

Differential efficacy of group and individual/couple psychotherapy with infertile patients

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BACKGROUND: The diagnosis of infertility and concurrent medical treatment may inflict an array of negative emotional symptoms in infertile persons. Evidence for the positive effects of psychotherapy on negative affect and also possible influence on conception rates has been discussed in several studies. **METHOD:** Meta-analyses were conducted in order to evaluate the efficacy of group and individual/couple therapies on (i) the reduction of negative emotional symptoms, and (ii) the possible promotion of pregnancy. **RESULTS:** Group and individual/couple psychotherapy led to a decrease in feelings of anxiety. Upon termination of psychotherapy, a reduction of depressive symptoms in patients was greater after 6 months. Psychotherapy accompanying IVF treatment yielded similar conception success rates to psychological interventions administered to patients not in specific medical care. **CONCLUSION:** Results are suggestive of positive effects of psychotherapy for infertile patients. However, these results must be viewed with caution due to methodological and informational bias within the studies analysed.

Key words: infertility/IVF/meta-analysis/psychotherapy

Introduction

Fecundity and giving birth to a child define the essence of life for many couples. However, the World Health Organization (1992) reports that ~8–10% of women and couples worldwide experience infertility. The assisted reproductive technology of choice, IVF, is successful in an estimated 25.2% of cases (National Center, 1999). Studies have shown that the psychological impact of failed IVF treatment induces emotional distress, such as anxiety and depression in women and couples (Strauss *et al.*, 1991, 2000, 2001). Although the relevance of psychological treatment for infertile individuals has discarded its shroud of novelty since the advocacy work of Barbara Eck Menning (1980), one could conclude otherwise due to the apparent scarcity of intervention studies in the field of infertility. In her extensive systematic review, Boivin (2003) recognized and highlighted this dire need for evaluative studies and she analysed all existing research in this field. From the 380 studies appraised, 25 could be classified as independent studies and, due to lack of adequate control groups, only eight met the minimum quality research standards. In essence, results indicated positive effects of psychotherapy for infertile patients. The systematic psychological findings for all Boivin's evaluation studies revealed that psychosocial interventions successfully palliated negative affect in infertile women and couples, but were less likely

to influence interpersonal functioning. Furthermore, the evaluation of the quality studies indicated that psychosocial interventions had little influence on pregnancy rates.

Without prior knowledge of the Boivin (2003) study, the authors of this paper independently sought to supply evidence of the efficacy of psychological interventions for infertility patients in an earlier, larger scale unpublished thesis. This paper introduces an extract from this work. In comparison to the Boivin (2003) systematic review, the aim of this study was to provide a meta-analytic review of the available statistical evidence for the efficacy of psychotherapy on infertile patients. Commencing with an expansive search for studies, the following questions were investigated: do group and individual/couple psychotherapies for infertile patients (i) reduce anxiety and depression and/or (ii) possibly promote pregnancy in infertile women?

Special attention will be given to group and individual/couple psychotherapy administered within the realm of the medical treatment regimen. Past research on differences between group and individual/couple therapies has shown both types to be of similar effectiveness when compared to each other (McRoberts *et al.*, 1998), and that psychotherapy is significantly more effective than no treatment or minimal treatments for a variety of disorders (Smith *et al.*, 1980; Fuhrman and Burlingame, 1994a,b; Lambert and Bergin, 1994; Lipsey and Wilson, 1993).

Materials and methods

Search strategy

A computerized Internet and local database search was performed using the following key words: 'psychotherapy and infertility', 'psychotherapy and involuntary childlessness', 'infertile couples and infertility'. The bibliography of the studies found by the search was probed for references of further trials. Other search attempts involved contacting authors and experts for literature recommendations and recovering missing data. The selection criteria included prospective studies from both published and unpublished sources, thus permitting an expansive search and preventing potential upward bias of published studies. The time frame was limited to studies from 1979 to 2003. Specific outcome key variables should report pregnancies and the reduction of negative affect, defined in this case as anxiety (Harlow *et al.*, 1996; Strauss *et al.*, 2000) and depression (Domar *et al.*, 1992; Strauss *et al.*, 2000) preceding or accompanying infertility treatment. The selection criteria further dictated that the sample of research respondents stemmed from clinics or private practice. The samples selected should reflect the typical population seeking infertility treatment: Caucasian, upper-middle class couples and women (Jordan and Revenson, 1999). Finally, the inclusion of sufficient statistical information was obligatory in order to permit calculation of ES. These include means and SD. Studies that do not report on these values are deemed 'incompatible', and thus not usable. Ideally, the studies should display a one-group pre-test/post-test design, randomization, as well as treatment and control groups.

Statistical analysis

The meta-analyses were carried out according to Lipsey and Wilson (2001) by generating (independent) sets of effect sizes (ES), testing for homogeneity of distribution and investigating sources of variance using a Fixed Effects Model (Hedges, 1994; Hedges and Vevea, 1996; Overton, 1998). ES denote the strength and magnitude of psychotherapy or other interventions on patients and correspond to the widely used convention for the magnitude of effect sizes, i.e. small: $ES \leq 0.20$; medium: $ES = 0.50$; large: $ES \geq 0.80$ (Cohen, 1977, 1988). Accordingly, SE and weighted inverse variance weights (WE) were computed to control for potential influences caused by uneven sample sizes.

In order to maximize the potential computing advantage from the study pool, two different statistical formulas were computed. First, for the reduction of anxiety and depression, the pre-post contrast effect size statistic is used to compare the central tendency on a variable measured at one point in time (t_1) with the central tendency of the same variable measured at a later point in time (t_2). This 'standardized mean gain statistic' standardizes differences between samples and aims to examine change (Becker, 1988).

Secondly, the possible effect of psychotherapy on conception may be described as a one-variable relationship and measured as the 'proportion effect size statistic'. This central tendency statistic denotes the amount of a sample that reportedly became pregnant following psychotherapy treatment. Its values range from 0.0 to 1.00 and it provides an estimate for the mean proportion across studies. In order to avoid compression of the SE when a proportion nears 0 or 1, the logit method was chosen for value flexibility (Lipsey and Wilson, 2001). However, for ease of interpretation, logit values are transformed back to proportion ES in a final step. The rate of reported pregnancies was further differentiated between treatment and control groups.

The Q-test screens the computed ES for homogeneity. This test is based on the Q-statistic, distributed as a χ^2 with $k-1$ degrees of freedom (k = number of ES) (Hedges and Olkin, 1985). We assume

that an effect size observed in a study estimates a so-called population effect while containing sampling error. Therefore, a homogeneous distribution implies that the dispersion of ES around their mean is no greater than expected from sampling error alone (H_0). However, significant results denote that the variability of ES around their mean is larger than would be expected from sampling error alone. The ES are heterogeneous and the variability may be spawned by other (unknown) sources of variance (H_1). Excess variability can be explained by showing that it is associated with moderator variables that systematically differentiate studies with larger and smaller ES. If differences in ES are associated with moderator variables, what remains will only be subject level sampling error.

In the initial step, the overriding hypothesis of homogeneity will test the entire distribution of ES separately for the reduction of anxiety, reduction of depression, and for the promotion of pregnancy. This will be called the psychotherapy total homogeneity test. Subsequently, this Fixed Effects Model and the corresponding analysis of variance (ANOVA)-Analog (ANOVA-Analog, Lipsey and Wilson, 2001) will attempt to evaluate possible systematic variation using the above-mentioned moderator variables. The moderator variables were selected according to computed qualitative and quantitative mean values extracted from the studies. The chosen ANOVA categorical moderator variables are as follows: psychotherapy type (group/individual/couple), number of psychotherapy sessions (<9 sessions, >10 sessions), follow-up time (<6 months, >6 months), as well as the additional moderator variable psychotherapy-supported IVF versus psychotherapy alone without specific medical treatment for the promotion of pregnancy. Ultimately, a *post hoc* descriptive comparison is made between the computed ES for the reduction of negative emotional symptoms and for the rate of conception in relation to the moderator variables investigated.

Results

A compilation of 66 studies met at least one of the inclusion criteria. However, only 35 of these studies included quantitative values. Nine studies did not report statistical data sufficient for computing ES and four studies utilized instruments whose values were of a qualitative nature. The pool of eligible studies comprised six studies aimed at the reduction of negative emotional symptoms, 11 interventions geared towards pregnancy rate effectiveness, and a final five studies evaluated psychotherapy efficacy for both the reduction of anxiety/depression and conception promotion. A total of 22 studies were allocated for evaluation.

Reduction of anxiety and depression

Seven individual and couple psychotherapies and four group psychotherapies fulfilled selection criteria and could be evaluated. The intervention customarily took place in a clinical setting. Emery *et al.* (2001), Strauss *et al.* (2001) and Wischmann (1998) aimed to reduce negative affect through individual and couple counselling. Bents (1991) and Tuschen-Caffier *et al.* (1999) attempted to truncate negative symptoms through cognitive behavioural concepts for individuals and couples. Takefman *et al.* (1990) administered other individual/couple interventions by presenting their participants with preparatory information on infertility and IVF procedures, and Connolly *et al.* (1993) combined both counselling and information concepts. Domar *et al.* (1999) and

Galletly *et al.* (1996a) offered their participants cognitive behavioural comprehensive group programmes. Finally, McNaughton-Cassill *et al.* (2000) and Stewart *et al.* (1992) based their intervention on anti-stress support groups.

Participants

Treatment group couples and women consisted of individuals specifically seeking medical support and psychotherapy. The average age across studies for women and couples was 33 years. Strauss (1991) maintains that psychological factors are most likely to be found in idiopathic infertility, or in an 'unknown' genesis, as found in the studies by Tuschen-Caffier *et al.* (1999) and Wischmann (1998). Other studies described their sample as having multiple infertility origins (Bents, 1991; Domar *et al.*, 1999; Strauss *et al.*, 2001). Patients were classified as suffering from either primary infertility and/or secondary infertility in the following studies: primary infertility (Takefman *et al.*, 1990; Bents, 1991; Galletly *et al.*, 1996a; Wischmann *et al.*, 1998; Tuschen-Caffier *et al.*, 1999; Emery *et al.*, 2001; Strauss *et al.*, 2001), and both primary and secondary infertility (Stewart *et al.*, 1992; Connolly *et al.*, 1993; Domar *et al.*, 1999; McNaughton-Cassill *et al.*, 2000).

Bents (1991), Takefman *et al.* (1990) and Domar *et al.* (1999) reported that their therapy participants were married. The average duration of a relationship was 8 years (Bents, 1991; Emery *et al.*, 2001). With regard to level of education, Domar *et al.* (1999) report that their 132 women participants have a mean of 17.1 (SD = 2.0) years of education completed, indicating a higher level of career qualification.

Psychological measures

The studies shared similar self-report measurement instruments in the evaluation of emotional symptoms. The most commonly used instrument was the State-Trait Anxiety Inventory (STAI) (Spielberger *et al.*, 1970; Spielberger, 1988), which assesses situation-induced (state) and personality latent (trait) anxiety. STAI was administered to patients in the studies of Takefman *et al.* (1990), Connolly *et al.* (1993) and Emery *et al.* (2001). Aside from STAI, Connolly (1993) also provided the Profile of Moods Scale (McNair, 1971) to assess fluctuating affective states of depression. Beck's Depression Inventory (Beck and Steer, 1987), as well as the Symptom Checklist (Revised) (SCL-90-R) (Derogatis, 1977), designed to assess psychological distress, were both administered by Domar *et al.* (1999). Wischmann (1998) and Strauss *et al.* (2001) utilized the SCL-90 for the parallel collection of anxiety and depression data. Stewart *et al.* (1992) chose the Brief Symptom Inventory (Derogatis and Spencer, 1982) for affect assessment. Bents (1991) employed the Emotional Inventory-State (Ullrich and Ullrich DeMuynch, 1977), in order to attain information on specific emotional stress reactions, including anxiety and depression. Galletly *et al.* (1996a), utilized the Hospital Anxiety and Depression Scale (Zigmond and Snaith, 1983), and McNaughton-Cassill (2000) distributed self-report questionnaires generally to infertile patients within the Wilford Hall Medical Center, Texas to rate anxiety and depression. Ultimately, Tuschen-Caffier *et al.*

(1999) incorporated a specialized Kognitionen bei Infertilität: Entwicklung und Validierung eines Fragebogens (KINT) questionnaire (Pook *et al.*, 1999), which was developed in order to assess infertility-specific cognitions significantly correlated to depression.

Study design

Three comparison groups were defined as 'Wait-List' controls (Bents, 1991; Wischmann, 1998; Strauss *et al.*, 2001). Wischmann (1998) and Strauss *et al.* (2001) formed comparison groups by combining wait-list subjects, non-compliers to psychotherapy, as well as patients pursuing routine medical care into comparison 'pools'. Other researchers re-grouped treatment subjects who failed to return final data into *post hoc* control groups (Galletly *et al.*, 1996a). Finally, studies relied on control participants in routine medical care (Stewart *et al.*, 1992; Tuschen-Caffier *et al.*, 1999; McNaughton-Cassill *et al.*, 2000; Emery *et al.*, 2001). Five comparison group studies relied on randomization of subjects (Wallace, 1984; Takefman *et al.*, 1990; Connolly *et al.*, 1993; Emery *et al.*, 2001; Strauss *et al.*, 2001). Four studies refrained from randomization and integrated routine care control subjects (Stewart *et al.*, 1992; Tuschen-Caffier *et al.*, 1999; McNaughton *et al.*, 2000), or including therapy drop-out participants (Galletly *et al.*, 1996a).

Quantitative findings

Using the standardized mean gain, separate computations were made for treatment groups, control groups, group/individual/couple psychotherapy for anxiety (Table II) and depression (Table III).

The hypothesis of homogeneity for the entire distribution of ES yielded heterogeneous ES for both the anxiety and depression sets of studies (Q -values: anxiety: 5766.88, depression: 1618.70; $\chi^2 = 16.919$, $df = 9$, $P < 0.05$). The results of moderator variables utilized in the ANOVA-Analog were recorded as the Q -between value. This is given as the critical value of χ^2 at $P < 0.05$ and understood as the number of categories minus 1 [χ^2 of 3.841, $df = 1$]. The moderator variables utilized in the ANOVA-Analog revealed that with regard to anxiety, the Q -value (4.68) for psychotherapy type (group/individual/couple) suggests significance in explaining effect size variance. This small between-groups effect is reflected in the weighted mean ES for individual/couple therapy (ES = 0.17) and group therapy (ES = 0.36), and suggests that both psychotherapy types yield positive effects for patients. Non-significant values were found for the moderator variables number of psychotherapy sessions (Q -value 0.82) and follow-up time (Q -value 0.40). They both did not contribute significantly to explained effect size variance.

Investigating studies measuring depression revealed only one of the three moderator variables to be significant. The mean follow-up interval (Q -value 6.94) suggests that a significant contribution to explained effect size variation may be given ($\chi^2 = 3.841$, $df = 1$, $P < 0.05$). The weighted mean effect size for follow-up after the 6 months marker following therapy termination (ES = 0.42) was greater than the value computed for the follow-up measured within the 6 months

Table I. Studies used

Study	Intervention	TG	CG	Duration ^a	Follow-up sessions	Psychological instrument ^b		Pregnancy measured
						Anxiety	Depression	
Individual/couple psychotherapy								
Bents, 1991	CB counselling	19 C	Wait list (19 C)	15	4 and 8 months	EMI-B	EMI-B	yes
Brandt and Zech, 1991	CB counselling	15 F	–	4	10 months			yes
Connolly <i>et al.</i> , 1993	Information and counselling	76 C	Only Info (76 C)	3	6 weeks	STAI-S	POMS	no
Höelze <i>et al.</i> , 2001	Resource counselling	30 C	Routine care (30 C)	1	6 weeks	STAI-S	BDI	yes
Höelze <i>et al.</i> , 2001	Focal counselling	24 C	Wait list 24 C	7	3 months			yes
Sarrel and DeCherney, 1985	Hypnotherapy	40 F	–	10	14 months			yes
Sarrel and DeCherney, 1985	Psychoanalytic counselling	10 C	Routine care 10C	1	18 months			yes
Strauss <i>et al.</i> , 2001	Focal counselling	12 C, 20 F	Wait list 6 F, 6 C and 17 C	9	4 months	SCL-90	SCL-90	yes
Takefman <i>et al.</i> , 1990	Preparatory information	13 C and 13 C	13 C	1	6 months	STAI-S	–	yes
Tuschen-Caffier <i>et al.</i> , 1999	CB sex therapy	17 C	Routine care 12 C	24	12 months	–	KINT	yes
Wischmann, 1998	Focal counselling	95 C, 24 C, 18 F, 2 M	Wait list 21 C, 2 F, 2 M	10	3 months	SCL-90	SCL-90	no
Group psychotherapy								
Christie and Morgan, 2000	Psychoanalytic	35 F	–	32	–			yes
Clark <i>et al.</i> , 1995, 1998	CB comprehensive	13 F	Drop-outs, 5 F	24	12 months			yes
Domar <i>et al.</i> , 1990	CB comprehensive	54 F	–	10	6 months			yes
Domar <i>et al.</i> , 1992	CB comprehensive	50 F	–	10	6 months			yes
Domar <i>et al.</i> , 1999	CB comprehensive	132 F	–	10	6 months	SCL-90	BDI	yes
Domar <i>et al.</i> , 2000	CB comprehensive	95 F	Routine care 25 F	10	6 months			yes
Galletly <i>et al.</i> , 1996a	CB comprehensive	64 F	Drop-outs, 32 F	24	12 months	GHH	GHH	no
Galletly <i>et al.</i> , 1996b	CB comprehensive	20 F	17 F	24	28 months			yes
McNaughton-Cassill <i>et al.</i> , 2000	CB anti-stress	17 C	Routine care 25 C	10	6 weeks	In-house Q	In-house Q	no
Stewart <i>et al.</i> , 1992	Anti-stress support	25 M, 39 F	Routine care 35 C	8	2 months	BSI	BSI	no

^aSessions counted as once per week.^bPsychological instruments used explained in text.

TG = treatment group; CG = comparison group; C = couples; F = females; M = males; CB = cognitive behavioural; EMI = Emotional Inventory-State; STAI = State Trait Anxiety Inventory; SCL = Symptom Checklist; BSI = Brief Symptom Inventory; POMS = Profile of Moods Scale; BDI = Beck's Depression Inventory; KINT = Kognitionen bei Infertilität: Entwicklung und Validierung eines Fragebogens; GHH = General Hospital Health Scale.

following therapy termination ($ES = 0.11$). The moderator variables psychotherapy type (Q -value 0.66) and number of psychotherapy sessions (Q -value 0.01) were non-significant, and thus could not explain unknown variance. ES for comparison groups were routinely computed but could not be directly compared to the treatment values due to missing reciprocal study control groups and due to partial lack of randomization within the individual study concepts.

Pregnancy rate

The set of research studies investigating diverse psychotherapies for pregnancy promotion took place in a clinical/university clinic setting and consisted of nine individual/couple and seven group psychotherapies (Table I). Six interventions were geared towards counselling for infertile women and couples using either cognitive behavioural, focal, resource or psychoanalytic methods (Sarrel and DeCherney, 1985; Bents, 1991; Brandt and Zech, 1991; Emery *et al.*, 2001; Hölzle *et al.*, 2001; Strauss *et al.*, 2001). Quinn and Pawson (1994) attempted to support successful conception with hypnotherapy; Takefman *et al.* (1990) chose preparatory information as their intervention of choice and Tuschen-Caffier *et al.* (1999) offered supportive sexual therapy. Christie and Morgan (2000) conducted psychoanalytic group therapy. Clark *et al.* carried out two studies using cognitive behavioural group psychotherapy on the same sample. For this reason, the results were aggregated and counted as one complete study intervention (Clark *et al.*, 1995, 1998). Galletly *et al.* (1996b)

and Domar *et al.* (1990, 1992, 1999, 2000) also administered comprehensive group psychotherapy programmes to infertile persons.

Participants

Couples and women specifically seeking medical and/or psychological treatment were on average aged 35 years. Some studies gave information on the origin of the infertility diagnosis. For example, Domar *et al.* (1990, 1992), Tuschen-Caffier *et al.* (1999) and Christie and Morgan (2000) reported their women and couples as being diagnosed with idiopathic infertility. Other studies described their samples as having multiple infertility origins (Clark *et al.*, 1995, 1998; Galletly *et al.*, 1996b; Domar *et al.*, 2000; Hölzle *et al.*, 2001; Strauss *et al.*, 2001). Patients diagnosed as primary infertile were found in the studies of Bents (1991), Brandt and Zech (1991), Clark *et al.* (1995, 1998), Domar *et al.* (1990, 2000), Emery *et al.* (2001), Galletly *et al.* (1996), Tuschen-Caffier *et al.* (1999), Hölzle *et al.* (2001) and Strauss *et al.* (2001). Sarral and DeCherney (1985) investigated only secondary infertility patients, and both types of diagnoses were found in the studies of Domar *et al.* (1992, 1999), Quinn and Pawson (1994) and Christie and Morgan (2000). With regard to relationships, Takefman *et al.* (1990) and Bents (1991) reported that their therapy participants were married and that the average relationship length was ~ 8 years (Bents, 1991; Emery *et al.*, 2001; Hölzle *et al.*, 2001). Clark *et al.* (1995, 1998) and Galletly *et al.* (1996b) report body mass index as

Table II. Reduction of anxiety/standardized mean gain

Study	Computed n	ES	SE	WE
Individual/couple psychotherapy				
Treatment				
Bents, 1991	19 C	1.27	0.35	8.30
Connolly <i>et al.</i> , 1993	152 C	0.35	0.17	34.90
Emery <i>et al.</i> , 2001	60 C	0.28	0.18	28.78
Strauss <i>et al.</i> , 2001	35 C, 26 F	0.01	0.20	26.00
Takefman <i>et al.</i> , 1990	39 C	0.28	0.17	33.70
Wischmann, 1998	140 C, 20 F, 4 M	0.17	0.08	136.91
Control				
Connolly <i>et al.</i> , 1993	152 C	0.38	0.15	42.01
Emery <i>et al.</i> , 2001	60 C	0.68	0.20	24.26
Strauss <i>et al.</i> , 2001	35 C, 26 F	0.12	0.21	22.83
Wischmann, 1998	140 C, 20 F, 4 M	0.04	0.20	25.98
Group psychotherapy				
Treatment				
Domar <i>et al.</i> , 1999	132 F	0.59	0.09	112.59
Galletly <i>et al.</i> , 1996a	96 F	0.05	0.12	63.91
McNaughton-Cassill <i>et al.</i> , 2000	42 C	0.02	0.24	16.99
Stewart <i>et al.</i> , 1992	25 M, 39 F, 35 C	0.34	0.13	60.48
Control				
McNaughton-Cassill <i>et al.</i> , 2000	42 C	0.02	0.20	24.99
Stewart <i>et al.</i> , 1992	25 M, 39 F, 35 C	0.07	0.17	34.90

Computed n = treatment and control group; ES = effect size; SE = standard error; WE = weighted inverse variance weight; C = couples; F = females; M = males.

Table III. Reduction of depression/standardized mean gain

Study	Computed n	ES	SE	WE
Individual/couple psychotherapy				
Treatment				
Bents, 1991	19 C	1.17	0.33	8.93
Connolly <i>et al.</i> , 1993	152 C	0.07	0.16	36.92
Emery <i>et al.</i> , 2001	60 C	0.05	0.18	29.96
Strauss <i>et al.</i> , 2001	35 C, 26 F	0.07	0.20	25.93
Tuschen-Caffier <i>et al.</i> , 1999	29 C	0.003	0.24	17.00
Wischmann, 1998	140 C, 20 F, 4 M	0.16	0.08	137.22
Control				
Connolly <i>et al.</i> , 1993	152 C	0.31	0.15	42.91
Emery <i>et al.</i> , 2001	60 C	0.56	0.20	25.92
Strauss <i>et al.</i> , 2001	35 C, 26 F	0.12	0.21	22.84
Tuschen-Caffier <i>et al.</i> , 1999	29 C	0.002	0.28	12.00
Wischmann, 1998	140 C, 20 F, 4 M	0.08	0.20	25.91
Group psychotherapy				
Treatment				
Domar <i>et al.</i> , 1999	132 F	0.04	0.09	131.92
Galletly <i>et al.</i> , 1996a	96 F	0.43	0.13	58.58
McNaughton-Cassill <i>et al.</i> , 2000	42 C	0.21	0.24	16.64
Stewart <i>et al.</i> , 1992	25 M, 39 F, 35 C	0.31	0.13	61.11
Control				
McNaughton-Cassill <i>et al.</i> , 2000	42 C	0.46	0.21	22.63
Stewart <i>et al.</i> , 1992	25 M, 39 F, 35 C	0.20	0.17	34.31

Computed n = treatment and control group; ES = effect size; SE = standard error; WE = weighted inverse variance weight; C = couples; F = females; M = males.

Table IV. Pregnancy rates in studies aimed at facilitating conception

Study	Computed <i>n</i>	Pregnancy (%)	Treatment control	PES
Individual/couple psychotherapy				
Bents, 1991	19 C	33	–	0.33
Brandt and Zech, 1991	15 F	47	–	0.47
Emery <i>et al.</i> , 2001	60 C	23	27	0.24
Hölzle <i>et al.</i> , 2001	24 C	16	–	0.16
Sarrell and DeCherney, 1985	40 F	65	–	0.65
Sarrell and DeCherney, 1985	20 C	60	11	0.60
Strauss <i>et al.</i> , 2001	35 C, 26 F	39	17	0.39
Takefman <i>et al.</i> , 1990	39 C	26	–	0.26
Tuschen-Caffier <i>et al.</i> , 1999	29 C	35	0	0.35
Group psychotherapy				
Christie and Morgan, 2000	35 F	60	–	0.60
Clark <i>et al.</i> , 1995, 1998	18 F	85	0	0.85
Domar <i>et al.</i> , 1990	54 F	33	–	0.33
Domar <i>et al.</i> , 1992	52 F	32	–	0.32
Domar <i>et al.</i> , 1999	132 F	43	–	0.43
Domar <i>et al.</i> , 2000	184 F	55	20	0.54
Galletly <i>et al.</i> , 1996b	37 F	78	–	0.78

PES = proportion effect size computed from logit values for ease of interpretation; C = couples; F = females; M = males.

an important distinguishing factor of women taking part in the weight loss/reproductive improvement programme. Table IV summarizes conception success per study.

Goal of studies

Four individual/couple (Takefman *et al.*, 1990; Brandt and Zech, 1991; Quinn and Pawson, 1994; Emery *et al.*, 2001) and one group study (Christie and Morgan, 2000) examined the interaction between psychotherapy influence on the reduction of emotional stress, as well as on the outcome success rate of IVF. Other psychotherapy studies emphasized conception mediation by specifically reducing stress and enhancing quality of life (Bents, 1991), by activating latent coping potential in patients (Hölzle *et al.*, 2001; Strauss *et al.*, 2001), and by alleviating negative affect that patients experi-

ence with the infertility diagnosis and treatment (Domar *et al.*, 1990, 1992). Further research on psychotherapy efficacy for possible conception compared different psychotherapy treatments on pregnancy outcome (Tuschen-Caffier *et al.*, 1999; Domar *et al.*, 2000), and also offered special comprehensive weight loss programmes to obese infertile women (Clark *et al.*, 1995, 1998; Galletly *et al.*, 1996b). Alternatively, Sarrel and DeCherney (1985) were the only research team to investigate a psychotherapeutic intervention solely on the course of secondary infertility patients. Although all patients were sampled from a clinical population, only three individual/couple psychotherapy studies (Brandt and Zech, 1991; Quinn and Pawson, 1994; Emery *et al.*, 2001) and one group psychotherapy study (Christie and Morgan, 2000) specifically reported that their samples were simultaneously undergoing some stage of the IVF medical infertility treatment cycle. Nevertheless, one researcher group explicitly stated that their study examined the influence of psychotherapy on conception rates of patients not in medical care (Clark *et al.*, 1995, 1998).

Quantitative results

The hypothesis of homogeneity for the entire distribution of ES yielded heterogeneous ES for the set of pregnancy rate studies (*Q*-value: 494.58, $\chi^2 = 24.996$, *df* 15, *P* < 0.05). The results of moderator variables utilized in the ANOVA-Analog were recorded as the *Q*-between value. This is given as the critical value of χ^2 at *P* < 0.05 and understood as the number of categories minus 1 [χ^2 of 3.841, *df* 1]. Psychotherapy type (*Q*-value: 3.98) was significant as compared to the number of psychotherapy sessions (*Q*-value: 23.61) and to follow-up time (*Q*-value: 34.07). All significant values suggest that the moderator variables distinguish the differences in groups correctly by demonstrating a between-groups effect, thereby contributing to clarification of unknown variance. Finally, the moderator variable psychotherapy-supported IVF versus psychotherapy alone did not contribute significantly to explained effect size variation (*Q*-value: 0.09).

The overall given pregnancy rate for psychotherapy treatment across all studies amounted to 284 from 628 partici-

Table V. Post hoc comparison

	Anxiety reduction		Depression reduction		Pregnancy rate	
	No. of studies	Variable	No. of studies	Variable	No. of studies	Variable
Psychotherapy type						
Individual/couple	6	ES = 0.17, SE = 0.06	6	ES = 0.12, SE = 0.06	9	PES = 0.39
Group	4	ES = 0.36, SE = 0.06	4	ES = 0.19, SE = 0.06	7	PES = 0.49
No. of sessions						
≤ 9	4	ES = 0.20, SE = 0.08	3	ES = 0.15, SE = 0.09	11	PES = 0.39
≥ 10	6	ES = 0.29, SE = 0.05	7	ES = 0.16, SE = 0.05	5	PES = 0.65
Follow-up time after therapy						
≤ 6 months	8	ES = 0.27, SE = 0.05	7	ES = 0.11, SE = 0.05	8	PES = 0.34
> 6 months	2	ES = 0.19, SE = 0.11	3	ES = 0.42, SE = 0.11	8	PES = 0.60
Psychotherapy-supported IVF versus psychotherapy alone						
Psychotherapy and IVF					5	PES = 0.45
Psychotherapy					11	PES = 0.45

ES = effect size; SE = standard error; WE = weighted inverse variance weight; PES = proportion effect size computed from logit values for ease of interpretation.

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pants (45%). In comparison, results showed that only 18 patients from 129 in the control groups were reported to be pregnant or to have conceived by study termination (14%). Table V gives the proportion effect sizes for each moderator variable (PES) and the percentage of reported conception for each group. Individual/couple and group psychotherapies as well as psychotherapy with or without accompanied IVF treatment both yielded similar pregnancy rates. More than 10 sessions of psychotherapy and a follow-up time >6 months after therapy termination led to a larger conception count.

Post hoc descriptive comparison

With regard to the moderator variables investigated, Table V depicts a *post hoc* comparison of the computed effect size values summarized for the reduction of anxiety and depression, as well as the computed proportion ES for pregnancy.

Discussion

The aim of this paper was to examine and compare the efficacy of psychotherapy for infertile patients in the reduction of anxiety and depression and in the possible promotion of pregnancy. An extensive search for methodologically sound studies was initiated and 66 studies containing either pre/post or comparison group values could be allocated. Due to missing statistical measures, only 22 of these studies were deemed suitable for meta-analytic computation. Two types of meta-analyses were computed to account for differences in study format and in order to reap maximum information potential. The main result suggests that psychotherapy (group and individual/couple) reduces anxiety and depression for infertile patients and possibly enhances conception success.

The moderator variable utilized in the ANOVA-Analog revealed, with regard to anxiety, a small between-groups effect for individual/couple therapy (ES = 0.17) and group therapy (ES = 0.36), suggesting that both psychotherapy types yield positive effects for patients. This is in line with McRoberts *et al.* (1998) who state that group and individual/couple therapies have been similarly effective when compared with each other. For depression, the weighted mean effect size for the moderator variable follow-up after the 6 months marker following therapy termination (ES = 0.42), as compared to follow-up measured within the 6 months following therapy termination (ES = 0.11), supports the theory that depressive symptoms increase with length of infertility duration (Domar *et al.*, 1992; Strauss *et al.*, 2000), and that women and couples may be more receptive to support provided earlier in therapies than at a later point in time. ES for comparison groups were routinely computed but could not be compared to the treatment values due to missing reciprocal study control groups and due to partial lack of randomization within individual study concepts.

The (proportion) ES computed for psychotherapy influence on possible conception reflected the fact that the study reported pregnancy rate count. Individual/couple and group psychotherapies yielded similar pregnancy rates, which would provide possible further support for the efficacy of

both types of psychotherapy (McRoberts *et al.*, 1998). With 9 months gestation in mind, it would appear reasonable to suppose that >10 sessions of psychotherapy and a follow-up time >6 months upon therapy termination would ultimately lead to an improved reported pregnancy outcome (PES: 0.65 and 0.60 respectively). Interestingly, the pregnancy rates for both psychotherapy-supported IVF and for psychotherapy alone appear to be identical (PES: 0.45). Other possible evidence for psychotherapy efficacy for infertile persons was given in the resulting overall given pregnancy rate for psychotherapy treatment across studies as compared to the control group rate (14%).

Nevertheless, it is difficult to attribute psychotherapy intervention success to possible pregnancy promotion when biasing factors such as medical treatment are involved. For this reason, a definite connection between psychotherapy efficacy and successful conception cannot be made at this point.

There were, however, many other limitations to generalizing these study results. For example, as mentioned earlier, many of the studies included did not supply a comparison group design. Simple pre/post measurements with standardized questionnaires before and after treatment cannot rule out the plethora of interacting effects on change reported. This dilemma also holds true for the studies including comparison groups but failing to randomize their participants. Clark *et al.* (1995, 1998) introduced drop-outs from the initial recruitment as comparison groups in both studies. Not only were these subjects previously informed of the treatment but they may have had personal bias against psychotherapy altogether. Randomizing entails the selection of a number of cases from the entire population of persons in such a way as to ensure that any one subject has the same chance of being chosen as any other. This establishes that the sample will be a valid representation of the entire population. Only randomized controlled studies may truly defy systematic differences and, with some confidence, attribute change to the treatment itself.

Additionally, results from psychological variables may vary from study to study due to differences in study designs and differences in patient characteristics of the treatment and control group, type and length of infertility, varying follow-up times, as well as the patient information collection interval (before, during, following IVF treatment). One reviewer commented that the moderator variables investigated (follow-up time, etc.) are actually correlated, making it difficult to attribute any effects of psychotherapy to the treatment itself. In fact, Lipsey and Wilson (2001) indicate that relative comparisons of ES across studies are inherently correlational, making this a fundamental weakness of meta-analysis. Since important study features are often confounding, this may obscure the interpretive meaning of observed differences. Future analyses could attempt to model out substantive influences by including multivariate methods.

The bulk of the studies described their subjects as women and couples participating in medical infertility diagnostic procedures and treatment. This may imply that IVF patients overly represent study participants. Also little is known about women and couples experiencing infertility who undergo

other forms of infertility treatment or those who refrain from any form of medical treatment. Greil (1997) contends that this may account for 50% of all infertile women and couples. Furthermore, it proved difficult to differentiate between the psychological consequences of the infertility diagnosis and those resulting from the medical treatment regimen, since the bulk of studies recruited their participants from clinical populations. Prospective studies should be geared towards the comparison of clinical and non-clinical populations with regard to psychological impact of infertility, adjustment, as well as to pregnancy rates.

Another potential bias involves the independence of ES. Lipsey and Wilson (2001) suggest that ES may be presumed to be statistically independent if, for a given distribution, no more than one effect size comes from any given subject sample. However, one must keep in mind that subject samples within studies may be independent, but not necessarily between study samples. This means that we cannot know for sure whether subjects may have simultaneously or successively taken part in any of the other research studies presented, and thus, we cannot definitely state whether the corresponding ES computed from these studies are really independent from each other.

Other methodological drawbacks within the studies include the use of self-report questionnaires that may lead patients to adhere to facets of social desirability in answering questions. Henning and Strauss (2000) comment that this form of response tendency is actually expected from infertile couples entering medical infertility treatment. These patients feel under pressure to 'appear normal' in order to focus attention on the medical (and not psychological) aspects of their infertility, thus qualifying for a medical treatment programme.

Finally, Lipsey and Wilson (2001) emphasize the fact that even a small number of studies may be meta-analysed, but at the cost of potential upward sampling bias.

Extensive research still needs to be conducted before the precise relationship between psychotherapy for infertility and outcome is understood. Results indicate that both group psychotherapy and also individual/couple psychotherapy supply evidence of positive effects in the alleviation of anxiety and depression in infertile patients. This is in line with the systematic review carried out by Boivin (2003). However, in comparison to the Boivin (2003) study, our meta-analysis has also indicated possible evidence for the enhancement of conception success through psychotherapy. This is an interesting discrepancy considering the fact that both studies incorporated a similar study pool. It may be possible to infer that the main outcome differences are due to the utilization of various evaluation instruments and also to a separate study focus. Whereas this meta-analysis utilized the PES statistic based on treatment groups, Boivin compared treatment versus control groups in measuring pregnancy. Hence, since the study pool in our analysis included a greater number of treatment-only studies, a stronger indication for pregnancy outcome through psychotherapy was suggested.

Unfortunately, although there may be some form of influence of psychotherapy on pregnancy, strong interacting bias in our analysis prevents us from making a definite connection

between psychotherapy efficacy and possible conception success. Meta-analysis is effective in comparing results across studies in a methodological fashion, yet cannot go beyond the limitations of the data upon which it is based. As Lipsey and Wilson (2001) put it, most meta-analyses include 'blemished studies'. For this reason, it is imperative that future research studies adhere to strict methodological principles. Ideally, future research on psychotherapy efficacy for infertility could incorporate both systematic and meta-analytic features in a larger scale evaluation involving only randomized studies. In this sense, both the systematic review and the meta-analytic approaches must not be viewed as rival evaluation approaches, but rather seen as interlocking contributors to research on psychotherapy. Both evaluation approach outcomes could be subsequently critically cross-evaluated in order to sift out possible further 'hidden' bias. In turn, results from such controlled evaluation studies may help further to evaluate the efficacy of psychotherapy for infertility patients.

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