grief, frustration) to be present without judgment, "sitting with" uncomfortable physical sensations, and practicing non-avoidant emotional awareness exercises.
Present Moment Awareness	Also known as mindfulness, this involves fully engaging with the current moment, observing thoughts, feelings, and sensations without distraction or judgment. Enhances the ability to respond thoughtfully rather than reactively.	Skills: Mindful breathing, body scan exercises, guided meditation focused on present experiences (e.g., during medical appointments), and mindful observation of daily activities or interactions.

Self as Context	Fostering the perspective of oneself as the observer of experiences, rather than being defined by thoughts or emotions. Helps develop a flexible and resilient sense of self.	Skills: Visualising oneself as the sky and thoughts as passing clouds, perspective-taking exercises, and guided imagery to reinforce a stable sense of self beyond infertility-related identity struggles.
Values Clarification	Identifying and connecting with personal values that give life meaning and direction. Guides behaviour and decisions, particularly in challenging circumstances.	Skills: Reflecting on core values, exploring what brings meaning beyond fertility status, value-mapping exercises, and defining what participants want to stand for during their infertility journey.
Committed Action	Setting and pursuing actionable goals that align with one's values, even in the face of adversity or discomfort. Focuses on consistent steps toward a meaningful life.	Skills: Goal-setting aligned with values, creating action plans for self-care and relationship support, problem-solving barriers (e.g., handling setbacks), and reinforcing progress toward personal growth during the infertility process.

5.2.7. *Efficacy of ACT*

ACT has been utilised effectively with various psychosocial presentations, individually and in a group format (Rahimi, Attarha, et al., 2018). The benefits of ACT for people with symptoms of depression (Bai et al., 2020; Coto-Lesmes et al., 2020), anxiety (Macri & Rogge, 2024; Twohig & Hayes, 2008), or even chronic pain are well documented (Hughes et al., 2017; Martinez-Calderon et

al., 2024). Similarly, ACT has been used with couples experiencing relationship discord and communication challenges (Harris, 2023).

5.3. Clinical Hypnosis: A Brief Introduction

Clinical hypnosis, also referred to as hypnotherapy, is a therapeutic technique that utilises guided relaxation, intense concentration, and focused attention to achieve a heightened state of awareness known as a trance (Green et al., 2005; Hammond, 1990; Peter, 2024; Yapko, 1995, 2012, 2013). In this state, individuals are more open to suggestions and can access deeper parts of their consciousness, allowing for the potential to modify behaviours, thoughts, and feelings (Green et al., 2005; Peter, 2024; Yapko, 2012). Clinical hypnosis is used to treat a variety of conditions, including but not limited to depression, anxiety, chronic pain, phobias, and habits such as smoking cessation (Green et al., 2005; Hammond, 1990; Milling, 2024; Peter, 2024; Valentine et al., 2019; Yapko, 1995, 2012).

5.3.1. *Theoretical Foundations and Mechanisms*

The practice of clinical hypnosis is grounded in psychological theories and models (De Benedittis, 2025). Theories suggest that hypnosis alters perception, memory, and the ability to manage pain (De Benedittis, 2025; Peter, 2024). The trance state is characterised by a focused state of attention and heightened suggestibility, which can facilitate therapeutic changes through suggestion, imagery, and cognitive restructuring (De Benedittis, 2025; Green et al., 2005; Milling, 2024). The format for hypnosis is structured and largely follows the same formula, which can also improve outcomes for patients who can learn self-hypnosis by re-listening to recordings of hypnosis sessions or by adhering to the same steps utilised in a session (De Benedittis, 2025; Green et al., 2005; Milling, 2024). The implementation steps for developing and facilitating a hypnosis session follow.

5.3.2. *Implementation Steps*

Table 5.2. details the process undertaken during a hypnosis session.

Table 5.2.

Steps Involved in a Hypnosis Session

Step	Description
Preliminary Assessment	The clinician assesses the patient's history, symptoms, and treatment goals, identifying any contraindications for hypnosis such as certain psychiatric disorders (e.g., psychosis).
Building Rapport	Establishing a trusting relationship is essential for comfort and openness. Clear communication about the hypnosis process helps set expectations and reduce concerns.
Induction	The clinician guides the client into a relaxed state using techniques like eye fixation, deep breathing, progressive relaxation, or visualisation.
Deepening	Deepening techniques, such as imagery (e.g., walking down steps with a countdown) or progressive muscle relaxation, enhance the hypnotic state and increase focus.
Suggestion Phase	Specific, tailored suggestions are made to address the patient's needs, such as behaviour change or stress reduction. For infertility, suggestions focus on well-being and fertility-related support.
Post-hypnotic Suggestions	Suggestions are provided to support behavioural changes after the session, often linking positive changes to everyday experiences (e.g., feeling relaxed when the sun shines).
Awakening/Re-alerting	The client is gradually returned to normal awareness, encouraged to retain comfort and energy, and to let go of the hypnosis experience.
Debrief	Discussion after the session reinforces suggestions and strategies, reviews therapeutic effects, and addresses questions. For home practice, this reflection occurs at the next group session.

5.3.3. *Efficacy of Clinical Hypnosis*

Clinical hypnosis can be an effective complementary treatment for a variety of issues, particularly in pain management and psychological conditions (De Benedittis, 2025; Milling, 2024; Peter, 2024; Ramondo et al., 2021). Patient outcomes vary; however, clinical hypnosis generally promotes relaxation and symptom reduction (Milling, 2024; Ramondo et al., 2021; Valentine et al., 2019). As it bypasses the "thinking" brain, there is marked benefit in utilising hypnosis with patients

who are cognitively stuck or overthinking (Levitas et al., 2006). Women with infertility, as detailed above (*Section 1.6*), are more likely to experience cognitive fusion with various unhelpful thoughts and feelings, whether consciously or unconsciously (Taebi et al., 2021; Xie et al., 2023). Therefore, targeted hypnosis to address these thoughts and feelings may promote better mental health and impact women's engagement with fertility treatment. Levitas et. al. (2006) completed hypnosis with 89 women before an embryo transfer and compared the results to a control group of women who did not receive hypnosis (n = 96). That study found that 58.4% of women in the intervention group had a clinical pregnancy after transfer compared with 30.2% in the control group (Levitas et al., 2006).

While generally considered safe for most individuals, hypnotherapy must be administered by a qualified professional trained in its use. As explained above, a structured approach with carefully worded suggestions promotes change and improvement of treatment outcomes in a variety of areas (Milling, 2024; Ramondo et al., 2021; Valentine et al., 2019). In the case of women with infertility, hypnosis additionally has been shown to improve implantation and pregnancy rates, highlighting an amplification of treatment outcomes.

5.3.4. *Evidence of Amplifying/Expediting Treatment Outcomes*

Regular home practice of clinical hypnosis targeted to a specific presentation can improve mental health, pain management, ego-strengthening, phobia remission, smoking cessation, and mindset (De Benedittis, 2025; Hammond, 1990; Ramondo et al., 2021, 2024; Valentine et al., 2019). Home practice additionally reinforces and imprints strategies developed in a session context, increases patients' connection to their therapist, and impacts their self-efficacy and belief in change (Kekecs et al., 2024; Peter, 2024). Ramondo et al. (2024) explored the adjunctive impact of clinical hypnosis in the treatment of major depression with CBT (CBTH). They compared a CBT manualised group treatment that included progressive muscle relaxation or clinical hypnosis (Ramondo et al., 2021). Although the CBTH group performed better and had improved remission rates, the results were not clinically significant. However, adding hypnosis in the management of pain has resulted in

clinically significant improvements (Jones et al., 2024) and likewise improvement in anxiety symptoms (Valentine et al., 2019), self-esteem (Grégoire et al., 2021), and well-being (Grégoire et al., 2021; Khayatjadidi et al., 2021), each of which can be experienced by women with infertility (Cousineau & Domar, 2007; Nik Hazlina et al., 2022; Vioreanu, 2021).

5.4. Overview of the Group Psychological Intervention Program – ACTInfertility

I developed the group psychological intervention program – ACTInfertility - incorporating the results from *Studies 1* and *2*. The program development additionally considered recent research assisting women with infertility regarding their mental health and well-being, while also considering their needs and preferences. The ACT model, and hexaflex served as the foundation for the program, and specific, tailored fertility-related approaches were incorporated, including at-home practice of clinical hypnosis that targeted specific behaviour change areas identified in *Study 2*.

5.4.1. *Behaviour Change Techniques*

Specific Behaviour Change Techniques (BCT) clusters and the associated BCTs were identified in *Study 2*. These were identified and documented to assist with program replicability and ensure that the interventions and strategies were relevant. The BCTs were drawn directly from *Study 2*, with only the strategies endorsed by study participants as helpful being mapped onto the appropriate BCT.

An overview of the BCTs and associated strategies or interventions is provided below (see Table 5.3.).

Table 5.3

BCT Cluster, Behaviour Change, and Strategies Identified for Inclusion in the Program

BCT Cluster	Behaviour Change	Strategies or intervention to be included
Feedback and monitoring	• Self-monitoring of outcomes of behaviour • Discrepancy between	• Value identification • Committed action • Visualisation • Hypnosis

	current behaviour and goal	• Commitment • Acceptance • Managing difficult thoughts and feelings • Defusion
Regulation	• Reduce negative emotions	• Acceptance • Distress tolerance • Defusion • Mindfulness of feelings • Present moment focus • Hypnosis/imagery/visualisation
Self belief	• Mental or rehearsal • Successful performance • Self-talk	• Visualisation • Hypnosis • Defusion • Acceptance
Reward and threat	• Incentive (outcome) • Reward (outcome)	• Acceptance • Sitting with distress • Letting go of those things outside of one's control
Natural consequences	• Monitoring of emotional consequences • Information about emotional consequences	• Mindfulness of feelings • Present moment awareness Sitting with distress • Observing self • Values • Committed action
Identity	• Identification of self as role model • Framing/re framing • Valued self identity	• Visualisation • Hypnosis • Contextualised self • Observing self • Defusion • Values • Committed action
Support	• Social supports (emotional)	• Group sharing • Shared experiences with thoughts and

	• Social supports (practical)	feelings • Not feeling alone
Shaping knowledge	• Instructions on how to perform the behaviour • Behavioural experiments	• Guided meditation • Guided hypnosis • Mindfulness • Defusion • Acceptance
Comparison of outcomes	• Credible source • Pros and cons • Comparative imagining of future outcomes	• At home and in group practise comparing before skill use and after skill use experiments • Before and after experiments • Visualisation • Hypnosis • Knowledge sharing • Value identification • Committed action

Once identified in *Study 2*, women's and ART providers' preferences regarding the frequency, duration and delivery method for the group psychological intervention program were noted. I then drafted the group psychological intervention program as per the next section.

5.5. ACTInfertility: Group Psychological Intervention Program Information

Guided by the results of *Study 2*, the group psychological intervention program was developed over six sessions, each of 60 minutes duration, to be delivered in person. The consensus was for the program to be facilitated fortnightly, including short home practice exercises, and for a facilitator to lead it rather than it being self-directed. The goal was to evaluate the program via a three-arm RCT. The plan was for (1) a wait-list control group, (2) an ACTInfertility group, and (3) ACTInfertility with Clinical Hypnosis as an adjunct.

Table 5.4. provides an overview of the program. It describes the session content topics, mindfulness scripts and hypnosis scripts. Examples of experiential exercises follow, with an

explanation of how they were structured. Once the program manual was completed, a facilitator training package was also developed to train facilitators in the program (see Chapter 6).

Table 5.4.

Overview of the Group Psychological Intervention Program - ACTInfertility

Session title	Topics covered	Hypnosis Recording
Introduction	• Group norms, expectations • Introduction to facilitators and group members • Introduction to the concept of willingness • Identifying the challenging thoughts and feelings of infertility and ART • Introduction to ACT and the Hexaflex • Experiential exercise (mindfulness of the breath) • Homework	• Introduction to hypnosis • Induction • Relaxation • Post hypnotic suggestions - body trust, observing thoughts and feelings, doing things better when relaxed
The Hexaflex (Present Moment and Acceptance)	• Revision of past session – the Hexaflex • Details of the different parts of the Hexaflex • Discussion around the myth of control (aim to introduce more detail around acceptance of those things that cannot be controlled) • Experiential exercise (mindfulness exercise to observe the present moment) • Homework	• Induction • Relaxation • Focus on building body trust • Acceptance metaphors with post hypnotic suggestions - let thoughts go, remain in the present moment

Looking at Thinking and Feeling Those Feelings (Cognitive Defusion)	• Revision of past sessions, with reference to the Hexaflex • Looking at experiential examples of fusion with thoughts and feelings • Developing defusion techniques • Experiential exercise (mindfulness exercise to observe thoughts and feelings) • Contextualised self vs observing self • Experiential exercise (mindfulness to observe thoughts and feelings) • Homework	• Induction • Relaxation • Focus on clearly separating thoughts and feelings from the self • Post hypnotic suggestions of taking difficult thoughts and letting them go imagery • Post hypnotic suggestions - to clear out any emotions that might be blocking pregnancy
Doing What Matters (Values and Committed Action)	• Revision of past sessions, with reference to the Hexaflex • Learning to identify what matters, outside of fertility and having a baby • Experiential exercise (value identification mindfulness) • Homework	• Induction • Relaxation • Focus on clearing emotions and beliefs that are impacting fertility • Post hypnotic suggestions - around health and well-being metaphors, the body clearing out any blockages and preparing the uterus for implantation

Self as Context	• Revision of past sessions, with reference to the Hexaflex • Identifying personal and individual values, and how to guide behaviour and assist in relationships • Experiential exercise (observing self exercise) • Homework	• Induction • Relaxation • Body responding to medication and treatment, with post hypnotic suggestions around their bodies ability to respond to treatment • Post hypnotic suggestions - regarding medication moving them closer to meeting their baby
Psychological Flexibility	• Revision of past sessions, with reference to the Hexaflex • Bringing it all together to develop a plan to prepare for what might come (acceptance of outcomes) • Psychological flexibility and how this can be applied and generalised • Experiential exercise (body scan meditation) • Homework	• Induction • Relaxation • Preparing for an embryo transfer • Doing things better when relaxed • Open and ready to receive the fertilized embryo • Finishing with post hypnotic suggestions - body trust and acceptance

To ensure fidelity (i.e., adherence to the session content) and a consistent approach to program facilitation, an electronic tool, *'Mentimeter'*, was employed to detail the session content and facilitate group interaction. I selected *Mentimeter* because it allowed group participants to freely ask questions, engage with the content, and provide input, without identifying themselves. To protect the Intellectual Property of the developed program, I have not included the full program in the dissertation. However, sample session content is described and illustrated below.

5.6. Example Program Content

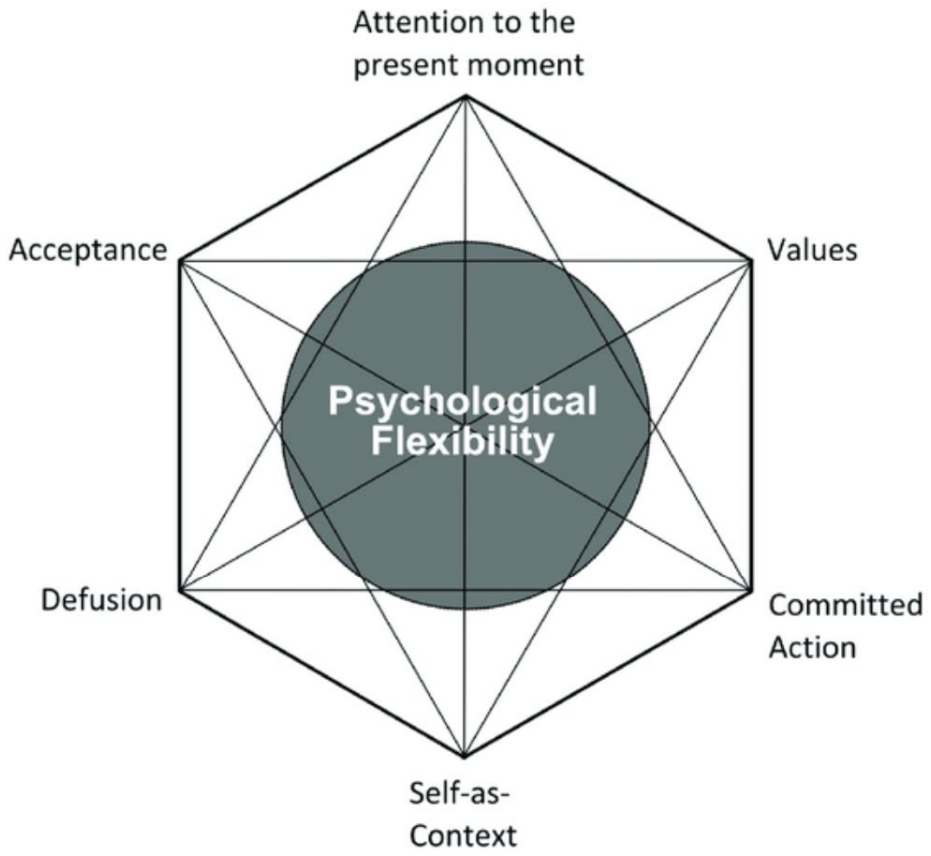
What follows are examples of the different engagement formats employed in the program. The *Mentimeter* presentations were developed for each session, as contained in the Program Manual – the slide content matches the Manual information and provides the facilitator with an opportunity to follow the Manual while also engaging the participants. The following examples demonstrate the various slide types employed during the program and the rationale for their inclusion.

5.6.1. *Diagram/Visual Representations*

Concepts are represented visually to clearly illustrate the program's concepts. The same visual is repeated throughout the six sessions, with attention being drawn to the area matching the session content. Below, the hexaflex image (see Figure 5.1.) provides a succinct overview of the ACT model, with example information to reinforce understanding of the interplay between each area.

Figure 5.1.

Image of The Hexaflex Included in Sessions 1 – 6 in ACTinfertility



5.6.2. *Word Clouds*

Word Clouds (see Figure 5.2.) are utilised within the program to provide participants the opportunity to share their thoughts, barriers, and ideas without feeling anxious about speaking up. The results additionally validate or normalise participants' behaviours, thoughts, attitudes, or beliefs, improving group cohesion and personal understanding that the distress experienced individually is also experienced by others, who may be able to offer support and empathy.

Figure 5.2.

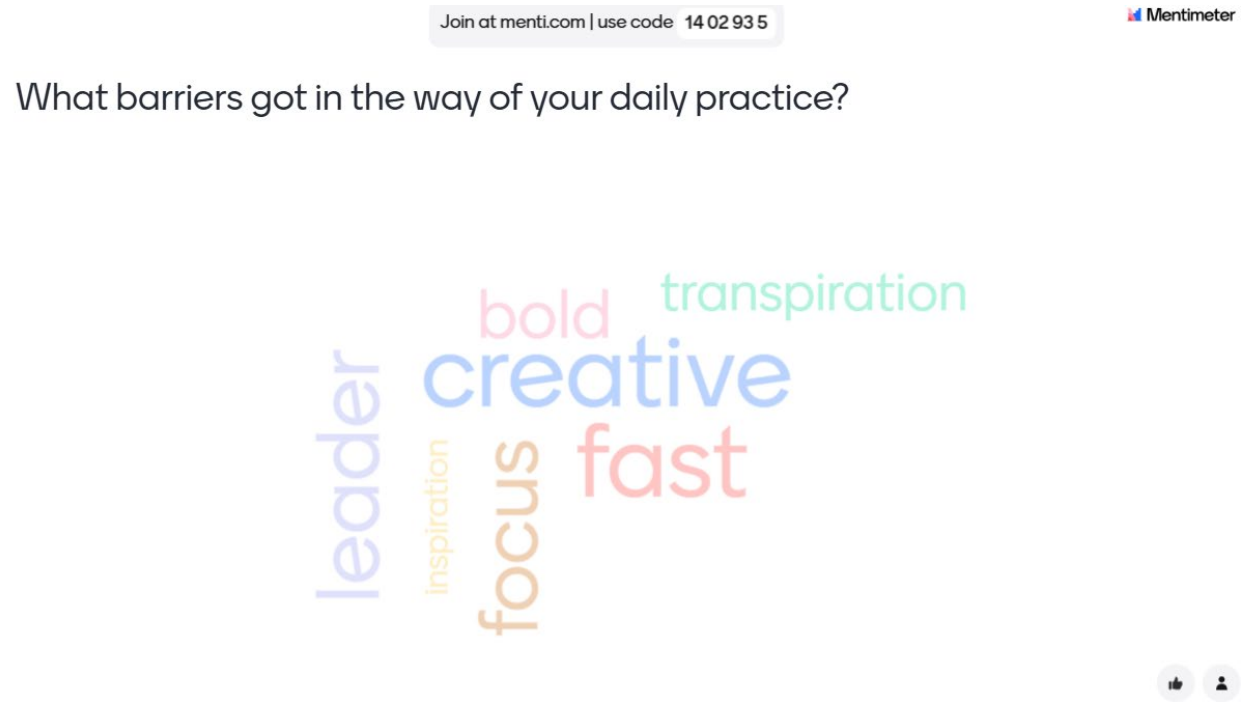
Example Word Cloud with a Prompting Question



Word clouds are also utilised to gather participants' answers, so that they can be revisited at the next session. For example, the following word cloud (see Figure 5.3.) asks participants what barriers they experienced completing their at-home practice. Once populated with answers, the facilitator can reuse the slide in the next session to help participants recall the barriers they need to consider when preparing for their at-home practice. This approach aims to ensure continuity between sessions, support participants to feel connected to the content, and prompt further discussion. Participants also receive the populated results, in the form of a completed workbook, at program completion.

Figure 5.3.

Example of a Word Cloud



5.6.3. *Reflection Slides*

At the start of each session, participants are shown a reflection slide on at-home practice and the implementation of skills learned in the prior session (see Figure 5.4.). This slide aims to foster discussion about at-home practice and to provide insight into participants' progress, difficulties, and understanding. From a BCT perspective, reflecting on at-home practice also serves as a self-monitoring strategy and reinforces the notion of experimenting with strategies, evaluating before and after completion. A short-answer reflection slide (see Figure 5.5) is also included to illustrate how participants can share their experience of the experiential exercises. Reflection slides also aim to help participants feel less alone if they find the content challenging or difficult.

Figure 5.4.

Example Reflection Slide – Traffic Lights

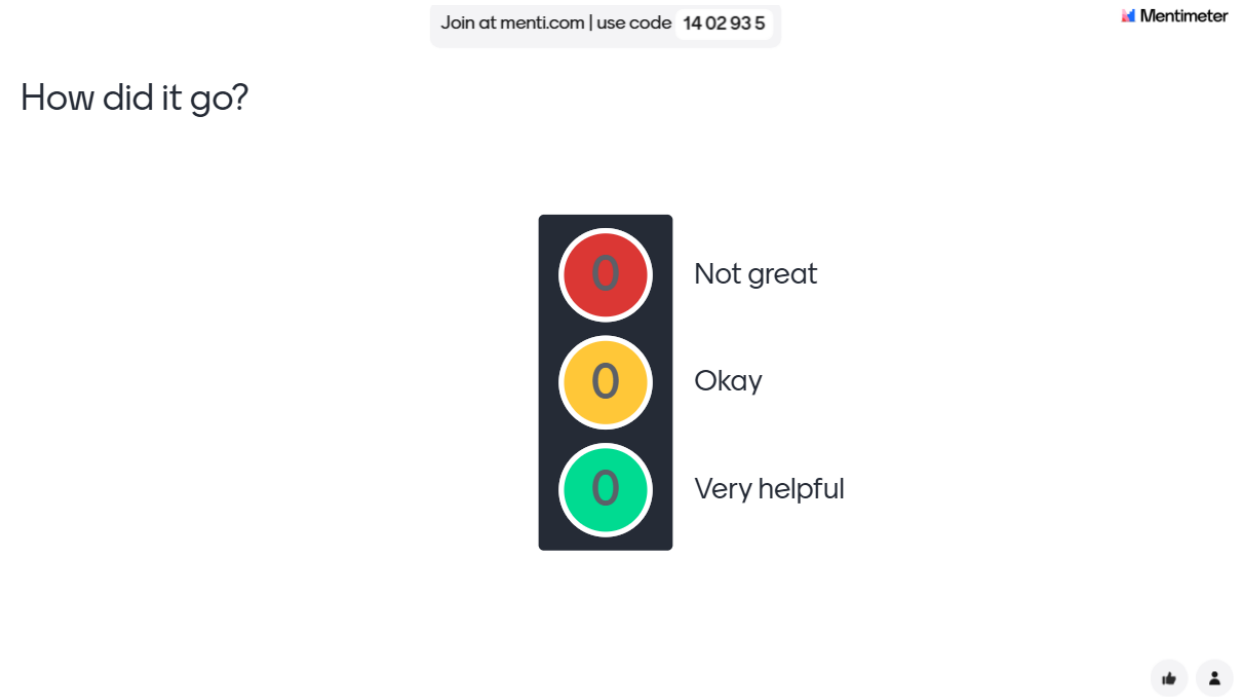
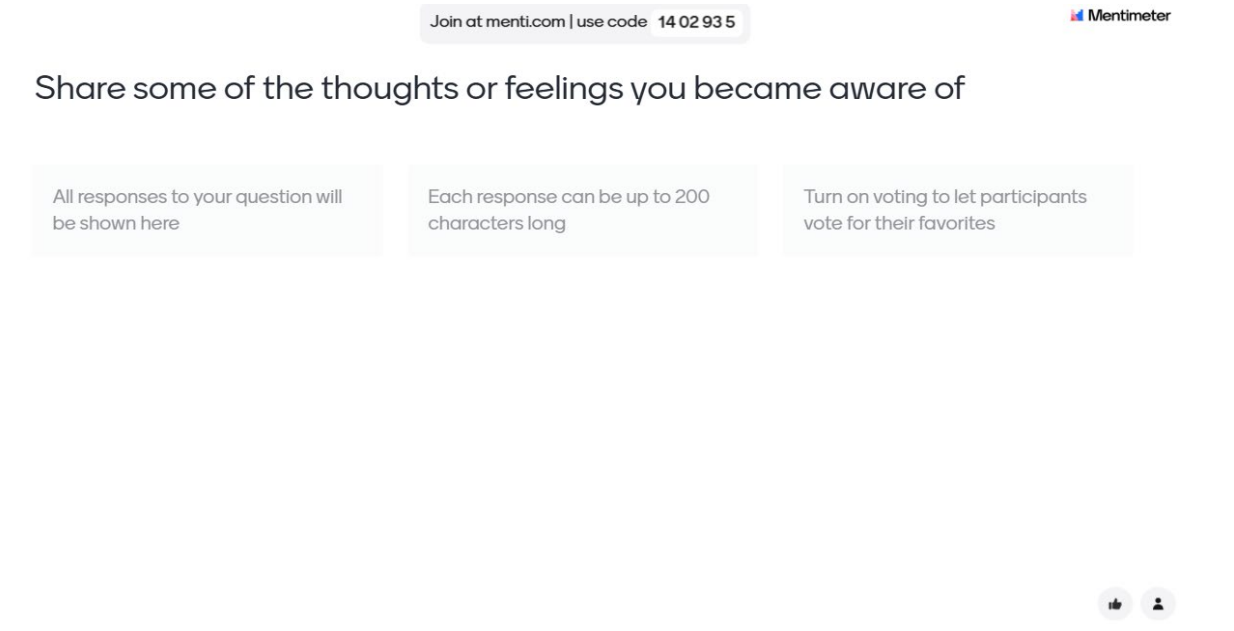


Figure 5.5.



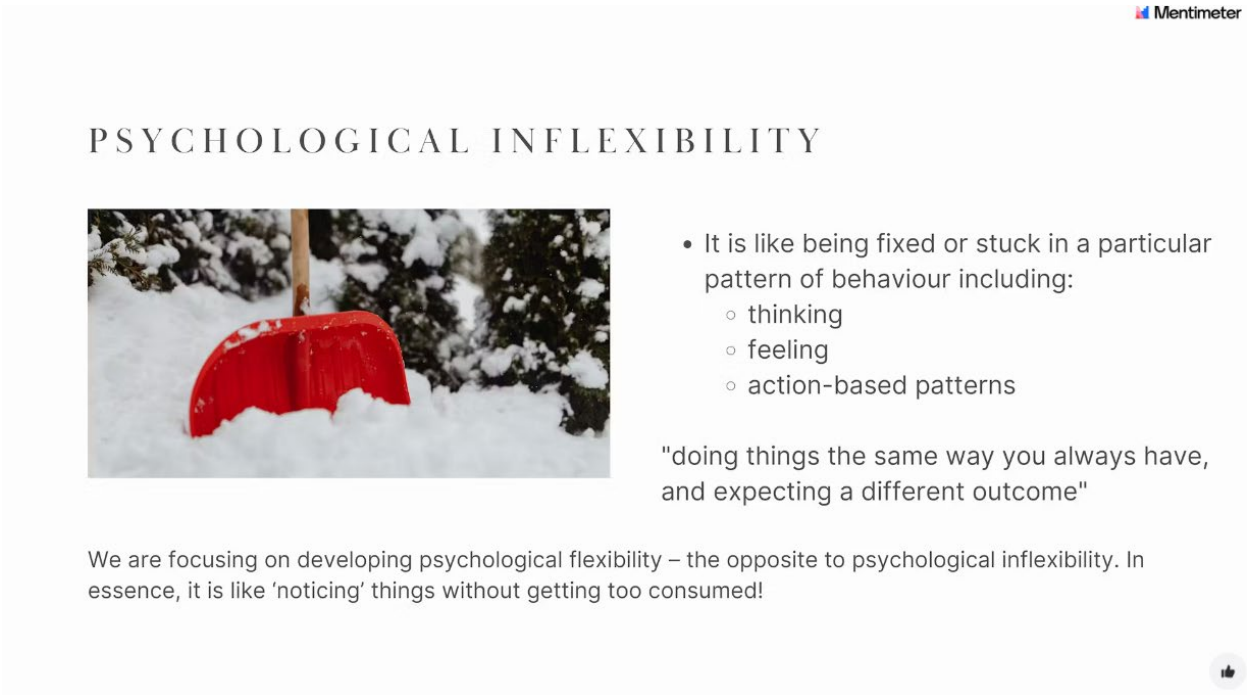
Example Reflection Slide – Short Answer Response

5.6.4. *Content Slides*

Every new concept or exercise has a content slide to explain the concept or to prompt the facilitator about what to discuss (see Figure 5.6.). The aim of these slides is two-fold: one, to support participants in learning the new concepts: two, to ensure facilitator adherence to the content.

Figure 5.6.

Example Content Slide Explaining Psychological Inflexibility

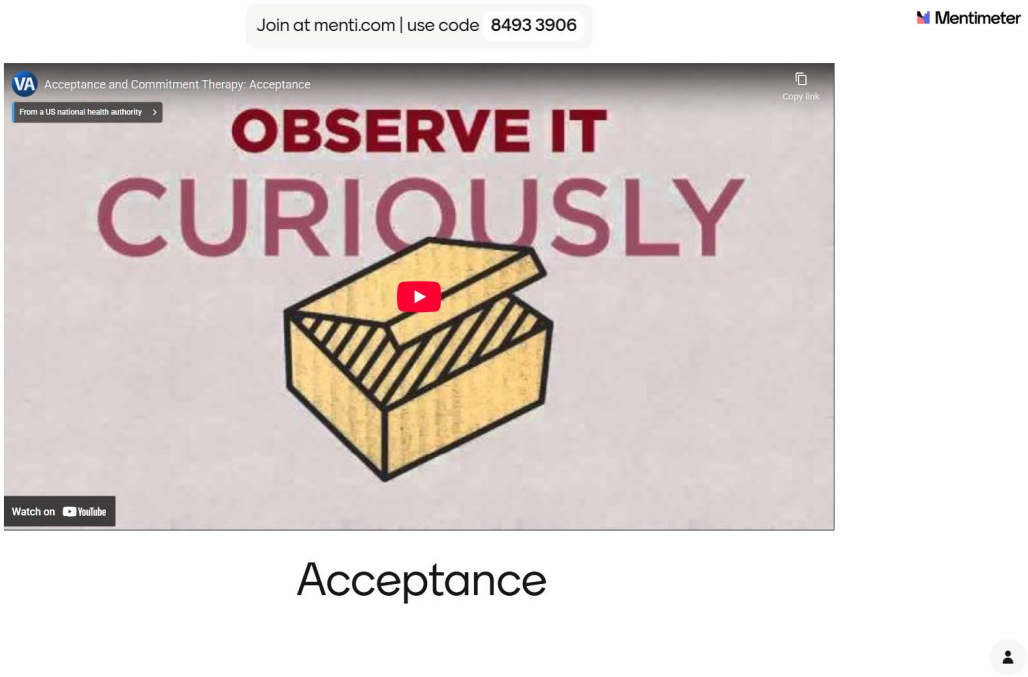


5.6.5. *Videos Depicting Teaching Materials*

Throughout the program, facilitators use recordings that explain concepts both visually and verbally to maximise participant understanding and engagement (see Figure 5.7.). These videos are psychoeducational and readily available and can used and cited within the program. I did not develop them for use in the program. These recordings aim to ensure that information is being taught in various modalities to suit different learning styles.

Figure 5.7.

Example Video Slide Utlised in Group Psychological Intervention Program



Note. Accessed from Veterans Health Administration (2015). *Acceptance and Commitment Therapy – Observe It Curiously* [Video]. You Tube. https://www.youtube.com/watch?v=jrmKtaMqOh4

5.7. Experiential Exercises

Throughout the program, the facilitators guide participants through various experiential activities, some short and others lasting for up to 10 minutes. These activities are utilised to examine and experience concepts, and to practice and reinforce skills developed. These activities were pre-recorded and are made available to participants after the relevant session. Participants are encouraged to practice these experiential activities at home between sessions and, as mentioned above, are asked to provide feedback on how they went at the next session (see *Section 5.6.3.*).

5.7.1. *Mindfulness Exercises*

Each mindfulness script I developed followed a similar format to help participants develop a sense of predictability and mastery. The formula utilised is displayed in Table 5.5.

Table 5.5.

Format of Mindfulness Exercises

Step	Content
1. Get comfortable	Focus on finding a comfortable position, seated, and allow your eyes to close.
2. Awareness	Bring your awareness to your breathing, body, or sensation, watching, observing and noticing it.
3. Session concept introduction	Introduction to concept developed in the session.
4. Skill repetition	Repetition of the skill developed in various formats or iterations.
5. Everyday life anchoring	Anchoring the skill developed to an experience in their everyday life.
6. Return to body and breath	Return to observing the body and breath.
7. Realerting	Guiding the participant back to the here and now, present moment, alert and refreshed.

An example script from the program is included below to illustrate:

5.7.2. *Present Moment Awareness Script*

(Facilitator Note: Read this slowly, with 2-4 second pauses between each instruction)

Take a moment to settle yourself on your chair, put both feet flat on the floor, sit up straight, and lay your hands on your lap (Step 1)*…. When you are ready to focus inward, take a deep breath in… and as you let that breath go, allow the eyes to close…. As they close, notice the sensations in your feet… your legs… your bottom… your torso… your shoulders… your arms… your neck… your head…. Pay attention to your ability to watch and notice these sensations… these body parts… and notice that they are separate…. There you are and there you are noticing your body* (Step 2)*….*

Bring that attention to your breath now…. Notice that as you watch the breath, you cannot be your breath…. Be curious to the sensation of the breath as you breath in…. and as you breath out…. You need not speed up or slow down the breath…. You need not do a thing….. Your breath

continues whether you watch it or not… Pay attention to where you feel the breath most predominantly…. Is it at the tip of the nose?... In the back of the throat?... In your chest?... Or in your tummy?... What happens as you watch the breath… and where you notice it?... Can you notice the temperature of your breath as you breathe in…. as you breathe out…. Is there a difference in temperature?... Watch the breath… notice the breath… and be aware of the fact that there is your breath… and there you are watching it…. It flows in….. and out….. whether you watch it or not (Step 3, Step 4 and Step 5)….

Move your focus and your attention now to being in that chair…. In this room…. In this moment….. there is nothing you need to do…. Just watch… observe… and notice….. (Step 4, Step 5)

If you notice a thought…. Watch it with curiosity…. Let it float by like a feather on the breeze…. A wave rolling in to shore and out again….. let the thought pass by as you bring your focus back to your feet on the ground…. Your bottom on the chair…. Or your breath moving out of your mouth…. (Step 4)

Our mind is a master story teller…. It will hook you in time and time again…. Just notice this… observe this… and return yourself back to watching your breath… your body… your experience with curiosity… (Step 4)

Watching, observing and noticing now the sounds outside of your body…. The temperature of the room… the sensations of the chair… Step 6) *and now… because life is like a stage show…. Bring up the stage show lights…. and bring yourself back into the room… in this moment… watching…. Observing… and being in the here and now… with your eyes open* (Step 7).

The above exercise is completed in Session 1 as an introduction to Present Moment Awareness and to demonstrate the approach to experiential learning. In the next section, the use of clinical hypnosis will be detailed.

5.7.3. *Clinical Hypnosis Recordings*

Clinical Hypnosis is not conducted in the group sessions; rather, it is set as private, at-home practice. Participants receive access to the pre-recorded hypnosis exercises after completing the associated in-group session. The hypnosis recordings are no longer than 15 minutes, as preferred by Study 2 participants, and utilise a set formula detailed in Table 5.6. below.

Table 5.6.

Stages of Clinical Hypnosis Recordings for At-Home Practice

Stage	Description
Induction	Guiding the participant into a relaxed and receptive state to begin the hypnosis session.
Deepening	Further relaxing the participant and deepening their state of focus and suggestibility.
Introduction of session content and skills	Presenting the main topics and techniques that will be explored during the session.
Repetition of skills and session content	Reinforcing learning by repeating key skills and session topics to enhance retention.
Instilling post hypnotic suggestions and anchoring	Embedding helpful messages or cues that can support positive behaviours after the session ends.
Reinforcement of helpful messages	Strengthening positive suggestions given earlier in the session for greater impact.
Realerting, with PHS of energy, focus, attention, and getting better at hypnosis every time it is practiced	Bringing the participant back to alertness, with suggestions for increased energy, focus, and progressive improvement in their hypnosis skills with ongoing practice.

An example script of a pre-recorded hypnosis is included below to demonstrate the stages included.

5.7.4. *Body Trust and Observing Self Clinical Hypnosis Script – Session 1*

As you notice into the body, just pay attention and answer these questions in your mind…. Are my legs feeling supported? Yes.

Are my upper legs feeling supported? Yes. Is my lower back feeling supported? Yes.

Is my neck and my head coming comfortably into contact with a great level of support? Yes.

As the body just sinks down into this feeling of support, just check-in with the self and ask the question, are you ready to go into hypnosis? Yes.

Reminding ourselves that we do everything better, relaxed. And if you haven't already done so, you can choose to let the eyes close gently. And as the eyes close, you might be curious to notice a sensation of heavy shoulder droopy relaxation drifting down the neck, into the shoulders, down into the arms, down through the wrists, down into the hands. Heavy, limp and loose, floppy.

Muscles lengthening, loosening. Breathing in some relaxation, blowing out any tension. It's that heavy, heavy, heavy shoulder droopy feeling. It flows backwards and forwards into every single cell.

Drifting down into the chest, settling in that relaxation around the heart, letting the heart, the lungs do exactly what they do best because we can trust the body to do exactly what it needs.

And things will happen just the way they need to. And in fact, there's nothing you need to be doing. Just noticing the breath in, the breath out, watching, observing.

And as that lovely shoulder droopy, limp, loose, floppy sensation flows freely down into the tummy. It's a warmth, a relaxation, a free flowing feeling of pure comfort and calm moving through the soles of the feet, into the ankles, the lower legs, that free flowing feeling of pure relaxation and calm moving through the knees into the upper legs, into the bottom, the hips, that free flowing feeling, letting our blood flow warm and calm comfortably into the pelvic region, the pubic region.

That lovely free flowing feeling meeting that shoulder droopy feeling of relaxation in the most important place of the body at the moment, the reproductive region, where all the miracles can happen. Because we know that every cell in the body has this written into its DNA.

Every single cell in the body has a memory bank. And in every single cell's memory bank, there's the knowledge of how to prepare the body for pregnancy, how to become pregnant, how to grow that beautiful embryo into a healthy foetus…. how to support, nourish, and nurture that foetus into a beautiful baby… taking that gorgeous, healthy, strong heartbeat all the way through to a full

term. Healthy, strong baby. The baby that you will be able to meet because things will happen just the way they need to.

There's nothing you need to do. In fact, you can just take a back seat and put all the knowledge back into trusting the body because the body knows just what it needs to do. In fact, remembering that every single cell in the body is programmed genetically with DNA, with chromosomes to do what it needs to do to support you to have that beautiful baby. And we can just observe any thought as it comes and as it goes. We can observe and notice any feeling. Let it come. Let it go. We can draw the focus of our attention to the warmth contained within the uterus, allowing a free flowing feeling that shoulder droopy, calm relaxation to infiltrate, to permeate, to flow freely through every single cell of the uterus lining.

Thickening that lining, allowing it to become rich with nutrients, with healthy, free flowing blood, almost like we're flushing it through, clearing out any rubbish, any thoughts, any feelings that don't serve a purpose, just letting them flow freely through and away.

Much like we empty out the vacuum cleaner once we've vacuumed, we can clear out the uterus of any dust, any debris, anything that's not helpful in your pursuit to parenthood. You can fill the space with this luxurious, rich liquid gold, the elixir of life. Its colour, rich and vibrant just the way we need it to be.

And you'll notice now as you breathe in relaxation, you can breathe out any tension. As you breathe in relaxation, you can breathe out any apprehension. You can breathe in relaxation. Breathe out any uncertainty. Breathe in that relaxation, and breathe out that relaxation.

There's nowhere you need to be. Nothing you need to be doing. Just floating freely in this state of pure relaxation where we do everything better. And the body has been preparing. The mind has been preparing.

All the doctors that need to be involved have been preparing. All the nurses, all the staff, the embryology team. Each of them have a role to play in helping you to meet your beautiful baby, and things will be just the way they need to be. All the people that need to be there will be there.

In fact, so much so that there's nothing you need to do but show up. You can leave the rest to the team because we know our mind is a bit like a stage show. There's always activity, noise, flitting, sounds, and voices. We can just allow all of that to be present without us engaging. We can watch, observe, and notice with curiosity. We can let those unhelpful messages go because this is the first time and this experience is all that matters.

This experience has no bearing on future experiences, and past experiences have no bearing on this experience.

Much like we roll a six one roll, we might roll a one on the next, but the one has no bearing on the six, and the six has no bearing on the one.

The body has been preparing, and the body knows just what it needs to do. And much like your body knows how to breathe when you're sleeping, the body knows how to have a baby healthy, full term, with a good set of lungs.

And much like your body knows when to wake you up to go to the bathroom, your body knows how to prepare the uterus so that your little embryo will nestle down, implant, and grow healthy and strong with a gorgeous rhythmic heartbeat.

And much like your body knows how to walk without you asking it to, your body knows how to nourish and nurture the right embryo.

And much like your body knows how to swallow, your body knows how to fall pregnant.

And you might like to remind yourself that thoughts can come, they can go. They do not have a bearing on the outcome. Remembering we have between seventy to ninety thousand thoughts per day. We certainly can't pay attention to all of them. So don't forget to defuse from the unhelpful. Notice the brain. Notice the thought, and notice that there you are watching, observing, and noticing.

Reminding yourself that things will be just the way they need to be. Settle into the comfort of trusting that the body knows how to walk, how to breathe, how to swallow, and how to give you the

appropriate necessary messages of bodily function. And your body knows how to get pregnant and have a baby.

And once again, because we know that our worlds are like stage shows. There's always something going on.

Take a moment to bring the focus of your attention back to the sound of my voice, remembering that we do everything better relaxed, and remembering as we practise, as we rehearse hypnosis, the skill, the muscle gets stronger.

And you can practise hypnosis here with me, out there, or even over there, because it's a skill that you can take with you wherever you go. Short, moderate, or even long hypnosis is yours for the using.

And as you let all of the helpful messages become deeply associated with every cell in the body, knowing that every step you take is moving you closer to your outcome. I'm going to count from one to five where five represents alert, awake, refreshed and energised, comfortable, calm, and settled.

One, feelings of lightness, heaviness leaving the body.

Two, feelings of renewed energy, vigour, vitality flowing freely through the body.

Three, coming closer to the surface, aware of your body. The sound of my voice, sounds outside of my voice, the feeling on the couch.

Four coming closer to the surface, wiggling the toes, the fingers, knowing you've taken some much-needed time to rest, to replenish, rejuvenate, and most importantly, relax because we do everything better when we're comfortable, calm, and relaxed.

Five, coming back to the room, eyes open, alert, awake, refreshed, and really and truly ready to take on the rest of the day as though you've had the most remarkable eight hour sleep. Refreshed, alert, and awake.

Participants will have access to all recordings to revisit at the completion of the relevant session and after the programme has been completed, for personal use. It is noted that the above

script has been utilised individually with women with infertility and feedback has been sought anecdotally to ensure it met their needs and was of benefit. This process of reviewing and debriefing is consistently applied with clinical hypnosis as discussed previously, and as part of the intervention mapping and co-design of this dissertation.

5.7.5. *Consultation with Women who had Previously Undertaken ART*

Once the program manual and *Mentimeter* presentations were completed, as part of the intervention mapping approach and co-design methodology, I approached several women who had expressed an interest in reviewing the program. These women had experience with ART and provided feedback to ensure the group psychological intervention program was relevant and acceptable. I also sought feedback regarding the understandability of the session content, the explanations provided, and the at-home practice exercises.

The facilitator manual was provided to these women, who read the content, watched the videos, viewed the Mentimeter participant presentations, and considered the relevance to their own experience of infertility. They were given two weeks to review the manual and add comments to the document. I then reviewed these comments and included the feedback, adapting materials and flow of information as deemed clinically appropriate and relevant.

The women suggested minor amendments to the wording or examples, which were actioned. For example, I revised the order of concept delivery in the first session based on their suggestions. I also adjusted some psychological terminology, using more colloquial language. Also, I adjusted one specific mindfulness exercise, as one reviewer and facilitator noted that it may have indirectly led to emotional distress for some participants. Overall, the women affirmed the program and advised that they would have been keen to participate in a program during their treatment. Once revised, I trained the facilitators and gave them the opportunity to also comment on the session content. I describe the facilitator training in Chapter 6.

CHAPTER 6

FACILITATOR TRAINING

6.1. Overview

In Chapter 6, I describe the facilitator training I conducted with two nurses and social workers who expressed an interest in facilitating the group psychological intervention program. Two of the facilitators had lived experience of infertility, while the other two had exposure to infertility and its impact on loved ones. Due to a potential conflict of interest and to ensure ethical and valid evaluation, I, as the researcher and creator of the content, decided I could not act as the facilitator of the pilot program. Further, it was likely that fertility clinic nurses and counsellors will be facilitate the program and, thus, it was essential that I created a training manual to assist with program fidelity, consistency and education.

The facilitator training aimed to provide clarity on session content, ensure fidelity, and explore options with the facilitators about how to respond to group scenarios, questions, and difficulties that might arise. Having comprehensive facilitator training also set the framework for a supervisor/supervisee relationship between myself and the facilitators that could be utilised throughout program facilitation. Below, I detail the goals of the training, as well as the format and content.

6.2. Goals of Facilitator Training

There were many goals of the facilitator training. The first was to provide background context regarding women with infertility going through ART, to ensure a level of understanding around the challenges they may experience, such as distress and mental health concerns. Further, teaching the core components of ACT and how to use it with women undergoing ART, with examples, was deemed an important goal. Finally, I conducted the training to improve fidelity to the program content and ensure consistent content delivery. A bonus of providing this training was that the facilitators were able to give input on session content, readability and understandability.

Facilitators were active participants in the *Mentimeter*, reviewing the program content, and offered small suggestions that were incorporated into the program manual or *Mentimeter* presentations.

6.3. Training Format

I scheduled in-person training on a public holiday to ensure that all facilitators could attend and meet one another. Before the training, I provided each facilitator with pre-reading regarding ACT (ACT Made Simple – 2nd Edition). I also provided facilitators with the program in its entirety and described and explicitly taught each session. I utilised *Mentimeter* to support the training as it is used within the group psychological intervention program. The facilitators provided feedback on the content, order, and materials. I incorporated this feedback into the final program.

6.4. Training Content

Facilitators received a copy of the program manual that we reviewed together. We discussed the specific content and explanations, and I role modelled the presentation of the content (see Figure 6.1.). Concurrently, I showed the developed participant *Mentimeter* presentations (Session 1 – 6), and noted minor adjustments suggested by facilitators. The *Mentimeter* training package for facilitators included various slide types, in line with those described previously in Chapter 5 (see *Section 5.6.*). Example slides from the facilitator training are included below. To demonstrate how *Mentimeter* works, I have provided facilitators' responses (see Figure 6.2. to Figures 6.4.).

Figure 6.1.

Overview of Facilitator Training Day

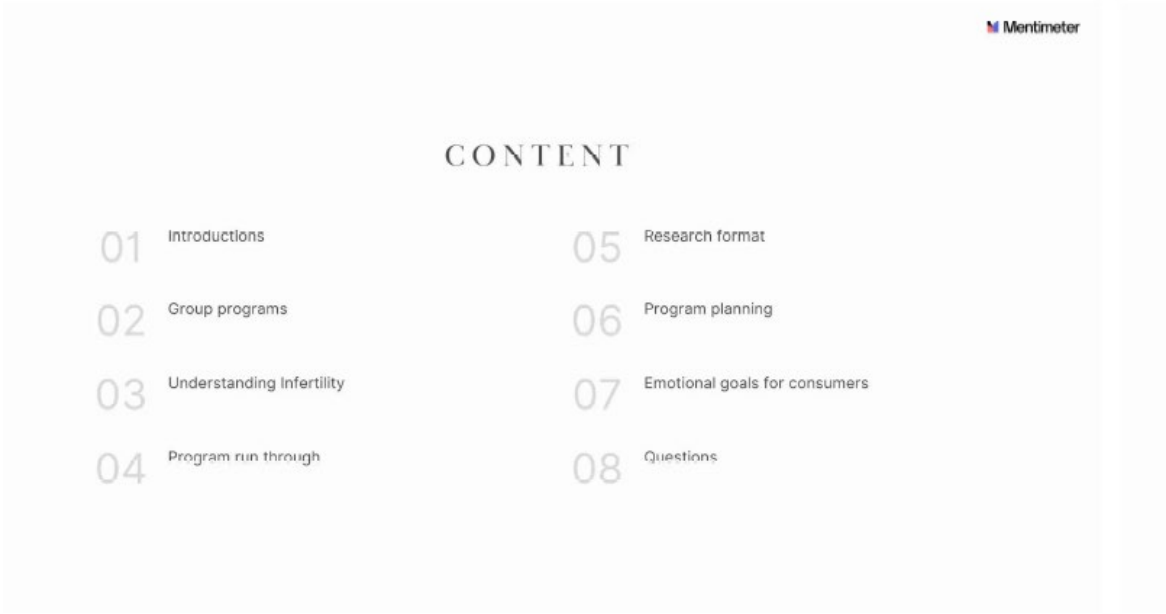


Figure 6.2.

Example Word Cloud Showing Facilitators' Responses Regarding the Benefits of Group Facilitation



Figure 6.3.

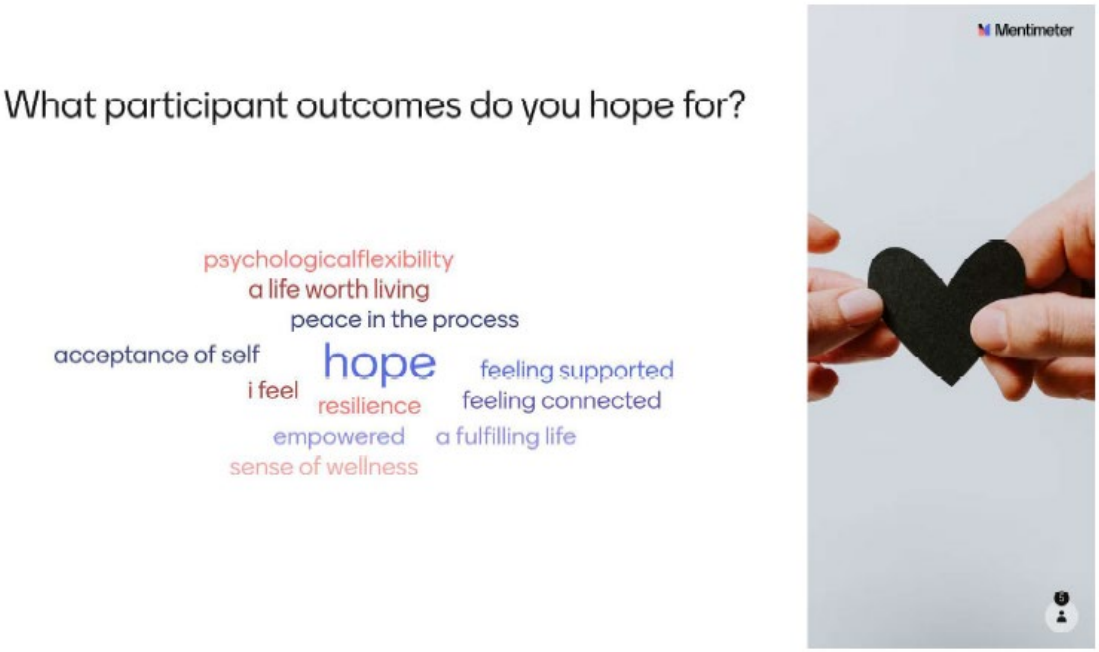
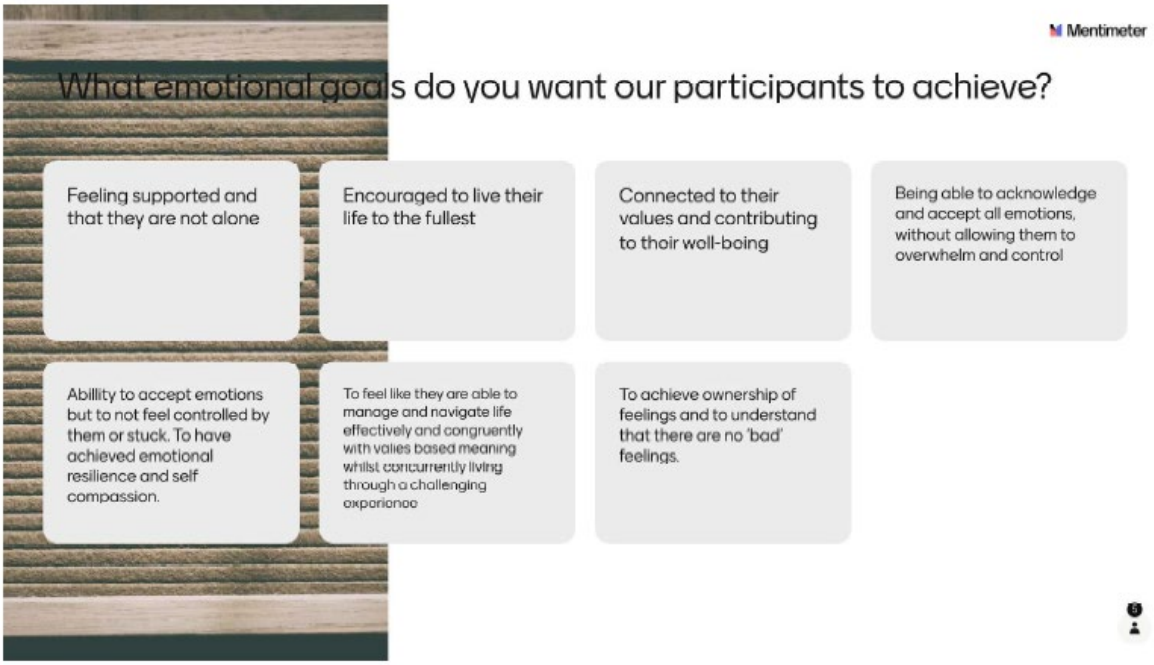


Figure 6.4.

Example Short Answer Slide Detailing Facilitators' Desired Outcomes for Participants



6.5. Summary

At the conclusion of the facilitator training, I made some adjustments to the language contained in the participant program, the order of delivery within sessions, and added additional *Mentimeter* slides at the facilitator's feedback. Revisions included an exercise for participants to reflect on their values following the brief experiential exercise on Values in Session 2. Participants would record their values on paper, rate how consistently they were behaving with them, and place them in an envelope to be sealed and reviewed at the end of the final session. The aim was to have participants re-rate these values at the final session. This exercise supported the BCT of behavioural experiments and may help increase self-efficacy and mastery, allowing participants to reflect, evaluate their learning outcomes and observe any growth or change.

Facilitators gave positive feedback on the training. As a result, I did not make any alterations to the facilitator training as it was flexible and adapted to the questions or comments posed by the intended facilitators.

Once the facilitator training was completed, and the group psychological intervention program manual and associated *Mentimeter* presentations were finalised, I commenced program recruitment. In Chapter 7, I explore the difficulties associated with that recruitment.

CHAPTER 7

CHALLENGES RECRUITING WOMEN WITH INFERTILITY TO AN IN-PERSON GROUP PSYCHOLOGICAL INTERVENTION PROGRAM – A COMMENTARY CONSIDERING THE BARRIERS TO RECRUITMENT

7.1. Preamble

Following the finalisation of the program content (Chapter 5) and completion of the facilitator training (Chapter 6), recruitment for a RCT to evaluate the group psychological intervention commenced. Recruitment attempts spanned over 15 months, during which three ethics amendments were sought and obtained to improve recruitment outcomes. As a result of those difficulties, I have been unable to evaluate the group psychological and report the results of the RCT as I had planned.

The following commentary (*Study 3)* details the process undertaken. It is included in the dissertation to explore the complexity of recruiting women with infertility undergoing ART to the group psychological program. The commentary explores the discrepancy between clinical practice and clinical research, the identified barriers to participating in the research process despite women with infertility endorsing the development of a group psychological program, and more broadly, aims to guide future researchers seeking to work with similar populations.

This chapter presents an article that has been finalised in preparation for submission: Warne, E., Best, T., & Oxlad, M. (2025). Challenges Recruiting Women with Infertility to an In-Person Group Psychological Intervention Program – A Commentary Considering the Barriers to Recruitment [Ready for Submission]. I have formatted the article to align with the dissertation style. The references cited in this article are provided in the reference list at the end of the dissertation.

7.2. Statement of Authorship

Title of Paper	Challenges Recruiting Women with Infertility to

	an In-Person Group Psychological Program – A Commentary Considering the Barriers to Recruitment
Publication Status	Finalised and ready for submission
Publication Details	Warne, E., Best, T., & Oxlad, M. (2025). Challenges Recruiting Women with Infertility to an In-Person Group Psychological Program – A Commentary Considering the Barriers to Recruitment [Ready for Submission].

Principal Author

Name of principal author (candidate)	Emma Warne		
Contribution to the Paper	Conceptualisation; Methodology; Investigation, Project Administration; Writing – Original Draft		
Overall percentage (%)	85%		
Certification	This paper reports on original research I conducted during the period of my Higher Degree by Research Candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this dissertation. I am the primary author of this paper.		
Signature		Date	09/12/2025

Co-author contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate to include the publication in the dissertation; And

iii. the sum of all coauthors contributions is equal to 100% less than candidates stated contribution.

Name of Co-author	Associate Professor Melissa Oxlad		
Contribution to the Paper	Conceptualisation; Validation; Supervision; Writing – Review and Editing		
Signature		Date	04/12/2025

Name of Co-author	Professor Talitha Best		
Contribution to the Paper	Conceptualisation; Validation; Supervision; Writing – Review and Editing		
Signature		Date	10/12/2025

7.3. ABSTRACT

Background/Objectives: Infertility can be an isolating and difficult experience for individuals and couples desiring parenthood. Research has shown that the mental health and well-being of women with infertility are often impacted more significantly than those of their male counterparts. Psychological interventions, whether individual or group-based, have shown improvement in the mental health and pregnancy outcomes of women with infertility. We developed a group psychological intervention program and aimed to evaluate it through a randomised control trial; however, multiple recruitment attempts were unsuccessful. Methods: A group psychological intervention program was developed with input from women with infertility and fertility clinic health professionals. Recruitment attempts occurred over 15 months. It was unsuccessful, and we explored the challenges associated. Results: Translating research into practice appeared to be a barrier to recruitment, as did the conflict between women wanting the service and providing feedback regarding the program, yet struggling to engage. It may be that the time constraints, isolation, and intensiveness of ART precluded women from engaging. Conclusions: We discussed the various recruitment approaches utilised, the possible and reported reasons for unsuccessful recruitment, and proposed alternative approaches, such as increased patient and clinic staff engagement and education, building trust prior to group commencement, and expanding the use of social media platforms, which might assist other researchers to improve recruitment and contribute to the evidence base.

Keywords: infertility; group psychological intervention; recruitment challenges

7.4. Introduction

Infertility is a profoundly personal and often distressing experience that affects an estimated 15% of couples globally, with women frequently bearing the emotional brunt of the diagnosis and treatment process (Mascarenhas et al., 2012; Taebi et al., 2021). The psychological toll includes heightened levels of anxiety, depression, and social isolation, often compounded by societal stigma and personal grief

(Clifton, 2016; Cousineau et al., 2008; Domar et al., 2012). For many women, infertility is not only a medical condition but also a deeply sensitive and stigmatised life event that can disrupt identity, relationships, and future planning (Taebi et al., 2021; Xie et al., 2023).

To address these psychological challenges, researchers and clinicians have developed support programs to provide people with infertility with coping strategies, emotional validation, and a sense of community. These programs—ranging from peer-led groups to professionally facilitated therapy—have demonstrated significant benefits, including reductions in distress and improvements in quality of life (Bokek-Cohen, 2024; Clifton, 2016; Dube et al., 2021). Further, improved pregnancy rates have also been observed with the implementation of psychological interventions, whether in group or individual formats (Boivin & Gameiro, 2015; Chan et al., 2006; Domar et al., 2011; Warne et al., 2022). Despite the proven efficacy, participation in such programs or individual therapy remains limited.

Women with infertility often struggle to seek support (Peterson et al., 2025; Taebi et al., 2021). As a result, recruitment into randomised control trials (RCT) evaluating interventions for women with infertility is often challenging (Calitri et al., 2021; Docherty et al., 2021; Field et al., 2019; Fletcher et al., 2012; Lehmann et al., 2020; McDonald et al., 2006). Specifically, recruiting women into in-person infertility groups presents several unique challenges, as well as many others also experienced in other research cohorts. Common barriers include concerns about privacy, time constraints, geographic inaccessibility (Field et al., 2019; Lehmann et al., 2020), and emotional difficulties discussing infertility in a group setting (Clifton, 2016; Cousineau & Domar, 2007; Domar et al., 2012; Meyers & Domar, 2021). Additionally, stigma and internalised shame may discourage women from seeking support, even when they recognise its potential benefits (Taebi et al., 2021; Xie et al., 2023).

In seeking to better understand support options for women with infertility, we conducted a systematic review and meta-analysis examining group psychological intervention programs and their effectiveness for women with infertility (Warne et al., 2022). The results demonstrated that overall, group psychological interventions resulted in reduced anxiety, depression and stress, and pregnancy rates were two times more likely for participants (Warne et al., 2022). Building on those results, we

surveyed women who were or had participated in reproductive technologies (ART) and ART providers to inform the development of a group psychological intervention program (Warne et al., 2023). We sought preferences regarding delivery mode – online, in-person, or self-guided; session length, frequency, duration, and content; and facilitator teaching style. Thereafter, we developed a group psychological intervention program, utilising a person-centered and intervention mapping approach (Bartholomew et al., 2016; Yardley et al., 2015). Women with infertility and providers of ART reviewed the intervention as part of the development process.

This commentary describes the recruitment process utilised and the multifaceted challenges associated with recruiting women into an in-person group psychological intervention program. Drawing on recent literature and practical insights, we propose evidence-based strategies to enhance future recruitment efforts and ensure broader access to these critical support services.

7.4.1. *Background to the Study*

In a study approved by the University of Adelaide Human Research Ethics Committee (HREC-2022-178), we aimed to conduct a three-arm RCT – (1) Waitlist Control, (2) Acceptance Commitment Therapy (ACT) for Infertility, and (3) ACT for Infertility with clinical hypnosis. Our goal was to recruit 40 – 60 participants to be randomly allocated to the three arms.

Women with infertility who were currently participating in ART were eligible to complete an initial expression of interest (EOI). Various eligibility criteria needed to be met for a person to progress to inclusion into the pool for randomisation. These criteria included:

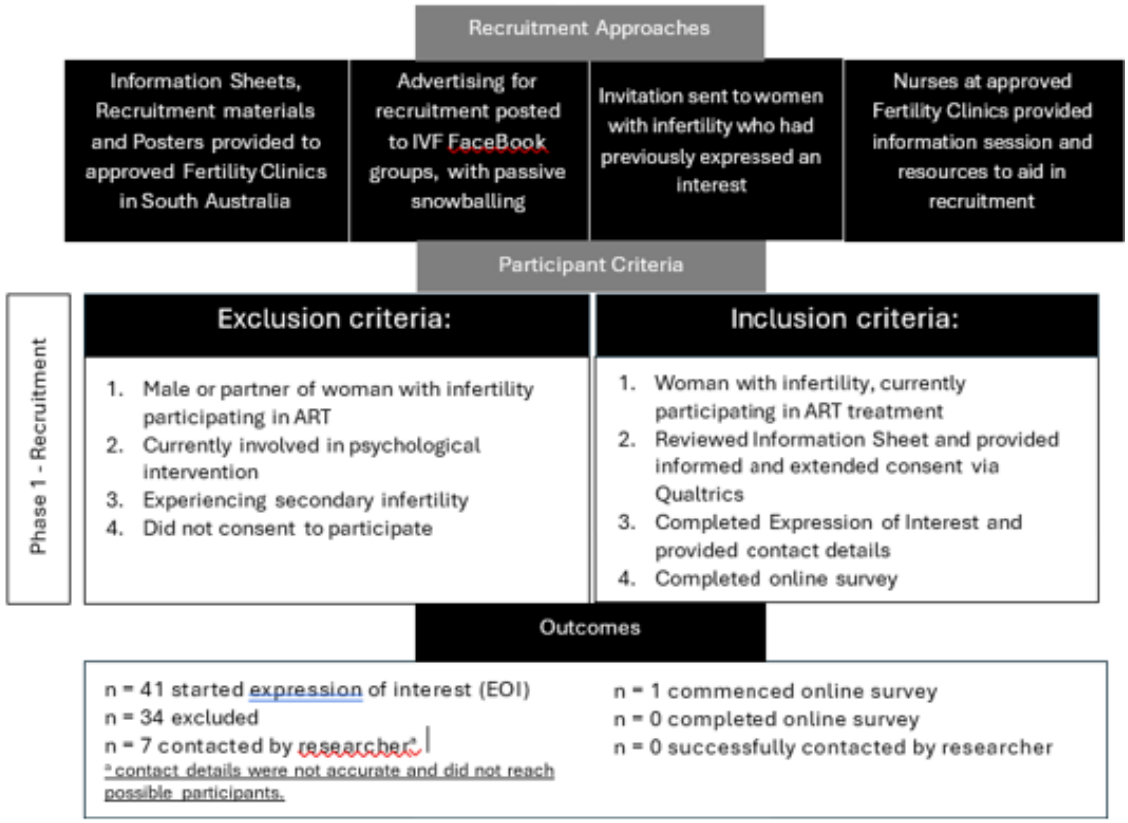
- Providing informed consent following reading the Information Sheet;
- Being a woman with infertility;
- Commencing ART shortly or engaged in treatment currently;
- Experiencing primary infertility;
- Not participating in counselling or psychological intervention

Active recruitment commenced in July 2023 (Phase 1). Various social media posts, contact with several South Australian fertility clinics, and in-person attendance at the approved clinics ensued. By

December 2023, we had no completed EOIs from women with infertility. See Figure 7.1. for further information.

Figure 7.1.

Illustrating Phase 1 of Recruitment, Highlighting Inclusion and Exclusion Criteria



As part of our person-centred (Yardley et al., 2015) and intervention mapping approach (Bartholomew et al., 2016), we spoke with eligible participants to understand potential recruitment barriers and ways to improve engagement.

7.5. Results

Given the challenges experienced in recruiting eligible participants in the initial phase of recruitment, we informally approached women with infertility who assisted in the early stages of program development (consultation phase and review of program phase; *see Chapter 3 and 5*) and

asked them about program recruitment processes. We discussed the program recruitment and summarised the information obtained.

As a result of these conversations, we identified the following barriers to engagement.

7.5.1. *Exploring Barriers to Engagement*

These women (n = 3) identified the following potential factors they perceived may be preventing women with infertility from completing the EOI.

- *Randomisation of Group Allocation* – Two women were concerned that they would not be allocated to the intervention program and, as a result, did not submit an EOI. The other woman indicated that she would have withdrawn if she had not received an active group allocation. Collectively, they each indicated that, given the pressure of their current fertility treatment, adding another expectation that did not benefit their overall goal of having a baby was not a priority.
- *Requirement to Complete the Recruitment Material Online* – Having time to complete the initial forms was a barrier. The women advised that they would have preferred to speak to a researcher to understand the nature of the program, the commitment, and the randomisation process in more detail. In addition, they noted that the online completion felt impersonal and did not centre on them as people.
- *Time Commitment* – The women reported that committing to 12 weeks with fortnightly out-of-hours sessions felt insurmountable. They each expressed that this could also have equated to two rounds of treatment, which significantly impacted their interest in engaging. One woman suggested that the program should be offered weekly to align with a treatment round.
- *Not Knowing the Group Facilitator* – The women who provided feedback had individually consulted the program developer for supportive psychological intervention related to their infertility. They each indicated concern about who the group facilitator would be and whether the facilitator would provide the same level of care.
- *Wanting to Continue Working with the Group Program Developer* – Women described the therapeutic relationship as important. As the women who provided feedback had already engaged

with the program developer, they expressed a desire to continue working with her rather than complete the program facilitated by someone with whom they had no established relationship.

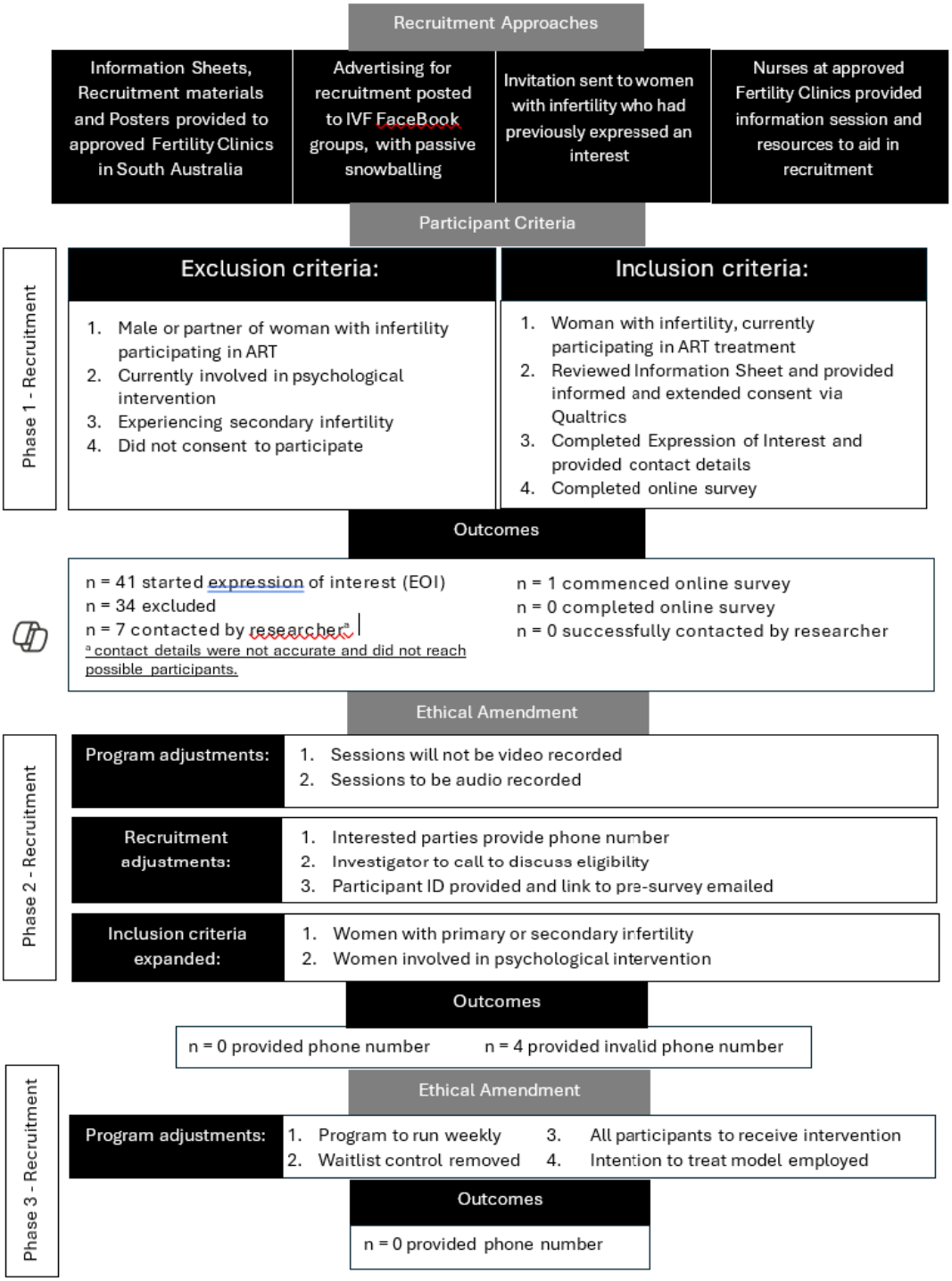
- *ART Already Placing a Strain on Employment* – Given the frequency of appointments during treatment, women indicated that another commitment was "too much". They noted that the first two weeks of a treatment cycle involved blood tests, injections, scans, and waiting for telephone calls, and that, if they were engaged in additional complementary therapies, these appointments often occurred more frequently. In contrast, they reported that the period post-transfer or oocyte retrieval involved very limited communication or attendance at appointments.
- *Emotional Fatigue Due to ART* – Women stated that attending a group session, with other women, after hours, felt like something they could not commit to regularly. They advised that they recognised the benefits of attending. However, when they returned home most evenings, they did not want to leave the house again due to emotional and physical fatigue. One woman also indicated that after-hours might impact the timing of an individual's medication plan and could lead to non-attendance during an active treatment phase.
- *Struggling with Activities Outside of the Home* – Women expressed that attending anything out of their home that did not directly contribute to work, or their fertility treatment was difficult.

Prior research has additionally found that women with infertility may fear being stigmatised by their fertility clinic, may be sceptical regarding program effectiveness, may feel uncomfortable or feel too shy or scared, or may be concerned about who to contact or who will find out about the information shared (Boivin & Gameiro, 2015; Clifton, 2016; Gameiro et al., 2015).

As a result, we sought and received ethics approval to adjust the program inclusion and exclusion criteria and format based on the anecdotal information provided. The amendments related to Phase 2 of recruitment. As Phase 2 did not result in any eligible participants completing the EOI, we sought a further ethics amendment, which led to Phase 3 of recruitment. Figure 7.2. illustrates the recruitment process, the inclusion and exclusion criteria, and the phases of recruitment, including modifications and adjustments applied to improve recruitment.

Figure 7.2.

Recruitment Process and Modifications



7.6. Discussion

Despite making significant amendments to our research design, recruitment approach, and program, we were unable to recruit any eligible participants. Although we had thought the offer of 6

hours of focused psychological intervention to assist during ART would have been inviting, participants would also have received a small amount of financial compensation for their time and effort. However, despite the potential benefits, the need to submit an EOI, provide contact details, and then complete psychometric testing before randomisation appeared as a barrier to engagement

When added to the demands of ART, namely the time for appointments, blood tests, scans, time off work, and the need for specific timing for the retrieval or transfer, a weekly commitment, outside of work hours, appeared to be too much. If the program had been included in the treatment cycle at the start of treatment, it might have increased engagement; likewise, had an online option been made available, this may have improved recruitment. We also hypothesised that researchers could consider the following approaches to improve participant recruitment for similar intervention trials.

7.6.1. *Building Trust and Creating a Safe Space*

Developing a support group for women with infertility that is less formal and research-heavy, and available at a consistent time and place, could build and develop a supportive and confidential environment. Consistent with prior research (Burlingame et al., 2018), this support group could emphasise the importance of shared experiences, group cohesion (Haslam et al., 2016) and support, while also providing the opportunity to discuss the group treatment program in person. Prior research has demonstrated that cohesion in group programs targeting mental health improves social identity, and is important and contributes to outcomes (Burlingame et al., 2018; Haslam et al., 2016). Further, a more person-centric approach to recruitment, where potential participants can complete the information sheet and EOI with a person rather than online, may build trust, enhance individuals' safety, ands increase their motivation to commit their time.

7.6.2. *Building in More Flexibility in Program Design*

Although we did not reach the point of scheduling our group sessions due to low numbers, we considered offering flexible scheduling options or an online option to increase participant recruitment and retention. Incorporating virtual elements or hybrid formats for participants who were struggling to attend in person may have been beneficial. In a pilot trial, Clifton (2016) found that an online

mindfulness-based intervention program was well attended in the initial stages and effective, such that when an individual commenced with elevated anxiety and/or depression scores, they experienced a reduction in symptoms at the midpoint and end of the intervention, while those in the waitlist control group experienced an increase in symptoms. However, this study had significant attrition by the end of the program. This research additionally noted that a 10-module online intervention may have been too long and not required, as reductions in depression and anxiety occurred on average after 2.39 sessions (Clifton, 2016).

7.6.3. *Motivation*

Although our participants were to receive a small amount of financial compensation and the program was free to attend, a more personalised approach, such as an individual psychological session to discuss program inclusion and include some skill development, may have encouraged participation. As mentioned above, the individualised approach and relationship that developed with the program developer served as both a motivator and a detractor for women when they were advised that the facilitator would be someone unknown to them. Connection and rapport appear particularly relevant to this population consistent with research indicating that the therapeutic alliance is viewed as a key mediator of change in therapy (Baier et al., 2020).

7.6.4. *Personal Testimonials and Word of Mouth*

Expanding our recruitment efforts within online infertility support networks and inviting more fertility clinics may have led to a higher engagement rate. Although we used social media and passive snowballing, focusing on recruiting via various social media platforms, while providing snapshots of what the program, may have led to better outcomes, if ethically permitted. A larger online presence and relying less on fertility clinics may have overcome potential participants' concerns about their treating clinic stigmatising or dismissing them (Boivin et al., 2011; Clifton, 2016).

7.6.5. *The Role of Healthcare Providers in Recruitment*

Spending more time educating fertility clinic doctors, nurses, and therapists about the adjunctive benefits of psychological intervention on patient anxiety, depression, and stress, and the details of the

group intervention content may have increased participant engagement. Although we collaborated with multiple fertility clinics, further focus on this would be appropriate to boost engagement and recruitment, and diversity of patients.

Demonstrating sections of the program with various clinics as part of this process may have increased their likelihood of recommending that patients participate in the program. Emphasising the importance of a multidisciplinary approach to fertility care, while providing evidence of improved outcomes, may also have increased clinics' motivation to support patients in expressing their interest. Providing information about the benefits of proactive counselling support rather than referring when patients are demonstrating significant distress would also have likely had an impact. Focusing on closer collaboration and a multidisciplinary approach to recruitment may have improved our uptake and, in turn, overall participation in the program.

7.7. Future Considerations

Future attempts to improve recruitment for similar psychological intervention programs will likely benefit from focusing on building an online presence across multiple social media platforms and from increasing the person-centric approach to recruitment within fertility clinics. Engaging fertility clinic staff from several fertility clinics and educating them about program content by providing examples should also be a priority to improve engagement of staff, which could also improve recruitment. Meeting and talking directly with women with infertility, in person, regarding program content and potential outcomes should also be a focus. Removing the barriers identified, while increasing the possible therapeutic connection to women with infertility, may also improve recruitment and retention rates.

Although this study took a person-centred approach, consideration of other possible systemic barriers, such as the routine care of patients not aligning with proactive counselling, or the need for individual clinic staff to follow procedure when meeting with patients, may have taken precedence over discussing the program. Thus, future recruitment will likely require consideration to the inclusion of the program in the information sharing, initial intake and patient introduction to ART taken by clinic staff.

Supporting both women and fertility clinic staff in recognising the program's benefits as superior to the time associated with participation will likely be imperative for more successful recruitment.

Finally, offering the program online while still maintaining group participation may have increased recruitment response. Online delivery may need to be considered in order to respond to the needs of this patient cohort, given the experience of overwhelm often reported while participating in fertility treatment.

7.8. Conclusions

Despite the observed benefits of group psychological interventions for women with infertility (Frederiksen et al., 2015; Katyal et al., 2021; Kremer et al., 2023; Wang et al., 2022; Warne et al., 2022), the provision and participation in such programs remain limited. Recruiting women with infertility to an in-person, group psychological intervention program proved markedly challenging.

In this commentary, we explored the recruitment challenges and barriers associated with a group psychological intervention program designed for women with infertility. Barriers identified included the balancing act of adhering to an RCT framework and translating clinically relevant research into clinical practice. The challenge of implementing best practice research within an emotionally taxed patient group, women with infertility who are engaging in ART, led to significant barriers to recruitment. It appeared that concerns about time, accessibility, and the emotional difficulty of discussing infertility in a group setting also detrimentally impacted recruitment attempts. Prior research with this population had not cited difficulties with recruitment; however, attrition from ongoing participation in the intervention has been observed due to similar factors (Bai et al., 2019; Bidgoli et al., 2020; Chan et al., 2006; Clifton, 2016; Shafierizi et al., 2023). Additionally, stigma, internalised shame, and the pressure of ongoing fertility treatment (appointments, scans, blood tests) further discouraged participation. Understanding and addressing such barriers and challenges is imperative for researchers and clinicians to improve recruitment and participation.

As a result, we suggest that future researchers and clinicians may improve recruitment by increasing in-person engagement with women with infertility and the clinic staff, building trust and

creating a safe space, offering flexible scheduling options, providing personalised approaches and motivators, expanding the use of social media platforms, and providing more detailed and personalised education for frontline healthcare providers.

CHAPTER 8

DISCUSSION

8.1. Overview

In this chapter, I synthesise the findings from the current doctoral research and demonstrate the contributions to knowledge. I also articulate the implications of the findings for providing psychological support to women experiencing infertility. I then describe strengths, limitations and areas for future research, before sharing my final conclusions.

8.2. Contributions to Knowledge

The work presented in this dissertation consolidates and highlights the benefit of psychological input that is evidence-based as a means to support women with infertility. By reviewing the literature in Chapter 1 and completing a systematic review and meta-analysis in Chapter 3 (*Study* 1), the research found that in Australia and other countries, psychological support for women with infertility is not routine. Despite research demonstrating marked benefits for women with infertility undergoing ART who engage in individual or group psychological intervention, currently in Australia, psychological support is provided reactively, if a patient presents with significant distress. As detailed in *Section 1.8.1.*, there were no published group psychological intervention programs for women with infertility, whether engaged in ART or not, in Australia at the time of completing *Study 1*.

By engaging women with infertility who were participating or had participated in ART, and ART providers, the current research expanded work completed outside of Australia (Read et al., 2014; Spoletini et al., 2022), identifying what women with infertility may want or benefit from, when undergoing ART. *Study 2* elucidated preferences regarding group type, delivery mode, frequency and duration, content and at-home practice. The type of content preferred sat within an ACT framework, which had been under-researched. Similarly, only one research trial that utilised clinical hypnosis with women undergoing an embryo transfer was found, with significantly improved implantation rates (Levitas et al., 2006).

Given that clinical hypnosis utilised prior to embryo transfer improved implantation rates (Levitas et al., 2006) and ACT, or principles of ACT, with this patient group had also been viewed as efficacious (Gaitzsch et al., 2020; Galhardo et al., 2013, 2019; Rahimi, Abed, et al., 2018; Rahimi, Attarha, et al., 2018), I sought to develop a program based on both. As ACT complements clinical hypnosis due to the use of metaphors, mindfulness, and visualisation, and as there had been no observed exploration regarding the benefits and efficacy of ACT paired with clinical hypnosis to support women with infertility while participating in ACT, I endeavoured to develop a psychological intervention program suited to the end user – women with infertility undergoing ART.

Consultation with the end user during *Study 2*, and *Study 3,* assisted in identifying the preferences of women with infertility and ART providers, barriers to recruitment, and an eagerness for psychological support in the form a group program. The following section details how the current doctoral research program contributes to knowledge about how to support women with infertility undergoing ART and highlights the associated challenges and limitations in conducting research with this complex patient population, despite the potential value of and demand for group psychological interventions among women with infertility.

8.2.1. *The Value and Demand for Group Psychological Interventions*

A substantial and growing body of literature demonstrates the profound psychological challenges women may experience when contending with infertility and ART. Evidence indicates that stress, anxiety, depression, and pervasive feelings of isolation often accompany infertility, whether undergoing ART or not (Cousineau & Domar, 2007; Greil et al., 2010; Warne et al., 2023; Xie et al., 2023). Against that backdrop, psychological support programs—particularly those delivered in group-based formats—have emerged as critical adjuncts in the holistic care of women affected by infertility (Aghaei & Atashpour, 2015; Boivin & Gameiro, 2015; Chan et al., 2006; Domar & Dusek, 2000; Karaca et al., 2019).

The findings generated from the studies in this dissertation reinforce the significant value of group psychological interventions. Recent systematic reviews and meta-analyses (Abdollahpour et al.,

2021; Frederiksen et al., 2015; Gaitzsch et al., 2020; Katyal et al., 2021; Koochaksaraei et al., 2023; Kremer et al., 2023; Wang et al., 2022; Wang & Wang, 2022) have demonstrated that group psychological interventions are effective not only in reducing symptoms of depression and anxiety (Cousineau et al., 2008; Faramarzi et al., 2008; Shafierizi et al., 2023) but also in enhancing coping skills (Cunha et al., 2016; Lemmens, 2004), and improving quality of life in women with infertility (Li et al., 2016; Rahimi, Attarha, et al., 2018). Importantly, group-based interventions appear to offer unique benefits over individual formats, owing to the opportunities they provide for peer connection, mutual validation, and the normalisation of often stigmatised experiences (Cousineau et al., 2008; Gameiro et al., 2015; Kremer et al., 2023; Xie et al., 2023). Group interventions foster cohesion among participants, normalise the experience, reduce stigma, and are more cost-effective for individuals (Haslam et al., 2016; Pappas, 2023; Rosendahl et al., 2021). These benefits have been demonstrated across various presentations, including depression (Haslam et al., 2016; McDermut et al., 2001), anxiety (Barkowski et al., 2020), PTSD (Schwartze et al., 2019), and in fostering support to reduce social loneliness (Haslam et al., 2016).

This dissertation aimed to assist women with infertility undergoing ART and build knowledge regarding the value and desire for group psychological interventions within the setting of medically assisted reproduction by synthesising and extending findings in several ways. *Study 1* highlighted a positive association between participation in group psychological intervention programs based on CBT or mindfulness, or psychological support programs to improve anxiety, depression, and infertility stress of women with infertility who were participating in ART (Aghaei & Atashpour, 2015; Koochaksaraei et al., 2023). Several included studies documented reductions in distress, and also positive impacts on relationship satisfaction (Bokek-Cohen, 2024) and, in some cases, increased pregnancy rates (Frederiksen et al., 2015; Li et al., 2016; Nicoloro-SantaBarbara et al., 2018; Ying et al., 2016). Specifically, CBT or MBI group psychological intervention programs of 6 – 10 sessions duration, facilitated in person, were supported. Thus, *Study 1* provided the invaluable information about group program duration, treatment modality, and possible outcomes that were successfully impacted. These

findings led to the development of *Study 2* that considered the lived experience of women with infertility who had or were likely to undergo ART as well as the perspectives of ART providers.

Qualitative studies (Taebi et al., 2021) included in *Study 1*, along with *Study 2*, highlighted that women with infertility who participate in ART express a strong desire for structured counselling support. Prior research also supported the acceptability of group-based psychological intervention programs, which were viewed as providing a rare and invaluable space for open discussion, emotion processing, and shared understanding (Bedi et al., 2019; Read et al., 2014; Warne et al., 2023). The women in *Study 2* were encouraging and invested in the development of the group psychological intervention program. However, expressing an interest and a desire for the program did not translate to participation.

Despite the recruitment challenges discussed elsewhere (see *Chapter 7*), the women with infertility and experience of ART involved in *Study 2*, contributed to the development and review of the program, and provided input regarding recruitment challenges. The opinions consistently underscored a pronounced need for accessible, empathetic, and evidence-based support. Women with infertility who had or were undergoing ART described a cold and detached healthcare landscape, in which emotional needs were frequently unmet within traditional medical care. Routine care in Australia was reactive and provided on an as-needed basis, when a patient had high levels of distress.

Women with infertility expressed an interest in group-based psychological interventions that specifically acknowledge and address the unique complexities of infertility. Notably, the present research revealed that even among women with infertility who did not enrol to participate, due to logistical or emotional barriers, there was a widespread endorsement of the concept and anticipated utility of such group programs. Thus, the development, evaluation, and refinement of a group-based psychological intervention program for women experiencing infertility and ART was envisioned by recognising the needs and insights arising directly from clinical encounters and lived experience.

From a translational perspective, this dissertation advances the field by offering nuanced insights into the factors underpinning both the value and the demand for group psychological intervention programs, and by listening to those with lived experience. The findings highlight the

centrality of skill development, peer support and the therapeutic benefit of shared narratives, and the importance of normalising the distress associated with infertility. The research further articulates a clear imperative: holistic fertility care must extend beyond biomedical interventions to encompass the psychosocial dimensions of the patient experience.

At a higher level, the research presented contributes to a growing recognition of the need to integrate psychological care as a routine and adjunctive component of fertility treatment, as contrasted with the current model of care within Australia. The desire for a group psychological intervention program for women with infertility undergoing ART was present; however, translating that desire into treatment participation was challenging.

The synthesis of evidence within this dissertation affirmed the potential benefits of group psychological interventions for women with infertility undergoing ART. However, the developed program, with input from women with infertility and ART experience, could not be evaluated. By capturing the lived experiences, delineating the tangible benefits of participation in a group program, and elucidating the widespread desire for such psychological intervention and support programs, this research offers guidance for clinical practice, service development, and future research. It underscores the necessity of accessible, flexible, and empathetic support as an integral part of effective infertility care. It lays the groundwork for ongoing efforts to embed psychological support as a standard of care within fertility services. To date, however, there has been a notable gap between the evidence for these benefits and the implementation of psychological support as standard care.

8.2.2. *The Evidence-Practice Gap and Implementation Challenges*

Despite the well-established benefits of psychological support interventions for women experiencing infertility while undergoing ART (Domar et al., 2000; Domar & Dusek, 2000; Frederiksen et al., 2015; Xie et al., 2023; Ying et al., 2016), the translation of these programs from research evidence to routine clinical practice remains fraught with considerable challenges. This section critically examines the various obstacles encountered in attempting to formally evaluate the developed group

psychological intervention program, and the potential implementation of such interventions, with attention to both the procedural demands of research and the realities of clinical care.

As mentioned, *Study 1* built on previous research (Domar et al., 2000; Domar & Dusek, 2000; Frederiksen et al., 2015; Xie et al., 2023; Ying et al., 2016) and demonstrated the value of group psychological interventions for women with infertility undergoing ART. In addition, *Study 1* identified no Australian research regarding group psychological interventions for women with infertility and highlighted a paucity of research regarding the usefulness of ACT in a group format for these patients. The results additionally highlighted improvements in pregnancy rates, suggesting that women with infertility who participated in group psychological interventions were more than two times more likely to have a positive pregnancy outcome than those who did not participate.

Despite the growing body of literature showing the value and desire for group interventions, evaluating the effectiveness of such programs can be challenging. The challenges were particularly evident in the current research program. Initially, the intention was to evaluate the developed group psychological intervention in a three-arm RCT. The aim of this RCT was to compare the effectiveness of the ACT group psychological intervention program, with and without clinical hypnosis, with a waitlist control to examine the efficacy and possible amplification of benefit with the addition of hypnosis. Ideally, the research would have determined the program's effectiveness and efficacy, leading to improved mental health and pregnancy outcomes. However, despite considerable efforts over a long period of time, recruiting participants for the RCT of an in-person, group-based psychological intervention program proved too difficult within the constraints of the doctoral research.

While the literature consistently documents improvements in mental health and, in some cases, pregnancy outcomes as a result of group psychological interventions (Cousineau & Domar, 2007; Domar & Dusek, 2000; Nicoloro-SantaBarbara et al., 2018; Warne et al., 2023; Xie et al., 2023), in the current research program, substantial barriers hindered recruitment for the planned RCT. Barriers identified in *Study 3* included the eligibility requirements, program length, and it spreading across three months, and the process to express interest in participating. Furthermore, potential participants

reported concerns regarding privacy and connecting with a new therapist, the emotional intensity of group participation, time constraints arising from ongoing fertility treatments, and issues of accessibility as adversely influencing their willingness to commit to the intervention evaluation. Stigma and internalised shame associated with infertility, as well as the practical burden of frequent medical appointments, scans, and blood tests, additionally proved significant deterrents to program participation.

The decision to conduct a three-arm RCT to evaluate the group psychological intervention program was likely overly optimistic, given the nature of the research and the time constraints. Further, the women the research aimed to recruit may have been overwhelmed by the structure of the EOI, as stipulated by our ethical mandate. The need to adhere strictly to research protocols and ethical guidelines was essential, yet it may have contributed to recruitment challenges. It would seem that those requirements resulted in procedural inflexibility, limiting the capacity to adapt recruitment strategies swiftly in response to observed difficulties and potential participants' feedback. While I made amendments to recruitment methods in response to initial low enrolment, the time required for ethics amendments contributed to delays and, ultimately, to ongoing recruitment shortfalls.

This experience underscores a critical distinction between implementing group psychological interventions in research contexts and in real-world clinical practice. In the research environment, the need for methodological rigour and standardisation, although essential for generating robust evidence, can at times conflict with the responsiveness and flexibility required in clinical settings (Gray et al., 2025). In regards to this doctoral research, the desire to develop and evaluate a group psychological intervention program arose from lived experience, positionality within the patient group, and a clinical setting that does not align with the rigidity required in a research setting. Research and evaluation of proposed interventions should be the gold standard to ensure the benefits outweigh any risks and to validate that the intervention is addressing the variable it is intended to impact.

Researching the mode of treatment and applicability to the patient cohort goes some way towards ensuring safety and minimising risk of harm, while also increasing the intervention's

replicability. In clinical practice, there is often greater latitude to individualise care, adapt delivery modes, and respond to participants' evolving needs in the moment (Barkham & Mellor-Clark, 2003; Gray et al., 2025), which, while patient-centric, can lead to variability and difficulties in replicability. In this research, I wanted to minimise variability, and thus developed the group psychological intervention program manual, facilitator training manual and package, and utilised *Mentimeter* as a platform to improve fidelity and replicability. However, while replicability and accessibility were important and necessary, I found that the research constraints may have inadvertently led to the interventions being less accessible and acceptable to women with infertility undergoing ART who were my intended participants, thereby perpetuating the evidence-practice gap (Calitri et al., 2021; Docherty et al., 2021; McDonald et al., 2006).

The desire for evidence-based practice within fertility care is widely supported; however, translating evidence into practice in this case was hindered by recruitment barriers and the unique challenges inherent to women with infertility. Active treatment for infertility is itself a demanding process, and for many women, the added burden of research participation may seem insurmountable. This desire for support and the demands of engaging in the EOI process appeared too demanding for potential participants. This finding highlights a crucial paradox: while I aimed to conduct an RCT that could build the evidence necessary for effective care, the very structures and requirements of research practice, paired with a unique patient population that had other priorities, despite having a desire for such a program, impeded access to, and the practical delivery of, a potentially valuable support in the form of a group psychological intervention program.

In response, there is a growing recognition of the value of practice-based evidence as a complementary paradigm (Barkham & Mellor-Clark, 2003; Gray et al., 2025). Practice-based evidence utilises real-world clinical experience and iterative feedback to shape best practice – recognising that formal research designs may be difficult to operationalise and that participant engagement may be persistently challenged (Calitri et al., 2021; Docherty et al., 2021). The journey of this doctoral research, born out of clinical practice and shaped by lived experience, attests to the potential for clinical insights

to inform and, even actively drive, the research process. Recognising this interplay between research and practice will be essential in future research within an Australian context, while realising the full benefit of psychological interventions for women with infertility undergoing ART.

In summary, while empirical evidence increasingly supports the effectiveness of group psychological interventions (Abdollahpour et al., 2021; Bedi et al., 2019; Clifton, 2016; Domar et al., 2000; Karaca et al., 2019; Ying et al., 2016), the implementation and evaluation of these programs for women undergoing ART in research contexts remain constrained by recruitment challenges, procedural inflexibility, and the realities of participants' lived experiences. The current research and associated barriers experienced epitomise this challenge. Ensuring potential program participants could provide ongoing input into the research provided valuable information regarding how researchers and clinicians may overcome the barriers. This consultation contributed significantly to the current research and confirmed the need to involve the participant in research output. As a result, addressing these barriers will require a more dynamic and reciprocal relationship between research and practice, where practice-based evidence is afforded greater emphasis alongside traditional evidence-based paradigms (Barkham & Mellor-Clark, 2003; Bartholomew et al., 2016; Durks et al., 2017; Gray et al., 2025; King et al., 2010). Only by bridging this gap and considering a model for practice-based evidence can we hope to make such interventions accessible and meaningful for those who stand to benefit from them.

The current research program prompted a critical examination of the current routine care provision and reactive offer of psychological or counselling support within fertility care. While evidence-based practice, grounded in methodologically rigorous research and systematic reviews, has undoubtedly advanced the standardisation and quality of care and safety, contextual realities, procedural inflexibility, and the intricate lived experiences of women navigating infertility have, within this dissertation, hindered practical translation. Against this backdrop, this dissertation suggests it may be useful to consider a conceptual shift: integrating practice-based evidence as a complementary paradigm within fertility care. Practice-based evidence underpins the significance of clinical expertise, iterative adaptation, and patient feedback—elements that are essential when traditional research

designs encounter operational or engagement barriers, as repeatedly evidenced throughout this research.

8.2.3. *The Role of Lived Experience in Program Design and Refinement*

The present dissertation demonstrates the importance of integrating lived experience as a cornerstone of initial consultation and an essential and ongoing resource throughout program development and implementation. While I initially anticipated applying a co-design framework, as the research developed, I adapted my modality to focus on a modified intervention mapping approach consultation or feedback-informed approach, as co-design was beyond the scope of the current dissertation. Irrespectively, the current research program extends the discourse by evidencing the irreplaceable value of sustained, iterative engagement with participants long after the design stage has concluded, more in line with an intervention mapping framework of design.

Specifically, this research program demonstrated that embedding mechanisms for ongoing participant input—via structured and anecdotal feedback channels—can be pivotal for pre-empting and resolving practical challenges during the recruitment into psychological interventions. *Study 2* and the commentary particularly sought input from women with infertility undergoing ART to guide program development and attempted recruitment process. In considering these women across the research, the realities of participants' unpredictable lives contributed to unforeseen implementation barriers.

Anecdotal feedback, often overlooked or undervalued within conventional evidence-based paradigms, emerged as a central contributor to the developed group psychological intervention program (see *Study 2*), and informed recruitment attempts informally, as detailed in the commentary (see *Study 3*). Those narratives from the commentary revealed, for example, previously unrecognised obstacles related to privacy, the emotional weight of certain activities and unknown facilitators, and logistical issues regarding attendance. These insights enabled timely, context-sensitive adaptations to recruitment strategies, session content, and delivery modalities and exemplify the dynamic, reciprocal relationship advocated in contemporary theories of intervention mapping and person-centred care (Bartholomew et al., 2016). Notably, these adaptations were not superficial but often involved

substantive reconfiguration of program elements—demonstrating the depth of insight achievable only through authentic engagement with those for whom the intervention is intended. While *Study 2* specifically supported the development of the group psychological intervention program, including content, format, mode of delivery, and frequency, further consultation with potential eligible participants was required after RCT recruitment attempts were unsuccessful. Specifically, based on informal feedback, the program format and frequency were amended, and the nature of the research program was modified, as seen in the commentary (*Study 3*). This informal engagement also contributed to the research as it provided valuable information for future research and ways to counteract the barriers identified, while also detailing and refining the areas that require intervention for women with infertility.

In this context, the use of BCTs, as identified in *Study 2*, was systematically mapped and refined across the studies, significantly enhancing the nuanced understanding of the patient context provided by lived experience input. For instance, feedback about emotional readiness, privacy concerns, and the perceived relevance of intervention components enabled more precise matching of BCTs to participants' preferences and needs, thereby maximising engagement and efficacy.

The contribution to knowledge articulated here is twofold. First, the current research program offers empirical support for the argument that program co-design with patients is necessary; only by sustaining channels for lived experience input throughout an intervention's lifecycle can the full complexities of implementation be understood and addressed. Second, it demonstrates that person-centred, intervention-mapped programs—augmented by continuous participant feedback—are uniquely positioned to overcome engagement barriers and deliver truly responsive, patient-driven care. This approach not only enhances the fidelity and acceptability of interventions but also offers a template for future research, policy, and clinical practice in the rapidly evolving domain of fertility support.

8.3. Strengths and Limitations

The design of this dissertation reflects a deliberate integration of multiple research methodologies, each contributing distinct insights to the overall evidence base. This multiple-methods design was a strength of this work. It allowed for triangulation of findings and enhanced confidence in the results. Intervention mapping provided a systematic framework for developing, adapting, and evaluating the group psychological intervention program, ensuring fidelity to both clinical standards and participants' lived realities. The consultation process, involving ART patients and providers, underscored the value of practice-based evidence, allowing iterative adaptation of the intervention to optimise relevance and feasibility.

The participant-centred ethos permeated every stage of the research, from consultation to iterative refinement, honouring the principle that people with lived experience are partners in knowledge creation (ANZICA, 2021; Coulter & Oldham, 2016). Furthermore, the commitment to critical reflexivity—actively interrogating personal and disciplinary assumptions—served as a safeguard to minimise interpretive bias, ensuring that program adaptations remained responsive to evolving realities.

Person-centred approaches permeated all aspects of the research, from recruitment and consent through to intervention development and review, ensuring that programs were responsive to individual needs, preferences, and cultural contexts. This commitment to inclusivity is particularly significant in the Australian context, where cultural and geographic diversity shape the landscape of fertility care.

This dissertation contributes novel insights to the literature on psychosocial support in fertility care by systematically documenting the complexities of program development and engagement. The inclusion of feedback loops and adaptive protocols aligns with emergent frameworks in health research, emphasising the value of practice-based and patient-based evidence alongside controlled data (Durks et al., 2017; Gray et al., 2025). These contributions are particularly salient in the context of shifting clinical guidelines and the increasing emphasis on person-centred innovation. For example, ESHRE recommends that ART providers consider patients' preferences as paramount (Gameiro et al., 2015), and the National

Women's Health strategy emphasises co-designing interventions (Australian Government Department of Health, 2023).

While the research demonstrates notable strengths—such as inclusivity, methodological rigour, and dynamic knowledge translation—it is essential to acknowledge its limitations. It appeared that translating clinical research into a vulnerable and diverse population, such as women affected by infertility, led to recruitment challenges with some people being excluded due to the research design, or women choosing not to participate due to the program facilitators being unknown (see Chapter 7).

Despite flexible strategies taken to improve recruitment, challenges persisted, ultimately proving insurmountable and preventing the planned three-arm RCT. It was posited that although the scope of the group psychological intervention, though innovative, was primarily focused on women undergoing fertility treatment, it may not fully encompass the diverse needs of all individuals affected by infertility. Likewise, on reflection focusing on providing an in person group based psychological intervention program may have impacted on our recruitment efforts. Consideration to adjusting the program to be facilitated online may have been an appropriate option, particularly as there is increasing evidence that group programs can be facilitated effectively online (Clifton, 2016; Cousineau et al., 2008; Meyers & Domar, 2021). As the key researcher, it was likely that my personal position and opinion regarding the benefits of in person intervention may have biased my decision making in this space.

Further, the research contained other relevant potential biases. My positionality as the researcher—a woman with a history of infertility, a psychologist and a researcher—inevitably shaped decisions concerning study design, participant recruitment, and data interpretation. While I took steps to maintain transparency and interrogate assumptions, it is essential to acknowledge how personal and disciplinary perspectives may have influenced what was prioritised or omitted, as well as how I constructed meaning from the data. This complex role, while affording unique access to clinical populations and practical challenges, risked introducing subtle confirmation or desirability biases, particularly during qualitative data collection and analysis.

Methodologically, the research design faced constraints that warrant candid discussion. As documented in the commentary (*Study 3*), recruitment of participants to a three-arm RCT proved challenging and insurmountable. The desire to adhere to a strict RCT design, while minimising potential confounding variables, may have resulted in the exclusion of women who may have benefited from participating in the program. This limitation demonstrated a very real challenge with the inevitable trade-off between what is methodologically ideal and what is practically feasible. The self-selection sampling strategy for *Study 2* may have yielded participants who were more engaged or empowered, raising the possibility of response bias and limiting the generalisability of the findings. It was additionally noted that seeking the perspectives of women with infertility who had previously engaged in fertility treatment may have been a limitation as their opinions may have been influenced by their treatment outcomes and may have overestimated their capacity to attend an in person program.

While this dissertation advances the field by offering a practice-informed, critically reflexive model for future intervention development, there remains substantial scope for strengthening research moving forward. Being able to evaluate program effectiveness, with consideration of a longer-term follow-up, would be important to support the ongoing implementation of the group psychological intervention program. If effective, the program could again be modified to include a broader population of people with infertility, with the goal of becoming included as routine care for people with infertility participating in ART.

8.4. Implications for Clinical Care and Future Research

In the following section, I will detail how the body of research contributes to the clinical care of women with infertility, and how research could be conducted with this population. I aim to provide a synthesised discussion of how this research can include women with infertility at each step of intervention inception, development and delivery.

8.4.1. *Implications for Clinical Care*

Drawing upon a robust set of findings, this research offers actionable clinical insights for practitioners and fertility services supporting women with infertility. The findings show the importance

of embedding structured psychological support programs within routine care. The literature reviewed for this research program and the research itself highlighted women's desire for support, the type of support, and the evidence that group psychological interventions reduce psychological distress, foster emotional resilience, and promote communal support (Clifton, 2016; Domar et al., 2000; Katyal et al., 2021; Kremer et al., 2023; Warne et al., 2023). These outcomes directly translate into improved patient well-being and engagement.

Regarding engagement, this research highlighted the specific challenges and limitations associated with undertaking a three-arm RCT with women with infertility undergoing ART. The intervention was developed in consultation with the patient group, as mentioned, and although there was acceptability and enthusiasm, the actual readiness of women with infertility to be able to engage was low. The intervention was unique and tailored to the experiences of women with infertility undergoing ART and was developed in line with *Study 1* and *Study 2's* results in mind.

Clinicians are encouraged to adopt a multifaceted approach, integrating evidence-informed psychological support as a standard component of fertility care, as advocated by the Australian National Women's Health Strategy (Australian Government Department of Health, 2023) and the National Health and Medical Research Council [NHMRC] (Ethical Guidelines on the Use of Assisted Reproductive Technology in Clinical Practice and Research, 2017). Ideally, psychosocial support should include regular, accessible individual and group support options delivered face-to-face or via telehealth platforms tailored to patients' diverse needs and cultural backgrounds. Services are advised to leverage existing national digital health strategies and telehealth infrastructure to broaden reach, particularly for those in rural, remote, or underserved communities, in accordance with the National Digital Health Strategy (Discover the National Digital Health Strategy 2023 - 2028, 2025).

This dissertation contributed to what might be viewed as better practice for women in Australia who have infertility undergoing ART. Specifically, although individual and group psychological interventions benefit these women, there has been no research conducted in Australia regarding utilising this approach. Further, to date, there is limited research demonstrating the effectiveness of

ACT and clinical hypnosis as adjuncts to routine fertility care. This dissertation highlighted the need for a model that integrates rigorous research evidence with the realities of clinical practice. At a higher level, the research attempted to exemplify the value of recognising and systematically incorporating lived experience and clinician expertise at all stages of intervention development, implementation, and evaluation. Facilitating a more dynamic, reciprocal relationship between research protocols and real-world adaptation, allowing for timely and meaningful modifications in response to participant and ART provider feedback, was key, as was demonstrating the limitations of a strictly evidence-based practice approach. These experiences led to this research advocating for policy frameworks that utilise and value practice-based knowledge.

The research further highlights the broader implication that advancing women's health—particularly in sensitive and complex domains such as infertility—requires methodological pluralism and an openness to responding and adjusting flexibly to address barriers as they arise. The lived realities of women navigating infertility are not always amenable to research structures; as such, practice-based evidence stands as an essential counterpart to evidence-based practice, ensuring interventions are both evidence-informed and truly patient-centred.

This doctoral research supports the argument that the full potential of psychological interventions in fertility care can only be realised through a dual commitment to evidence-based and practice-based paradigms, while placing the patient at the centre. This approach will position clinical insights and lived experience not as peripheral, but as central drivers of research innovation and service delivery. This conceptual shift, as identified in the studies conducted herein and the challenges encountered during the doctoral research, constitutes a significant contribution to the field and offers a guiding framework for future research, policy, and clinical practice in fertility care.

The clinical implications of this research are deeply informed by, and contribute to, the standards set by ESHRE (Gameiro et al., 2015) on the routine integration of psychological support within fertility services. The findings reinforce the imperative for embedding structured, evidence-informed psychological programs as a standard of care—addressing the well-documented psychological distress

experienced by women navigating infertility. These recommendations resonate strongly with the Australian National Women's Health Strategy (Australian Government Department of Health, 2023), which prioritises mental health, accessibility, and culturally safe care throughout fertility treatment. The utilisation of digital health platforms and telepsychology, in accordance with the National Digital Health Strategy (Digital Health Strategy 2023 - 2028, 2025), could further extend the reach of support, particularly benefiting women in rural, remote, or otherwise underserved communities.

In summary, the clinical implications of this research are wide-reaching, emphasising the necessity for routine, inclusive, and evidence-informed psychological support for women experiencing infertility. By integrating national and international guidelines, innovative methodologies, and a person-centred ethos, this research lays a robust foundation for transformative practice and policy. The insights generated not only inform current fertility care but also chart new directions for future research.

8.4.2. *Implications for Future Research*

The implications for future research are multifaceted. First, future studies should continue to prioritise the co-production of interventions with end-users, embedding flexible feedback mechanisms that persist throughout program delivery. Methodological transparency—clearly articulating the interplay between evidence forms and acknowledging tensions—will be critical for advancing both theoretical and practical understanding (Barkham & Mellor-Clark, 2003). There is also a pressing need to expand participation to more diverse and underrepresented groups, ensuring that fertility care innovations are truly inclusive and equitable (NHMRC, 2018). Furthermore, it is important to recognise that different approaches, such as clinical hypnosis and ACT, have a place to improve the anxiety, depression, and fertility stress outcomes of women with infertility, and that these require further research.

Future research advancing the roles of clinical hypnosis and ACT within multidisciplinary and culturally attuned models of care will also be important. In *Study 2*, women with infertility endorsed the implementation of principles of ACT and the utility of clinical hypnosis. Women with infertility and ART providers agreed on the content, format, delivery mode, and frequency of a group program; however,

the inherent challenges associated with facilitating a group psychological intervention program detrimentally impacted recruitment success.

The current research encountered and systematically addressed notable challenges associated with recruiting participants in the emotionally and logistically complex context of fertility care. Despite employing flexible, person-centred recruitment strategies that engaged both clinicians and consumer networks, recruitment was unsuccessful. The findings highlight the critical importance of tailored engagement and support strategies, particularly for marginalised and hard-to-reach groups, aligning with both national policy and the ethical imperatives of the NHMRC (Ethical Guidelines on the Use of Assisted Reproductive Technology in Clinical Practice and Research 2017, 2023).

Future research in this area, exploring the utility of ACT and clinical hHypnosis, delivered in a group setting, will need to respond flexibly to the inherent barriers experienced and consider alternative options, as explored in the commentary, to improve recruitment. Consideration the research through the lens of practice-based evidence may help to reduce challenges with recruitment due to the need to strictly adhere to a research protocol, such as a RCT.

8.5. Concluding Comments

This dissertation offered valuable information about psychological support for women navigating the complexities of fertility treatment. The integration of evidence-based modalities, patient consultation, and a reflexive, person-centred ethos has yielded findings relevant to clinical practice and further research.

As such, a clear avenue for future development lies in evaluating the group psychological intervention program's acceptability and efficacy with women with infertility undergoing ART. In subsequent iterations, developing digital modalities and providing flexible participation options should further dismantle barriers—linguistic, cultural, practical, and financial—that may restrict engagement. Once evaluated, I or others may eventually extend the program to the partners of women with infertility. Infertility is frequently a shared experience, profoundly impacting relationships, levels of distress, and the broader psychosocial context of couples. Integrating partner-focused interventions and

family-based support would enhance the comprehensiveness and therapeutic efficacy of future psychological intervention programs, fostering resilience and mutual understanding during fertility treatment.

In all, the implications of this research program are multifaceted. Clinically, the findings highlight that women with infertility are interested in routine, adaptable, and culturally attuned psychological support as a standard element of fertility care. This research provides insight into the BCTs and how they can be used with ACT and clinical hypnosis. For researchers, the dissertation proposes a robust framework for iterative intervention development, grounded in collaborative feedback and an ethic of continuous improvement. Most importantly, patients and ART providers may benefit from programs such as the one developed through this doctoral research.

In conclusion, this research lays a vital foundation for ongoing innovation. It invites continued expansion of program offerings, increased support for partners, and deeper engagement with the diverse communities affected by infertility. Through sustained commitment to ethical practice and research and multidisciplinary collaboration, the contribution of this work will resonate across clinical settings, research agendas, and patients' lived realities.

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APPENDICES

Appendix A: Search Grid 1

PubMed			
Infertility	Therapy	Group	Women
"infertility, female"[MH] OR infertil*[tiab] OR non fertil*[tiab] OR unfertil*[tiab] OR subfertil*[tiab] OR sub fertility[tiab] OR steril*[tiab] OR infecund*[tiab] OR childless*[tiab] OR barren[tiab] OR unbearing[tiab] OR unfruitful[tiab] OR nonproductive[tiab] OR non productive[tiab] OR secondary infertility[tiab] OR sub fertilit*[tiab] OR "reproductive techniques, assisted"[mh]	"Psychotherapy"[mh] OR "mind-body therapies"[mh] OR "cognitive behavioral therapy"[mh] OR hypnos*[tiab] OR cognitive therap*[tiab] OR cognitive behav*[tiab] OR CBSM[tiab] OR CBT[tiab] OR cognitive psychotherap*[tiab] OR ACT[tiab] OR acceptance and commitment therapy[tiab] OR mind-body*[tiab] OR mindful*[tiab] OR psychosoc*[tiab] OR psychoeducat*[tiab] relaxation therap*[tiab] OR autogenic training*[tiab] OR mindfulness-based*[tiab] OR stress manag*[tiab] OR internet-based*[tiab] OR online intervention*[tiab] OR skills training*[tiab] OR relaxation training*[tiab] OR "internet-based intervention"[mh] OR MBSR[tiab] OR MBCT[tiab]	"psychotherapy, group"[mh:noexp] OR group psychotherap*[tiab] OR group therap*[tiab] OR group work*[tiab] OR group*[tiab] OR skills training program*[tiab] OR group therap*[tiab]	"women"[mh] OR wom*[tiab] OR mother*[tiab] OR female*[tiab] OR wife[tiab] OR wife*[tiab] OR wive*[tiab]
PsychInfo			
Infertility	Therapy	Group	Women

infertility.sh OR infertil*.mp OR non fertile.mp OR unfertile.tw. OR subfertil*.tw OR steril*.tw OR infecund*.tw OR childless*.tw OR barren.tw OR unfruitful.tw OR exp reproductive technology OR secondary infertility.tw OR nonproductive.tw OR non-productive.tw	Exp cognitive therapy OR cognitive therap*.tw OR Exp mindfulness-based interventions OR Exp mindfulness OR Exp mind-body therapy OR mind-body therapy.mp OR mindfulness.mp OR Exp cognitive behavior therapy OR cognitive therapy.mp OR cognitive-behavapy.mp OR Exp stress management OR CBSM.tw OR CBT.tw OR cognitive psychotherap*.tw OR psychoeducation.mp OR exp hypnotherapy OR hypno*.tw OR stress management.mp OR Exp psychotherapy OR psychotherapy.mp OR exp relaxation therapy OR relaxation therapy.mp OR exp psychoeducation OR ACT.mp OR (acceptance and Commitment Therapy).sh OR (acceptance and commitment therapy).mp OR cognitive techniques.mp OR MBSR.tw OR MBCT.tw OR autogenic training.mp OR Exp treatment OR intervention.mp OR psychosocial.mp OR internet-based.mp OR Exp online therapy OR (psychological intervention).mp OR internet-based*.tw	(group therapy).sh OR exp group psychotherapy OR group*.tw OR group interventions.mp OR group intervention.mp OR group therapy.mp OR exp group intervention OR group psychotherapy.mp OR group work.mp OR skills training program*.tw	exp human female OR human female*.mp OR exp mothers OR mother*.mp OR women*.tw OR woman*.mp OR maternal*.mp OR female*.mp OR wife*.mp OR wive*.mp

Web of Science

Infertility	Therapy	Group	Women
(“female infertility” OR infertil* OR nonfertile OR “non fertile” OR nonfertility	(“cognitive therap*" OR “cognitive behav*” OR “mindful* based cognitive therap*” OR “cognitive behav* stress management” OR	(“group therap*” OR “group intervention*” OR “group psychotherap*” OR “skills	(women* OR woman* OR mother* OR maternal* OR female* OR wife* OR wives*)

OR “non fertility” OR unfertile OR unfertility OR subfertile OR subfertility OR “sub fertile” OR “sub fertility” OR sterile OR sterility OR infecund OR infecundity OR childless* OR barren OR unfruitful OR “non-productive” OR “non productive” OR “secondary infertility”)	CBSM OR CBT OR “cognitive psychotherap*” OR MBSR OR MBCT OR hypno* OR “clinical hypno*” OR ACT OR acceptance* OR internet-based* OR mindfulness-based* OR online* OR psychoeducation* OR “psychosocial intervention*” OR “psycho* intervention* OR “mindfulness based*”)	training program*” OR “relaxation skills training program*” OR group* OR “support group”)

CINAHL

Infertility	Therapy	Group	Women
MH infertility+ OR TI infertil* OR AB infertil* OR TI nonfertile OR AB nonfertile OR TI non-fertile OR AB non-fertile OR TI unfertile OR AB unfertile OR TI subfertil* OR AB subfertil* OR TI sub-fertil* OR AB sub-fertil* OR TI sterile OR AB sterile OR TI sterility OR AB sterility OR TI infecund* OR AB infecund* OR TI childless* OR AB childless* OR TI	MH “cognitive therapy+" OR MH psychotherapy+ OR TI “cognitive therap*" OR AB “cognitive therap*” OR TI “cognitive behav*” OR AB “cognitive behav*” OR TI “mindful*” OR AB “mindful*” OR TI “stress management” OR AB “stress management” OR TI CBSM OR AB CBSM OR TI CBT OR AB CBT OR TI psychotherap* OR AB psychotherap* OR AB ACT OR TI ACT OR TI MBSR OR AB MBSR OR TI hypno* OR AB hypno* OR TI “clinical hypno*” OR AB “clinical hypno*” OR TI	MH “group therapy+” OR TI “group therap*” OR AB “group therap*” OR TI “psychotherap* group*” OR AB “psychotherap* group*” OR TI group* OR AB group* OR TI “support group” OR AB “support group” OR TI “skills training*” OR AB “skills training*”	MH women OR MH mothers OR MH motherhood OR TI women OR AB women OR TI mother* OR AB mother* OR TI maternal OR AB maternal OR MH female OR TI

barren OR AB barren OR TI unfruitful OR AB unfruitful OR TI non-productive OR AB non-productive OR AB "secondary infertility" OR TI "secondary infertility" OR MH "Embryo Transfer" OR MH "Reproduction Techniques+" OR TI non productive OR AB non productive	“internet-based” OR AB “internet-based” OR TI "online treatment*" OR AB “online treatment*” OR TI “online therap*” OR AB "online therap*" OR TI psychoeducation OR AB psychoeducation OR AB “psychosocial intervention*” OR TI “psychosocial intervention*” OR AB “psychological intervention*” OR TI "psychological intervention*"	MH group OR (second run)	female OR AB female OR TI wife OR AB wife OR TI wives OR AB wives OR TI woman OR AB woman OR MH human

Infertility	Therapy	Group	Women
“female infertility”/exp OR “female infertility”/syn OR “female infertil*”:ti,ab OR nonfertile:ti,ab OR “non fertile”:ti,ab OR nonfertility:ti,ab OR “non fertility”:ti,ab OR unfertile:ti,ab OR unfertility:ti,ab OR subfertile:ti,ab OR “female subfertility”:ti,ab OR “sub fertile”:ti,ab OR “sub fertility”:ti,ab OR sterile:ti,ab OR sterility:ti,ab OR infecund:ti,ab OR infecundity:ti,ab OR childless*:ti,ab OR barren:ti,ab OR unbearing:ti,ab OR unfruitful:ti,ab OR ”secondary	“cognitive therapy” OR ”cognitive therap*”:ti,ab OR “cognitive behav* therap*”:ti,ab OR “mindful* based cognitive therap*”:ti,ab OR “cognitive behav* stress management”:ti,ab OR CBSM:ti,ab OR CBT:ti,ab OR ACT:ti,ab OR MBSR:ti,ab OR MBCT:ti,ab OR “cognitive psychotherap*”:ti,ab OR internet-based*:ti,ab OR psychotherapy”/exp OR “psychotherapy”/syn OR “relaxation training”/exp OR “relaxation training”/de OR “mindfulness”/exp OR “mindfulness”/de OR “cognitive behavior therapy”/exp OR “cognitive behavior therapy”/de OR “stress management”/de OR “autogenic training”/de OR “psychosocial intervention”/de OR “cognitive-behavioural intervention”/de OR “acceptance	group*:ti,ab OR “support group”/exp OR groupwork/de OR “group program”/de OR “group therapy”/de OR “group therapy”/syn OR “skills training program*”:ti,ab	female/de OR mother/de OR female:ti,ab OR mother:ti,ab OR motherhood:ti,ab OR womanhood:ti,ab OR maternal:ti,ab OR wife:ti,ab OR wives:ti,ab OR human/de OR human/exp

infertility”/de OR “secondary infertility”:ti,ab OR “nonproductive”:ti,ab OR non-productive:ti,ab	and commitment therapy”/exp OR “mindfulness-based stress reduction”/de OR psychoeducation*:ti,ab OR “psychosocial intervention*”:ti,ab OR “psychological intervention*”:ti,ab OR “web based intervention”/exp OR “web based intervention”/syn

Appendix B: Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Pg 1,
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Pg 2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Pg 4 – 6
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Pg 6- 7
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Pg 7
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Pg. 7
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Pg 7 and supplementary table 2
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Pg, 8, 9, 10, 11
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.,	Pg. 8

Section and Topic	Item #	Checklist item	Location where item is reported
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Pg. 8, 9
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Pg. 8, 9
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Pg. 8, 9
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Pg 9
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Pg. 9
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Pg. 7, 8
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	See pg. 10, Pg. 14 – Table 1
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Pg. 9, 10, 11
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Pg. 8, 9
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Pg. 8, 9
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Pg. 9,
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Pg. 9,
RESULTS			

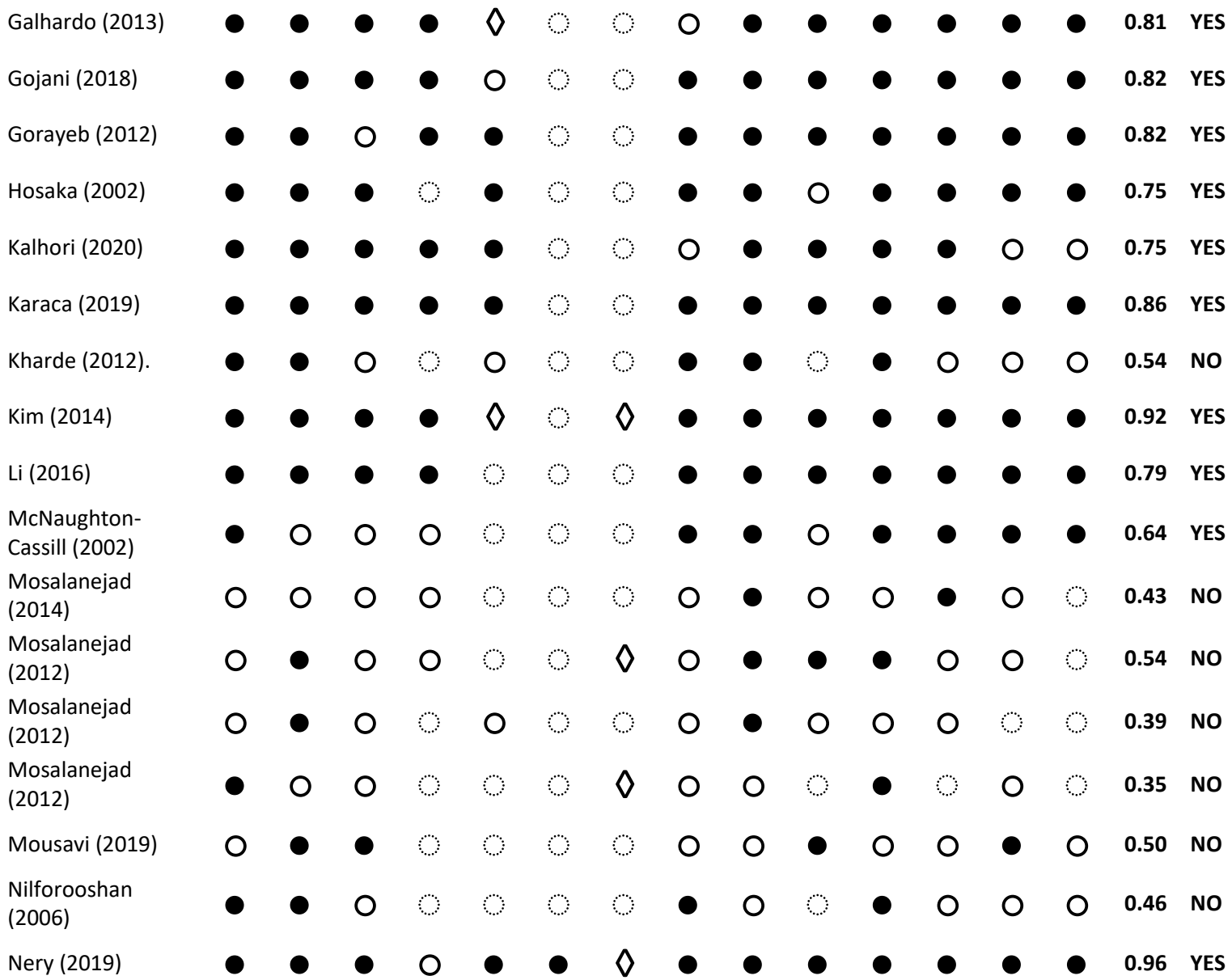
Section and Topic	Item #	Checklist item	Location where item is reported
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Pg. 9, 10, Figure 1 - PRISMA flow chart
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Pg. 10
Study characteristics	17	Cite each included study and present its characteristics.	Table I – Included Studies Characteristics ; Pg. 13
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	See Table 3, 4, 5, 6, 7 and text on pg. 21 - 23
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	See Table 3, 4, 5, 6, 7
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	See Table 3, 4, 5, 6, 7
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	See Table 3, 4, 5, 6, 7
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	See Table 3, 4, 5, 6, 7, and pg. 21 - 23
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	See Table 3, 4, 5, 6, 7

Section and Topic	Item #	Checklist item	Location where item is reported
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	See Table 3, 4, 5, 6, 7
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	See Table 3, 4, 5, 6, 7 pg 21-23
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Pg 23- 26
	23b	Discuss any limitations of the evidence included in the review.	Pg. 26
	23c	Discuss any limitations of the review processes used.	Pg. 26
	23d	Discuss implications of the results for practice, policy, and future research.	Pg 26, 27
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Pg 7
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Pg 7
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Pg. 7
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Pg 27
Competing interests	26	Declare any competing interests of review authors.	Pg 27
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Pg. 27

Appendix C

Evaluation of Reporting Quality of Potentially Eligible Studies

	Question Number															
Lead Author	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**Score**	**Included**
Shargh (2016)	○	○	○	○	○	◌	◊	○	○	○	○	◌	○	○	**0.42**	**NO**
Ahmadi (2019)	●	●	●	○	○	◌	◌	●	●	●	○	○	●	●	**0.71**	**YES**
Bai (2019)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**1.00**	**YES**
Chan (2012)	●	●	●	●	●	◌	◌	●	●	●	●	●	●	●	**0.86**	**YES**
Chan (2006)	●	●	●	●	●	◌	◌	●	●	●	○	●	●	●	**0.82**	**YES**
Domar (2000)	●	●	●	●	●	○	◌	●	●	●	●	○	●	●	**0.86**	**YES**
Domar (2000)	●	●	●	●	●	◌	◌	●	●	●	●	●	●	●	**0.86**	**YES**
Domar (2011)	●	●	●	●	●	◌	○	●	○	●	○	●	●	●	**0.82**	**YES**
Ehsan (2019)	○	●	●	●	●	◌	◌	●	○	●	●	●	●	●	**0.79**	**YES**
Faramarzi (2008)	●	●	●	●	◌	◌	◌	●	●	●	●	●	●	●	**0.79**	**YES**
Faramarzi(2008)	●	●	●	●	●	◌	◌	●	●	●	●	●	●	●	**0.86**	**YES**
Faramarzi (2013)	●	●	●	●	●	○	◌	●	●	●	●	●	●	●	**0.89**	**YES**


Galhardo (2013) 0.81 YES
Gojani (2018) 0.82 YES
Gorayeb (2012) 0.82 YES
Hosaka (2002) 0.75 YES
Kalhori (2020) 0.75 YES
Karaca (2019) 0.86 YES
Kharde (2012). 0.54 NO
Kim (2014) 0.92 YES
Li (2016) 0.79 YES
McNaughton-Cassill (2002) 0.64 YES
Mosalanejad (2014) 0.43 NO
Mosalanejad (2012) 0.54 NO
Mosalanejad (2012) 0.39 NO
Mosalanejad (2012) 0.35 NO
Mousavi (2019) 0.50 NO
Nilforooshan (2006) 0.46 NO
Nery (2019) 0.96 YES

Nilforooshan (2006)	●	○	○	○	◌	◌	◌	○	○	○	●	○	○	○	**0.46**	**NO**
Paiva (2015)	●	●	◌	◌	◊	◌	◊	●	●	●	●	◌	●	●	**0.67**	**YES**
Pasha (2018)	●	●	●	●	●	◌	◌	●	●	●	●	●	●	○	**0.82**	**YES**
Pasha (2017)	●	●	●	●	○	◊	◌	●	●	●	●	●	●	○	**0.85**	**YES**
Pasha (2013)	●	●	●	●	○	○	◌	●	●	●	○	●	○	●	**0.79**	**YES**
Psaros (2015)	●	●	●	●	◊	◊	◊	●	○	●	●	◌	●	●	**0.86**	**YES**
Rahimi (2018)	●	●	●	●	●	○	◌	○	●	●	●	●	●	○	**0.82**	**YES**
Rahimi (2019)	●	●	●	●	●	○	◌	○	●	●	●	●	●	○	**0.82**	**YES**
Terzioglu (2018)	●	○	●	●	◌	◌	◌	●	○	●	○	◌	○	○	**0.54**	**NO**
Zahra (2019)	●	●	●	○	○	◌	◌	●	○	●	●	●	●	●	**0.75**	**YES**
Zhang (2017)	●	●	○	○	○	◌	◌	●	●	●	●	●	●	○	**0.71**	**YES**
% meeting criteria	85%	85%	70%	60%	43%	5%	3%	73%	75%	78%	78%	68%	73%	60%		

Number of Studies meeting the quality criteria >.55	30
Number of Studies excluded due to low quality <.55	10
Overall average quality rating of rated studies	73%

Key ● – YES ○ – Partial ◌ - No ◊ - N/A

Appendix D

Intervention Overview

	Intervention						
Intervention Components	**Cogntive Behavioural Therapy**	**Mindfulness-based Interventions**	**Acceptance and Commitment Therapy**	**Behavioural Therapy**	**Relaxation and Stress Reduction**	**Problem Solving/ Positive Reappraisal Coping Intervention**	**Psychoeducation/Stress Reduction**	**Positive Psychology**
	Identifying, challenging and restructuring negative thoughts	Overview of infertility	Mindfulness	Listening	Information about infertility	Problem identification	Concepts of stress	Self understanding
	Concepts of behavioural therapy	Introduction to mindfulness	Value identification	Reinforcement-punishment	Stress impact on fertility	Recognition of most important problem	Stress coping	Ideal self identification
	Identifying challenging emotions	Barriers to mindfulness	Committed action	Verbal and non verbal communication	Stress reduction	Brainstorming	Stress in infertile women	Gratitude
	Progressive muscle relaxation	Understanding distress in infertility	Defusion	Cognitive errors	relaxation training	Disadvantages and advantages of solutions	Immune function	Intimacy

Psychoeducation regarding infertility	Benefits of Mindfulness	Acceptance	Problem solving	Imagery	Evaluation of solutions	The relationship between immune and stress	Finding meaning
Diet and behaviour	Mindfulness exercises (formal and informal)	Self as context	Behavioural activation	Relationships and gender Diet and stress	Developing positive, reappraisal statements		Describing happy events