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Communication and coping as predictors of fertility problem stress: cohort study of 816 participants who did not achieve a delivery after 12 months of fertility treatment

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BACKGROUND: We investigated coping strategies and communication strategies as predictors of fertility problem stress 12 months after start of fertility treatment. METHODS: We used a prospective, longitudinal cohort design including 2250 people beginning fertility treatment with a 12-month follow-up. Data were based on self-administered questionnaires measuring communication with partner and with other people, coping strategies: active-avoidance coping, active-confronting coping, passive-avoidance coping, meaning-based coping, and fertility problem stress. The study population included those participants (*n* = 816, men and women) who had not achieved pregnancy by assisted reproduction or delivery at follow-up. RESULTS: Among both men and women, difficulties in partner communication predicted high fertility problem stress (odds ratio for women, 3.47, 95% confidence interval 2.09–5.76; odds ratio for men, 3.69, 95% confidence interval 2.09–6.43). Active-avoidance coping (e.g. avoiding being with pregnant women or children, turning to work to take their mind off things) was a significant predictor of high fertility problem stress. Among men, high use of active-confronting coping (e.g. letting feelings out, asking other people for advice, seeking social support) predicted low fertility problem stress in the marital domain (odds ratio 0.53, 95% confidence interval 0.28–1.00). Among women, medium or high use of meaning-based coping significantly predicted low fertility problem stress in the personal and marital domain. CONCLUSION: The study provides information about where to intervene with fertility patients in order to reduce their stress after medically unsuccessful treatment.

Key words: assisted reproduction/clinical epidemiology/coping/marital communication/stress

Introduction

It is important for fertility clinic staff not only to treat the condition of infertility but also to deal with the couples' coping with infertility. Evidence-based knowledge about coping strategies and their consequences is therefore a prerequisite for professional fertility treatment. Coping research is conceptually complex and coping strategies are categorized differently in different studies.

Infertility is a low-control stressor; that is, a stressful situation in which the infertile couple can do little or nothing to influence the nature or the outcome of their situation (Terry and Hynes, 1998). In the transactional coping model, Lazarus and Folkman (1984) separated coping into problem-focused strategies (trying to manage the situation) and emotion-focused strategies (trying to regulate the distress). Folkman (1997) has later added meaning-based coping, which includes positive reappraisal of the situation, goal-directed problem-focused coping, spiritual beliefs and practices, and the infusion of ordinary events with positive meaning. In relation to low-control stress situations, Terry and Hynes (1998) further disaggregated problem-focused coping into problem-management strategies, such as active attempts to manage or come up with a solution to the problem, and problem-appraisal strategies, which reflect attempts to manage one's appraisal of the stressful situation (e.g. trying to step back and be more objective, and trying to see the positive side of the situation). It seems that a part of the problem-appraisal coping (e.g. trying to see the positive side) is also a part of Folkman's (1997) concept of meaning-based coping. Further, Terry and Hynes (1998) proposed that emotion-focused coping be categorized into avoidance strategies (escapism, wishful thinking and denial) and emotional approach strategies, which include efforts to acknowledge, understand and express emotions.

Reviews of the coping literature have often concluded that coping strategies towards managing negative emotions in stressful encounters demonstrate positive associations with maladaptive outcomes (Austenfeld and Stanton, 2004). However, in response to low-control situations it is likely that problem-focused coping strategies aimed at managing the situation actively may have deleterious effects, while emotion-focused coping strategies could be adaptive (Terry and Hynes, 1998). Longitudinal studies among couples or women in IVF treatment

(Hynes *et al.*, 1992; Litt *et al.*, 1992; Terry and Hynes, 1998; Verhaak, 2003) and among couples in donor insemination (Berghuis and Stanton, 2002) have shown that problem-appraisal strategies were a predictor of better adjustment (Terry and Hynes, 1998), and approach-oriented coping (including problem-focused, emotional processing, and expression) was related to lower distress (Berghuis and Stanton, 2002). Avoidance or escape coping was a predictor of poor adjustment to infertility (Terry and Hynes, 1998) and of increased distress after one treatment attempt (Litt *et al*., 1992; Berghuis and Stanton, 2002). Verhaak (2003) found no relationship between problem-focused, active coping and changes in anxiety or depression.

According to Lazarus and Folkman (1984), social skills are an important coping resource and social skills refer to the ability to communicate and behave with others in ways that are socially appropriate and effective. Most infertile couples talk with other people about their situation. Abbey *et al.* (1991a) reported that more women than men had spoken with their friends and family about the fertility problem. Women described more benefits and costs to these interactions than men did, while men described more reasons to be indifferent to the responses from other people than women did. Van Balen and Trimbos-Kemper (1994) showed that the 10% of men who kept infertility a secret reported lower well-being. In these studies, communication measured whether or not participants were talking to others.

However, a previous qualitative interview study among infertile couples showed that it is also important to measure what people talk about and what they do not talk about to other people (Schmidt 1996, 1998). In this study, infertility-related communication could be categorized into three strategies: an open-minded strategy, including sharing both formal information and emotions related to infertility and treatment with other people; a formal strategy, in which only formal information (e.g. date of treatment, numbers of eggs retrieved) was shared; and secrecy, in which the infertility experience was not shared with others. The different strategies were connected with the participants' expectations about treatment, the secrecy group only expressing a need for technical knowledge. The more openly a participant shared their fertility problem with others the more they expected from the health-care system (detailed information about all aspects of fertility treatment, patient-centred care, and psychosocial support) and the more they had been reflecting on different ways to become parents.

Infertility is a shared couple problem and being able to discuss the impact of the infertility and the different solutions to the problem with the partner seems important (Berg and Wilson, 1995; Newton *et al.*, 1999; Pasch *et al*., 2002).

Most of the studies about communication, coping and infertility are either cross-sectional or short-term follow-up studies. Furthermore, most of the studies are based on relatively small study populations. We took this opportunity to analyse a large study population of couples in fertility treatment who were in a similar stressful situation, namely not yet having achieved a pregnancy or delivery after assisted reproductive technology (ART) and with a long follow-up period. The objective was to examine whether (i) infertility-related marital communication and communication with other people and (ii) four different coping strategies at baseline were predictors of a high level of fertility problem stress at 12 months of follow-up. Based on previous research, our assumptions were that high fertility problem stress would be predicted by (i) problems in marital communication (Schmidt, 1996; Newton *et al.*, 1999; Tjørnhøj-Thomsen, 2005), (ii) keeping the infertility secret (Van Balen and Trimbos-Kemper, 1994; Schmidt, 1996), and (iii) avoidance coping (Hynes *et al*., 1992; Litt *et al.*, 1992; Terry and Hynes, 1998; Berghuis and Stanton, 2002). Further, our assumptions were that a low level of fertility problem stress would be predicted by (i) use of approach-oriented coping (Berghuis and Stanton, 2002), and (ii) use of meaning-based coping (Folkman, 1997).

Material and methods

Setting

Denmark provides a tax-financed, comprehensive health-care system with equal, free and easy access to high-quality ART. Among Western European countries, Denmark has the largest proportion of ART use per head of population (Nyboe Andersen *et al.*, 2005). Data in this longitudinal study were collected consecutively from Danish-speaking infertile couples beginning a new period of treatment at four public fertility clinic and one private fertility clinics. Three of the four public clinics included were university clinics. The study is part of an ongoing cohort study, The Copenhagen Multi-centre Psychosocial Infertility (COMPI) Research Programme.

Procedure

In the period from January 2000 to August 2001, all new couples received a questionnaire for each spouse, immediately before their first treatment attempt at the clinic (T1). A follow-up questionnaire was sent 12 months later (T2; from January 2001 to August 2002). All questionnaires were returned to the first author (L.S.), who was not employed at any of the fertility clinics. The clinic staff did not know whether a patient was participating in the study. For a more detailed description, see Schmidt *et al.* (2003a, b).

The study was assessed by the Scientific Ethical Committee of Copenhagen and Frederiksberg Municipalities and no objections were noted. The study was approved by the Danish Data Protection Agency.

Study populations

In total, 2812 people (1406 couples) received a questionnaire at T1, and 2250 (80.0%) participated. Slightly more women (1169, 83.1%) than men (1081, 76.9%) responded after two reminder letters. Forty-four participants were lost to follow-up: 38 participants (19 couples) whose identity was not registered at baseline; two women and two men whose addresses could not be traced; one man who had died; and one who woman suffered a severe brain injury following a road accident. In total, 2206 participants received the 12-month follow-up questionnaire (T2) and 1934 (87.7%) responded (1025 women, 89.4%; 909 men; 85.8%). At T2, 816 participants (441 women, 375 men) had not achieved a pregnancy or a delivery after ART and had responded to both the T1 and the T2 questionnaire. The results in this paper are based on this cohort.

Questionnaires

The participants completed the T1 COMPI questionnaire booklet, which contained questions about reproductive history, psychosocial

aspects of infertility, (including fertility problem stress, ways of coping, communication, social relations and sense of coherence) health, and well-being. The T2 questionnaire contained questions about treatment in the past 12 months, psychosocial aspects of infertility, (including the evaluation of care, fertility problem stress, ways of coping, communication, control of the situation, social relations, sense of coherence) and well-being. The following section describes only those materials used for the analyses presented here. A more comprehensive account of the entire project battery is available from the first author (L.S.).

Measurements

We used 14 items to measure fertility problem stress in the personal, marital and social domains at T1 and T2. Seven of these items were taken from The Fertility Problem Stress Inventory (Abbey *et al.*, 1991b), and we developed the remaining items from the Schmidt (1996) qualitative interview study with Danish couples attending fertility treatment (see items and response categories in Appendix A). Fertility problem stress in the personal domain (six items) measured the stress infertility had produced in the person's life and on mental and physical health. Stress in the marital domain (four items) assessed the extent to which infertility had produced strain in the marital and sexual relationship. Stress in the social domain (four items) assessed the stress that infertility had produced in social relations with family, friends and workmates. The intercorrelations between the three subscales were in the range 0.42–0.64 (all *P*-values <0.001). We assumed a multiplicative relationship between the variables in the analyses. Therefore, we decided to use multivariate logistic regression analyses rather than linear regression analyses. Furthermore, as we were interested in predictors of a high level of fertility problem stress it was appropriate to dichotomize the outcome measures into high and low level of stress. Each scale was dichotomized in such a way that approximately the most stressed third of the study population was defined as having a problem. For details about range, mean, the Cronbach α coefficient and the proportion of high stress, see Table I. In order to identify the most extensive stress we combined these three subscales in a measure of total fertility problem stress. This outcome measure separated individuals who were stressed in at least two of the three domains from those who were stressed in none or one of the three domains.

Communication with the partner was measured by one item at T1: 'Do you find it difficult to talk to your husband about your fertility problem?' The response key was: 1 = yes, always; 2 = yes, sometimes; 3 = no, never; dichotomized into 1–2 vs 3.

The infertility-related communication strategy (ICS) assessed the participants' communication with other people measured at T1 by the question: 'Do you talk to other people about …' followed by four items about factual issues related to childlessness and treatment (items 1–4 in Appendix A), and two items about the emotions related to infertility and to the treatment process (items 5 and 6 in Appendix A). The response key was: 1 = not to other people; 2 = only to close other people; 3 = to most people I know. The items and the response key were derived from Schmidt's (1996, 1998) qualitative interview study showing that participants used three different strategies for communication with people about their infertility and treatment. The responses at T1 were categorized into four communication strategies: (i) 'secrecy', in which at least three out of four factual issues and at least one of two emotional issues are not discussed with others; (ii) 'formal', in which at least three of four factual issues are discussed with others and a maximum of one of two emotional issues are discussed with only close people; (iii) 'open-minded', in which at least three of four factual issues are discussed with others and both emotional issues discussed with other close or distant social relationships; and (iv) 'others'; no participants fell into this category.

Ways of coping

We developed a coping questionnaire specifically aimed at measuring coping strategies in relation to the specific stressor infertility. This 29-item questionnaire was developed from three sources: (i) items were adapted from the 66-item Ways of Coping Questionnaire (WOCQ), a process-oriented measure of coping derived from Lazarus and Folkman's transactional model of stress (Lazarus and Folkman, 1984; Folkman and Lazarus, 1988); (ii) Folkman's (1997) later revision of the coping model with the inclusion of the new concept of meaning-based coping; and (iii) items developed from our qualitative interviews (Schmidt, 1996). An item was selected from WOCQ if this specific way of coping was clearly manifested in the qualitative interview transcripts. In total, 18 items were selected from WOCQ; seven of these were reformulated to focus on the specific stressor infertility. Further, we developed 11 items based on the results from the interview study. These 29 items covered a wide range of responses that the participants may have engaged in dealing with the fertility problem. The response key was: 1 = not used; 2 = used somewhat; 3 = used quite a bit; and 4 = used a great deal. The items were categorized into four subscales based on their conceptual content: (i) active-avoidance strategies (e.g. avoiding being with pregnant women or children); (ii) active-confronting strategies (e.g. showing feelings, asking others for advice); (iii) passive-avoidance strategies (e.g. hoping for a miracle); and (iv) meaning-based coping (e.g. thinking about the fertility problem in a positive light, finding other goals in life). Two items in the active-confronting coping scale (talking about emotions related to the infertility and to the treatment process) was also included in the ICS. See Appendix A for a list of the coping items. For further details about the subscales see Schmidt *et al.* (2005a).

Each subscale comprised items that were significantly intercorrelated. Ten items did not fit the scales, and these items were excluded from the analyses. A confirmatory factor analysis showed goodness-of-fit-index (GFI) of 0.88 for the entire model. When subscales were removed from the model one at a time the GFI was >0.91. The factor analyses were calculated in SAS Cary, NC, USA, version 8.02, using proc calis and the macro polychor.sas (http://ftp.sas.com/techsup/download/stat/polychor.html). The response categories in the items which formed our four coping subscales were not equidistant. Sum-scales based on items with non-equidistant components do not meet criteria for a proper quantitative scale. Therefore, we preferred to use broad categories rather than the full scale, and we trichotomized each scale into high, medium and low use. The cut-off point which separated the highest and the other groups was chosen in such a way that approximately one-third of the respondents at T1 were categorized as high. For details about range, mean, Cronbach's α and the proportion of high use, see Table I. Higher scores indicated more use of the specific coping subscale.

Sociodemographic variables

These included the following: age; having a child together; and social position. A standardized measure of social position included seven items about school education, vocational training, and occupation. Based on this measure, social position was categorized into a descending scale of occupational social class: from social class I (high) to social class V (low) (Hansen, 1984) and social class VI, which comprised individuals who received social welfare. Social position was recoded into three levels: high (social classes I + II, including professionals, executives and medium-level white-collar employees); medium (social classes III + IV, including low-level white-collar employees and skilled workers); and low (social classes V + VI, including unskilled and semiskilled workers and participants receiving social welfare).

Table I. Sociodemographic, medical and psychosocial characteristics at baseline (T1) of the cohort of participants without or with treatment-related pregnancy or delivery at 12-month follow-up (T2)

Variable	Women			Men		
	Treatment-related pregnancy or delivery at T2			Treatment-related pregnancy or delivery at T2		
	No (n = 441)	Yes (n = 573)	χ^2 test P-value	No (n = 375)	Yes (n = 526)	χ^2 test P-value
Sociodemographic						
Age (years)						
≤30 (%)	23.8	27.9		13.9	16.4	
31–35 (%)	46.3	51.3		40.0	43.4	
>35 (%)	29.9	20.8	0.003	46.1	40.3	0.201
Having a child together (%)	3.5	4.1	0.621	3.7	4.4	0.627
Occupational social class						
High, I + II (%)	15.5	19.6		31.8	28.0	
Medium, III + IV (%)	66.0	63.9		45.7	51.9	
Low, V + VI (%)	18.5	16.6	0.251	22.6	20.1	0.198
Medical						
Diagnosed female infertility (%)	41.1	33.2	0.010	40.3	31.0	0.004
Diagnosed male infertility (%)	38.3	41.4	0.328	38.9	43.0	0.226
Past fertility treatment (%)	38.0	42.3	0.172	38.7	46.1	0.027
Psychosocial						
Fertility problem stress						
Personal domain						
Range	0–20	0–20		0–20	0–20	
Mean (SD)	8.41 (4.69)	8.28 (4.44)		5.55 (3.87)	5.28 (3.70)	
Cronbach's α	0.82	0.80		0.78	0.76	
Percent >8 points	47.6	45.6	0.513	22.9	19.6	0.223
Marital domain						
Range	0–14	0–14		0–14	0–14	
Mean (SD)	4.12 (3.21)	3.89 (3.21)		5.52 (2.01)	13.33 (3.25)	
Cronbach's alpha	0.74	0.80		0.73	0.72	
Percent >3 points	50.6	46.3	0.172	49.9	46.2	0.277
Social domain						
Range	0–12	0–12		0–12	0–12	
Mean (SD)	2.34 (2.61)	2.25 (2.56)		1.38 (2.78)	1.48 (2.16)	
Cronbach's α	0.79	0.79		0.84	0.84	
Percent >3 points	31.8	28.8	0.310	16.3	18.1	0.551
Total fertility problem stress						
Range	0–3	0–3		0–3	0–3	
Mean (SD)	1.30 (1.04)	1.21 (1.09)		0.89 (0.95)	0.84 (0.98)	
Percent>1 point	42.4	39.3	0.510	23.7	22.4	0.375
Infertility-related communication strategy (ICS)						
Secrecy (%)	7.3	7.5		14.7	20.0	
Formal (%)	18.4	17.8		27.2	28.5	
Open-minded (%)	74.4	74.7	0.966	58.5	51.5	0.069
Difficult partner communication (%)	27.0	26.6	0.871	23.4	20.7	0.329
Coping strategies						
Active-avoidance coping						
Range	4–16	4–16		4–16	4–16	
Mean (SD)	6.95 (2.34)	7.02 (2.21)	0.380	6.05 (1.95)	6.07 (2.03)	0.917
Cronbach's α	0.69	0.67		0.68	0.71	
Percent >6 points	35.6	35.8		22.4	21.3	
Active-confronting coping						
Range	7–26	7–26		7–26	7–26	
Mean (SD)	16.13 (3.73)	16.10 (3.63)		13.87 (3.58)	13.33 (3.25)	
Cronbach's α	0.77	0.75		0.76	0.73	
Percent >16 points	53.1	51.1	0.607	39.1	29.4	0.065
Passive-avoidance coping						
Range	3–12	3–12		3–12	3–12	
Mean (SD)	9.04 (1.96)	9.33 (1.89)		8.45 (2.13)	8.54 (2.10)	
Cronbach's α	0.46	0.44		0.56	0.53	
Percent >9points	24.9	31.2	0.051	18.7	19.2	0.836
Meaning-based coping						
Range	5–20	5–20		5–20	5–20	
Mean (SD)	11.48 (2.97)	11.14 (2.76)		10.63 (2.76)	10.46 (2.73)	
Cronbach's α	0.62	0.56		0.50	0.51	
Percent >11 points	33.8	29.1	0.278	23.5	21.1	0.692

Medical background information

This included past fertility treatment and diagnosis. This diagnosis was recoded into female infertility (e.g. blocked tubes and/or irregular ovulation or anovulation) and male infertility (e.g. reduced semen quality).

Non-respondents at baseline (T1)

In total, 562 subjects (20.0%) did not answer the baseline questionnaire (T1). It was possible to obtain ages for 305 (54.2%) of these non-respondents. When separated into three age groups (≤30 years, 31–35 years, >35 years) the female non-respondents were significantly older (23.0%, 44.8%, 32.2%) than the women who participated [25.9%, 56.0%, 18.1%, $\chi^2(2) = 18.72$, $P < 0.001$]. The same was true for the men who did not participate (13.0%, 34.4%, 52.7%) compared with men who participated [15.0%, 50.6%, 34.4%, $\chi^2(2) = 16.59$, df=2, $P < 0.001$].

Non-respondents at 12-month follow-up (T2)

In total, 272 (12.3%) of the invited patients did not participate in the follow-up study (T2). Female, but not male, non-respondents were significantly older ($P = 0.009$). Among both women and men, there was a significantly higher non-response rate among couples treated at the public university clinics compared with the non-university clinic (women, $P = 0.002$; men, $P = 0.001$); among participants with short duration of infertility (women, $P = 0.024$; men, $P = 0.002$); diagnosed female fertility (women, $P = 0.017$; men, $P = 0.008$); and among those who had a child together prior to treatment (women, $P = 0.004$; men, $P = 0.004$).

Data analyses

Comparisons of baseline distributions between the study population and the participants who at T2 had achieved a pregnancy or delivery after ART were computed using χ^2 analyses. Comparisons of fertility problem stress at T1 and T2 among the study population not having achieved a delivery or pregnancy after ART were computed using the mean, SD and Student's *t*-test for paired data. Because we were interested in predictors of a high level of stress, we chose logistic regression analyses with a high level of stress as the event. The associations between the communication and coping strategies used at T1 and fertility problem stress at T2 were calculated by odds ratios separately for women and men. All odds ratios were adjusted for age and for the value at baseline of infertility-related stress. The exact number of years was used for age. Analyses were performed in SAS, version 8. The objective of this article was not only to investigate five specific assumptions but also to analyse the mechanism behind high levels of fertility problem stress, i.e. to estimate effects of communication and coping strategies on stress. In the evaluation of estimates, we followed the recommendations of Rothman and Greenland (1998), who suggest that conclusions are based on both statistical significance and assessment of estimates.

Results

Differences between those who had and those who had not achieved a pregnancy or delivery after ART at follow-up

Table I shows key data about the study population who had responded to both the baseline (T1) and the 12-month follow-up questionnaire (T2). This population is divided into participants who had not achieved a treatment-related pregnancy or a delivery at T2 and those who had. Women who had not achieved a pregnancy or delivery were significantly older ($P = 0.003$) and more had a diagnosis of female infertility ($P = 0.010$). There were no significant differences for any of the variables about communication and coping between the two study populations.

Differences between men and women

Significantly more women than men used an open-minded ICS, and more men than women used a formal or secrecy strategy. Women used all four coping strategies significantly more often than men (data not shown).

Changes in stress from baseline to follow-up

Table II shows fertility problem stress at T1 and T2 among those participants who had not achieved a pregnancy or delivery after ART. Women reported a higher level of stress in all three domains at T2 compared with T1. Men reported a lower level of stress in the personal and marital domain at T2 compared with T1 and a higher level of stress in the social domain. All changes were small but significant.

Table II. Fertility problem stress from baseline (T1) to 12-month follow-up (T2) among those participants who had not achieved a treatment-related pregnancy or a delivery at follow-up

	Women ($n = 441$)			Men ($n = 375$)		
	T1	T2	Student's *t*-test *P*-value	T1	T2	Student's *t*-test *P*-value
Personal domain						
Range	0–20	0–20		0–20	0–20	
Mean (SD)	8.41 (4.69)	9.05 (5.06)		5.55 (3.87)	5.44 (4.05)	
Percent >8 points	47.6	50.8	<0.001	22.9	19.7	<0.001
Marital domain						
Range	0–14	0–14		0–14	0–14	
Mean (SD)	4.12 (3.21)	4.96 (3.52)		5.52 (2.01)	4.79 (3.47)	
Percent >3 points	50.6	58.7	<0.001	49.9	56.5	<0.001
Social domain						
Range	0–12	0–12		0–12	0–12	
Mean (SD)	2.34 (2.61)	2.74 (2.80)		1.38 (2.78)	1.81 (2.32)	
Percent >3 points	31.8	38.1	<0.001	16.3	21.9	<0.001
Total fertility problem stress						
Range	0–3	0–3		0–3	0–3	
Mean (SD)	1.30 (1.09)	1.48 (1.16)	<0.001	0.89 (0.95)	0.98 (0.99)	<0.001
Percent >1 point	42.4	47.6		23.7	25.1	

Communication and coping as predictors of stress 12 months later

Table III shows the age-adjusted odds ratios for fertility problem stress at T2 by communication strategies and coping strategies used at T1 among those participants who had not achieved a pregnancy or delivery after ART at T2. Among both women and men, having difficulties in talking with the partner was a significant predictor of high fertility problem stress in the personal, marital and social domains [odds ratio (OR) for total fertility problem stress: women, 3.43, 95% confidence interval (CI) 2.08–5.67; men, 3.66, 95% CI 2.09–6.43]. The ICS was not a significant predictor of fertility problem stress in any of the domains for women or men. However, when the formal strategy was compared with the open-minded strategy, all the ORs were >1.00, indicating an increased risk of high fertility problem stress among participants who were not talking about the emotional consequences of infertility and the treatment process to other people (OR for total fertility problem stress: women, 1.63, 95% CI 0.95–2.81; men 1.71, 95% CI 0.98–3.00).

High use of active-avoidance coping was a significant predictor of high fertility problem stress in the personal domain and the social domain among both women and men (OR for total stress: women, 2.42, 95% CI 1.41–4.14; men, 2.41, 95% CI 1.29–4.53). But high use of passive-avoidance coping was not related to stress. All the ORs but one for active-confronting coping were below 1.00, indicating that this coping strategy was a predictor of low fertility problem stress. For men this odds ratio was significant for stress in the marital domain (OR 0.53, 95% CI 0.28–1.00). All ORs but one for meaning-based coping were below 1.00, indicating low fertility problem stress. For women, medium or high use of meaning-based coping was a significant predictor of low fertility problem stress in the personal domain, the marital domain, and for total fertility problem stress (OR 0.44, 95% CI 0.26–0.75). However, meaning-based coping was not a significant predictor in any domain for men.

Discussion

Difficult marital communication was a significant predictor of high fertility problem stress. This was so for men and women, in respect to how infertility was affecting people as individuals, spouses and members of a social network. The strength of these findings concurs with much past research showing that marital strife is an important predictor of negative outcomes, whether this be in terms of symptom ratings of depression (Newton *et al.*, 1999), marital life quality (Abbey *et al.*, 1995) or the transition out of treatment (Daniluk, 2001). Marital communication was measured by only a single item so we cannot ascertain which aspects of communication, frequency, content of the dialogues or satisfaction with communication was problematic.

We expected that using a secretive communication strategy would predict a high level of fertility problem stress at follow-up. However, this was not the case. The particular communication strategy adopted, whether secret, open-minded or formal

Table III. Odds ratios (95% confidence intervals) for fertility problem stress at 12-month follow-up by psychosocial predictors at baseline (T1) among women (n = 441) and men (n = 375) who had not achieved a treatment-related pregnancy or delivery at follow-up (T2)

Predictor	Adjusted odds ratio[a]							
	Women				Men			
	Personal domain	Marital domain	Social domain	Total stress	Personal domain	Marital domain	Social domain	Total stress
Infertility-related communication strategy (ICS)								
Secrecy vs open-minded	0.83 (0.36–1.91)	0.81 (0.37–1.78)	1.27 (0.56–2.90)	0.80 (0.35–1.82)	1.01 (0.43–2.36)	1.22 (0.64–2.32)	0.85 (0.38–1.90)	1.11 (0.52–2.37)
Formal vs open-minded	1.14 (0.66–1.98)	1.24 (0.71–2.16)	1.43 (0.83–2.45)	1.63 (0.95–2.81)	1.22 (0.65–2.31)	1.53 (0.90–2.60)	1.34 (0.75–2.42)	1.71 (0.98–3.00)
Difficulties in partner communication (yes vs no)	**2.40 (1.45–3.97)**	**1.91 (1.13–3.21)**	**2.26 (1.40–3.66)**	**3.47 (2.09–5.76)**	**2.56 (1.38–4.74)**	**2.27 (1.22–4.22)**	**2.76 (1.55–4.91)**	**3.69 (2.09–6.43)**
Active-avoidance coping	**1.81**	1.43	**2.32**	**2.36**	0.91	1.56	0.83	0.93
Medium vs low	**(1.07–3.07)**	(0.86–2.37)	**(1.33–4.05)**	**(1.39–4.00)**	(0.44–1.90)	(0.92–2.65)	(0.42–1.64)	(0.49–1.76)
High vs low	**2.37 (1.36–4.13)**	1.08 (0.65–1.80)	**2.65 (1.54–4.56)**	**2.42 (1.41–4.14)**	**2.12 (1.04–4.32)**	1.39 (0.76–2.51)	**2.58 (1.34–4.96)**	**2.41 (1.29–4.53)**
Active-confronting coping	0.95	0.69	0.85	0.78	1.37	0.97	0.81	0.95
Medium vs low	(0.56–1.59)	(0.41–4.17)	(0.51–1.44)	(0.46–1.31)	(0.70–2.68)	(0.56–1.66)	(0.43–1.52)	(0.52–1.72)
High vs low	0.84 (0.51–1.40)	1.04 (0.63–1.72)	0.78 (0.47–1.31)	0.77 (0.47–1.26)	0.75 (0.32–1.75)	**0.53 (0.28–1.00)**	0.67 (0.30–1.49)	0.52 (0.24–1.15)
Passive-avoidance coping	1.07	1.15	0.84	1.01	1.00	1.28	1.33	1.53
Medium vs low	(0.66–1.76)	(0.71–1.86)	(0.51–1.39)	(0.62–1.63)	(0.51–1.96)	(0.77–2.12)	(0.73–2.42)	(0.87–2.71)
High vs low	0.99 (0.57–1.72)	0.85 (0.49–1.46)	1.59 (0.92–2.75)	1.11 (0.65–1.91)	1.29 (0.64–2.76)	1.11 (0.60–2.07)	1.37 (0.67–2.78)	1.44 (0.73–2.85)
Meaning-based coping	**0.49**	**0.58**	0.82	**0.58**	0.56	0.65	0.77	0.80
Medium vs low	**(0.29–0.83)**	**(0.34–1.00)**	(0.49–1.38)	**(0.34–0.97)**	(0.29–1.10)	(0.38–1.09)	(0.42–1.41)	(0.45–1.43)
High vs low	**0.48 (0.28–0.83)**	**0.53 (0.34–1.00)**	0.76 (0.44–1.30)	**0.44 (0.26–0.75)**	1.15 (0.56–2.35)	0.65 (0.36–1.17)	0.78 (0.39–1.55)	0.94 (0.49–1.81)

[a]Odds ratio adjusted for age and for the value of the outcome infertility-related stress at baseline. Odds ratios in bold: $P < 0.05$.

did not significantly predict stress in any of the domains. These findings are in contrast to previous research. Van Balen and Trimbos-Kemper (1994) found in a cross-sectional study that those 10% of the long-term infertile men who kept infertility a secret reported a lower sense of well-being (measured as self-esteem, guilt/blame, sexuality, depression, anxiety, hostility and health complaints). In this Dutch study the mean duration of infertility was 8.6 years, and 75% of the couples had been infertile for 6 years or more. In our COMPI study the participants had been infertile for around 4 years at the baseline data collection (Schmidt *et al.*, 2003a). It could be argued that spending more years as infertile and still keeping it a secret would be more psychologically demanding than using a secrecy strategy during earlier years. Alternatively, it could be that people were keeping their communication with others at a level (formal, open, secret) that matched their needs. We have recently found that a key benefit of an intervention designed to improve communication and stress management was in helping people make better decisions about disclosure, both in terms of who to talk to and what to disclose (Schmidt *et al*., 2005b). Thus, it may not be the strategy itself that is problematic, but whether it matches the person.

Findings on communication have clear implications for marital interventions. Our results clearly demonstrate that difficulty in communicating is a central aspect of what makes infertility stressful, yet no specific strategy was found to put people at greater risk of stress.

We also expected that avoidance coping would predict a high level of fertility problem stress. We measured avoidance coping by two separate scales: (i) active-avoidance coping, in which the participants used active strategies to avoid the situation by, for example, leaving when people were talking about pregnancies and children and/or avoiding the expression of feelings; and (ii) passive-avoidance coping, in which the participants hoped for a miracle, felt the only thing they could do was to wait, and had fantasies and wishes about how things might turn out. The active-avoidance coping strategy was a significant predictor of high stress among both women and men. We interpret high use of active-avoidance as a kind of defence strategy protecting the infertile participant from some of the emotional burdens of the infertility experience. In contrast the passive-avoidance coping was not associated with fertility problem stress. Previous studies have measured the emotion-focused avoidance strategy of escapism (Litt *et al.*, 1992; Terry and Hynes, 1998) or avoidance coping (Berghuis and Stanton, 2002). The items in the escapism scale and avoidance scale overlap with our measure of passive-avoidance coping. All three studies reported that escapism or avoidance was associated with poor adaptation in study populations of women after a failed IVF treatment (Litt *et al*., 1992; Terry and Hynes, 1998) and couples after a failed insemination attempt (Berghuis and Stanton, 2002). Data were collected within 1–2 weeks after a negative pregnancy test. Terry and Hynes (1998) also collected T3 data 6 weeks later. It seems that escapism may not be a short-term adaptive response to a situation with little potential for control (Terry and Hynes, 1998). We collected the follow-up data 12 months after the baseline data and hence negative treatment outcome could have been months earlier. This time difference between the stressor (unsuccessful treatment) and the T2 reported fertility problem stress could possibly explain the differences between our negative study results about passive-avoidance coping as a predictor of stress and other researchers' positive results about escapism as a predictor of maladjustment. It should also be noted that, contrary to many health stressors, whereas escapism may bring about negative outcomes (e.g. not taking preventing medication), treatment for infertility requires a substantial amount of optimism if people are to remain engaged in the treatment process. Indeed, one of the causes of treatment drop-out is pessimism that treatment will never generate the desired baby (e.g. Daniluk, 2001). Given that not all couples in treatment are medically successful, hoping a miracle would happen or fantasizing about a positive outcome are not entirely out of context and may serve to keep this optimism alive. Indeed, in our sample 67% still hoped to pursue further treatment.

Based on Folkman's (1997) longitudinal studies among caregivers for HIV-positive men, we expected that meaning-based coping would predict lower infertility-related stress. This was significantly the case for women, but not for men. Other studies among infertile people have measured coping scales overlapping with our meaning-based coping scale: seeking meaning (Litt *et al.*, 1992), positive reinterpretation and growth (Berghuis and Stanton, 2002), problem-appraisal coping (Terry and Hynes, 1998), and cognitive restructuring (Morrow *et al.*, 1995). Among women in failed IVF-treatment, problem-appraisal coping was associated with better adjustment (Terry and Hynes, 1998), whereas Litt *et al.* (1992) found no association between post-IVF distress and seeking meaning. Berghuis and Stanton (2002) found that among couples in failed insemination treatment, men, but not women, reported a decrease in depressive symptoms when they coped through positive interpretation. What is noteworthy here is the lack of agreement about the value of this type of coping, and any number of factors may be contributing to conflicting findings: type of measure, stressor or outcome; time since stressor onset; gender, and so on. Future research needs to direct attention to the predictors of meaning-based coping that explain the inconsistencies observed.

Our results also indicated that active-confronting coping was associated with low fertility problem stress, but we found only one significant association: men using active-confronting coping experienced a low level of fertility problem stress in the marital domain at the follow-up. Other studies have measured coping overlapping with our coping scale of active-confrontive coping: informational and support seeking (Morrow *et al.*, 1995), seeking support (Litt *et al.*, 1992; Berghuis and Stanton, 2002), emotional processing and expression (Berghuis and Stanton, 2002), and emotional approach coping (Terry and Hynes, 1998). Among men, emotional processing and emotional coping were associated with decreased depressive symptoms. Among women, high use of social support seeking and emotional approach coping was predictive (Berghuis and Stanton, 2002). Terry and Hynes (1998) reported that emotional coping among women enhanced adjustment, but only for those strategies involving attention to and expression of one's emotional responses.

We developed our four coping scales conceptually based on the Ways of Coping Questionnaire (Folkman and Lazarus, 1988) and on results from qualitative interviews among couples in fertility treatment (Schmidt, 1996, 1998). The conceptually developed scales were later confirmed by factor analysis. As mentioned previously, coping strategies are often categorized into problem-focused strategies, emotion-focused strategies, and meaning-based coping. One of our coping subscales, active-confronting coping, is a combination of problem-focused strategies (e.g. asking for advice, reading or watching television about infertility) and emotion-focused strategies (e.g. seeking sympathy and understanding, letting feelings out, talking about emotions). This active-confronting coping strategy overlaps with the approach-oriented strategy as described by Berghuis and Stanton (2002). The approach-oriented strategy includes problem-focused coping (a combination of active coping and planning), emotional processing 'as active attempts to acknowledge, explore meanings, and come to an understanding of one's emotions', and emotional expression as 'reflecting active verbal and/or nonverbal attempts to communicate or symbolize one's emotional experience' (Austenfeld and Stanton, 2004, p. 1342). It seems useful analytically to categorize coping strategies in approach strategies and avoidance strategies, as these different strategies show different patterns in relation to fertility problem stress. Similarly, our study results support the idea that it could also be useful to divide avoidance strategies in active avoidance and passive avoidance.

An important strength of this study is that we measured the predictors (communication, coping strategies) 12 months before the outcome fertility problem stress. This prospective design allows us to examine the pretreatment variables that may put people at risk of higher distress later on, and therefore an indication of the type of preventive psychosocial interventions that could be most beneficial. In the light of these risk factors, it would be worthwhile for future studies to examine stability of communication and coping patterns and examine whether these add to the prediction of outcomes. Coping is a process and coping strategies that are relevant at one phase may have different effects if used at a different phase of the transaction (Carver and Scheier, 1994).

The study population was large and covered consecutively 80.0% of all new couples at four large public fertility clinics and the response rate at follow-up was high (87.7%). The communication strategy, the coping strategies and fertility problem stress were studied with instruments developed specifically to measure these concepts in relation to infertility. Although these instruments were all carefully developed, they still need to be validated and tested for reliability in other infertile populations.

In conclusion, we identified that difficulties in marital communication and/or high use of active-avoidance coping were significant predictors of high fertility problem stress among those fertility patients who had not achieved a pregnancy or delivery during a 1 year period of treatment. Further, among women, the use of meaning-based coping was a significant predictor of low fertility problem stress. Among men, high use of active-confronting coping was a significant predictor of low fertility problem stress in the marital domain. These results are highly relevant to clinical staff as they indicate where it is relevant to intervene in order to help fertility patients to reduce stress during treatment. A reduction in stress would not only be beneficial for the couples' well-being—it could also possibly enhance their chances of achieving a pregnancy after ART, as previous research has shown that infertility-related stress is associated with poorer treatment outcome (Facchinetti *et al.*, 1997; Eugster and Vingerhoets, 1999; Gallinelli *et al.*, 2001; Boivin and Schmidt, 2005).

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Appendix A. Items of communication with other people, of coping and of fertility problem stress

(i) Communication about infertility and its treatment with other people

Do you talk to other people about:

1. your inability to get children?
2. the reason why you are childless?
3. your tests and examinations?
4. what kind of treatment you are trying?
5. your emotional feelings as childless?
6. how tests and treatments affect you emotionally?

Response key: 1 = not to other people; 2 = only to close other people; 3 = to most people I know

(ii) Coping scales

People cope with their fertility problem in different ways. How do you cope?
Active-avoidance coping scale
I . . .

1. avoid being with pregnant women or children
2. leave when people are talking about pregnancies and children
3. try to keep my feelings to myself
4. turn to work or substitute activity to take my mind off things

Active-confronting coping scale

1. let my feelings out somehow
2. accept sympathy and understanding from someone
3. ask other childless people for advice
4. ask a relative or friend for advice
5. read or watch television about childlessness
6. talk to someone about my emotions as childless
7. talk to someone about how tests and treatments affect me emotionally

Passive-avoidance coping scale
I . . .

1. hope a miracle will happen
2. feel that the only thing I can do is to wait
3. have fantasies and wishes

Meaning-based coping scale
I . . .

1. have grown as a person in a good way
2. think about the infertility in a positive light
3. find my marriage/partnership even more valuable now
4. find other life goals
5. believe there is a meaning in our difficulties in having children

Response key: 1 = not used; 2 = used somewhat; 3 = used quite a bit; 4 = used a great deal

(iii) Fertility problem stress

Personal domain

1. My life has been disrupted because of this fertility problem
2. It is very stressful for me to deal with this fertility problem

How much stress has your fertility problem placed on the following:

3. your relationship with people with children?
4. your relationship to pregnant women?
5. your physical health?
6. your mental health?

Marital domain
What consequences has your childlessness for your marriage?
The childlessness has . . .

1. caused crisis in our relationship
2. caused thoughts about divorce

How much stress has your fertility problem placed on the following:

3. your marriage?
4. your sex life?

Social domain
How much stress has your fertility problem placed on the following:

1. your relationships with your family?
2. your relationships with your family-in-law?
3. your relationships with friends?
4. your relationships with workmates?

Response key for items 1–2 on personal domain and for items 1–2 on marital domain: 1 = strongly disagree; 2 = somewhat disagree; 3 = neither agree nor disagree; 4 = somewhat agree; 5 = strongly agree.
Response key for remaining items: 1 = none at all; 2 = a little; 3 = some; 4 = a great deal.