human reproduction

ORIGINAL ARTICLE *Psychology and counselling*

Disclosure strategies, social support, and quality of life in infertile women

Keli R. Steuber[1],* and Andrew High[2]

[1]Faculty of Communication Studies, The College of New Jersey, Ewing, NJ 08628, USA [2]Faculty of Communication, University of Iowa, Iowa City, IA 52241, USA

*Correspondence address. Tel: +1-609-771-2125; E-mail: steubek1@tcnj.edu

STUDY QUESTION: Do the strategies women use to disclose information about their infertility to social network members impact the quality of the support they receive and their quality of life?

SUMMARY ANSWER: The data showed that women who disclosed infertility-related information in direct ways, rather than in indirect ways (e.g. by incremental disclosures or through third parties), to social network members perceived higher quality support and reported greater quality of life related to their infertility experience.

WHAT IS KNOWN ALREADY: Social support has been shown to buffer stress associated with various health issues including infertility. The way people disclose information about stressors has been associated with the quality of the support they receive. Disclosing information in a way that most effectively elicits support is beneficial because women with infertility who have lower levels of stress are more likely to seek and remain in treatment.

STUDY DESIGN, SIZE, DURATION: This cross-sectional study of 301 infertile women was conducted in the USA.

PARTICIPANTS/MATERIALS, SETTING, METHODS: To determine the variation in length of infertility and treatment decisions, we conducted an online survey of 301 American women coping with infertility. We investigated the strategies women used to disclose infertility-related information with social network members, their perceptions of support from friends and family, and their quality of life both in general (overall quality of life) and related to the experience of infertility (fertility quality of life).

MAIN RESULTS AND THE ROLE OF CHANCE: Direct disclosure of experiences related to infertility was positively and significantly associated with the perceived quality of social support received ($P < 0.01$). Strategies of disclosure that use entrapment or indirect media were negatively associated with fertility quality of life ($P < 0.001$). Directly ($P < 0.01$) and incremental disclosures ($P < 0.01$) were positively associated with overall quality of life, while the use of humor was negatively associated with overall quality of life ($P < 0.01$). Perceived support quality also mediated the influence of direct disclosures on women's fertility quality of life (95% CI: 0.18, 1.05) and overall quality of life (95% CI: 0.10, 0.30). This effect is particularly noteworthy for the model predicting fertility quality of life, which exhibited a non-significant main effect with direct disclosures. The non-significant main effect combined with the significant indirect effect suggests that perceived support quality fully mediates the association between direct disclosures and fertility quality of life.

LIMITATIONS, REASONS FOR CAUTION: The cross-sectional nature of our convenient sample did not allow us to test cause and effect. It is equally plausible that women who perceive support are more likely to disclose. Longitudinal data are necessary to test the cyclic nature of these variables and confirm directionality.

WIDER IMPLICATIONS OF THE FINDINGS: When women make the decision to reveal information about their infertility, direct disclosure (i.e. face-to-face, clearly, verbally and with the opportunity for an immediate response) was the only strategy that significantly corresponded with perceived support quality and was one of only two strategies that were positively associated with quality of life. To the extent that social support reduces stress, and lower stress increases the chance that people seek and stay in treatment, infertility clinics and therapists can use this information as a low-cost strategy for supporting infertile women. Scholars and practitioners can also instruct women coping with infertility about how to most effectively engage in seeking effective support.

STUDY FUNDING/COMPETING INTEREST(S): No external funding was either sought or obtained for this study and no competing interests are declared.

Key words: disclosure / infertility / quality of life / support

Introduction

The psychological and relational factors associated with infertility have been well-documented in literature (e.g. Greil, 2010), and couples unable to conceive a child often cope with high levels of multidimensional stress (Newton *et al.*, 1999; Cousineau and Domar, 2007). Psychologically, infertility is linked to hopelessness, powerlessness and inadequacy, all of which are characteristics associated with depression (Peterson *et al.*, 2007a). Infertile women report experiencing anxiety, anger and feelings of guilt (Schmidt, 2006), as well as uncertainty within their marriage (Steuber and Solomon, 2008; Greil, 2010). These women also report difficulty communicating about their infertility with their family and broader social networks, and their desires for comfort often go unmet (Steuber and Solomon, 2011b).

In addition to the negative psychological and relational issues associated with the inability to conceive, the experience of stress during infertility is especially problematic because it interferes with treatment seeking. People who experience fertility-related stress are less likely to seek treatment (i.e. Domar *et al.*, 2012) and more prone to discontinue treatment than people who perceive less stress (Olivius *et al.*, 2004; Rajkhowa *et al.*, 2006; Brandes *et al.*, 2009; Van den Broek *et al.*, 2009).

Because of the psychological effects that stress can evoke on individuals who are infertile, it is important to consider behaviors people can utilize to minimize the amount of stress they experience. Both within infertility specifically (Lechner *et al.*, 2007), and more broadly (Burleson and McGeorge, 2002), research has documented that social support can buffer individuals from the emotional burdens associated with stress. When perceived positively, social support coincides with increased psychological and physical health in a variety of contexts (e.g. Cohen and Wills, 1985; Burleson and MacGeorge, 2002; Jones, 2005; Servaty-Seib and Burleson, 2007; Bodie *et al.*, 2011). A study by Verhaak *et al.* (2005) found that social support decreases anxiety and depression in patients who experience failed infertility treatments, and Vassard *et al.* (2012) found that family support related to infertility positively coincided with women staying in treatment after 1 year. Despite its numerous benefits, women coping with infertility often perceive that their desires for support from members of their social networks go unmet (High and Steuber, 2014b). Receiving quality support can be difficult, and women coping with the stresses of infertility might benefit by clearly disclosing their experience of infertility and communicating their need and desire for social support.

To help individuals and couples cope with the stresses associated with infertility, there is a need to examine the communicative behaviors that individuals can employ to increase the receipt of quality social support. Recent research shows that women do not obtain the benefits of social support if they do not disclose that they are infertile (Martins *et al.*, 2014) and other research suggests that the manner in which people disclose information about their stressors may influence the support they receive (Barbee and Cunningham, 1995; Derlega *et al.*, 2003). To the extent that individuals can control how they share information about their infertility experience with potential support providers, infertile women might be able to communicate in ways that increase the quality of the support they receive and, ultimately, positively impact their well-being. This communication becomes increasingly challenging when scholars appreciate the nuance in the process of disclosure.

Rather than being a unidimensional concept, women can disclose information about their infertility in a variety of ways, and these different styles of disclosure have implications for both the quality of the support they receive and their well-being.

Examining communicative behaviors that individuals employ to increase the receipt of quality social support can benefit those couples in counseling as well as those not in therapy. Therapists will be better able to equip individuals with communicative techniques to increase the quality of the comfort they receive. In addition, health-care providers can disseminate research suggesting productive disclosure strategies to their patients who are not seeking psychological treatment. This study is especially relevant because it situates the infertile individual as having control in the process of social support, and it is an inexpensive intervention to reduce stress, which might coincide with productive treatment decisions and outcomes.

We focus exclusively on women coping with infertility in the current study because they have heightened and more negative emotional reactions compared with men in response to infertility (Abbey *et al.*, 1991, Slade *et al.*, 1997; Holter *et al.*, 2007). They are also likely to act as the gatekeeper for a couple, such that they reveal information about their reproductive challenges to members of their social networks more frequently (Pasch *et al.*, 2002; Schmidt *et al.*, 2005; Peterson *et al.*, 2007b; Steuber and Solomon, 2011a, 2011b, 2012) and under different conditions than men (Steuber and Solomon, 2011a, 2012), which suggests that both the disclosure of infertility and the support process may not generalize across the sexes.

With these ideas in mind, we investigated how the disclosure strategies of 301 infertile American women coincided with support-related outcomes. More specifically, we examined how disclosure strategies that were relatively direct (i.e. in-person, face-to-face and verbal) or indirect (e.g. mediated, third-party and/or incremental) in their delivery were associated with perceptions of quality support from their social network members, as well as general quality of life and quality of life related to the experience of infertility.

Materials and Methods

Participants

The participants in this study were a community sample of 301 American women coping with infertility. The sample was collected through an electronic mailing list from a large mid-western university in the USA and its associated hospital, as well as through an online survey company that maintains a nationally representative pool of research participants. We opted to collect a community rather than a clinical sample to have variance in our participants with regard to treatment.

Procedures

Participants were sent a link to a survey and were asked to complete screening questions. Individuals who met the requirements in the screening questions were linked to an informed consent form and were invited to complete the rest of the survey, which took ~45 min. The participants (i.e. faculty, staff and students) who completed the study as part of the university mailing list were paid $15 for their participation, and people who completed the survey through the online survey company received points that could be redeemed for merchandise. The survey was completed entirely online. Prior to data collection, the study was approved by the University's Institutional Review Board.

Measures

Strategies for disclosing information about infertility

Participants used 7-point (1 = strongly disagree, 7 = strongly agree) Likert-type scales to answer questions about how they disclosed information about their infertility (modified from Afifi and Steuber, 2009). Specifically, we used three items to represent directness, which captures face-to-face personal disclosures of infertility-related information (e.g. 'I have told people about our infertility in person, face-to-face', $\alpha = 0.90$). Participants also reported their tendencies to disclose in more indirect ways: through third parties (e.g. 'I let people find out about our infertility through family members', $\alpha = 0.87$), incremental disclosures (e.g. 'I see how people respond to our infertility by revealing smaller pieces of information about it first', $\alpha = 0.92$), humor (e.g. 'I turn to humor to share information about our infertility', $\alpha = 0.86$), entrapment (e.g. 'I leave hints of our infertility in hope that people will discover them without me having to share information directly' and 'I reveal information about our infertility in the heat of an argument', $\alpha = 0.90$), indirect media (e.g. 'I share details of our infertility in emails or online messages' and 'I prefer to find ways to share details of my infertility that are not face-to-face', $\alpha = 0.87$).

Perceived support quality

Respondents answered five items to indicate their perceptions of the support quality they receive from their family and friends (e.g. 'I get excellent support' and 'I think the support I receive from family and friends is high quality') (modified from High and Solomon, 2014a). The items displayed acceptable reliability and were combined to form a composite variable where higher scores indicate greater support quality ($\alpha = 0.88$).

Quality of life

The Fertility Quality of Life Tool (FertiQoL) is an internationally validated instrument designed to measure the quality of life of individuals who are experiencing fertility problems (Boivin et al., 2011). We employed two measures in the FertiQoL questionnaire. The first index of quality of life is labeled 'fertility quality of life' and measures quality as it relates to people's experience with fertility problems. Participants indicated their agreement with 24 items (e.g. 'Do you feel drained or worn out because of fertility problems?') using 5-point Likert scales (1 = not at all; 5 = completely). The items displayed acceptable reliability, and a composite variable was calculated according to the instructions of the FertiQoL instrument. Higher scores signify greater levels of quality of life ($\alpha = 0.93$).

A second index from the FertiQoL questionnaire was employed to measure people's overall quality of life. These items assess 'general quality of life', including people's physical health. Participants responded to two items (e.g. 'Are you satisfied with the quality of your life?') using 5-point Likert scales (1 = very dissatisfied; 5 = very satisfied).

Statistical analysis

All analyses assumed one-tailed tests and were conducted using MEDIATE (Hayes and Preacher, 2014), a macro for SPSS. The different strategies of disclosure were simultaneously entered as independent variables, and support quality was included as a mediating variable. For direct effects, the macro produces unstandardized regression coefficients as estimates of effects. For indirect effects, MEDIATE is useful because it simultaneously incorporates multiple independent and mediating variables. Indirect effects do not assume a certain distribution; therefore, there is no conventional distribution-based test statistic (i.e. t, z, F) on which to base inferences of statistical significance. We employed 10 000 bootstrapped samples to generate estimates of the indirect effects, standard errors of these estimates, and 95% bias-corrected confidence intervals surrounding these effects, which serve as estimates of statistical significance. These mediating, or indirect, effects

were estimated using bootstrapping procedures recommended by Hayes (2009; Preacher and Hayes, 2008) and recent research in social support (Bodie et al., 2012). There is growing evidence that the causal steps approach introduced by Baron and Kenny (1986) no longer produces the most reliable or accurate tests of mediation or indirect effects between variables, given advances in statistical analyses and computing power. Simulation studies have reported that bootstrapping procedures generate more accurate Type I error rates and have greater power than alternative procedures, such as the Sobel test (MacKinnon et al., 2004). We ran our models twice, once with fertility quality of life and once with overall quality of life as the dependent variable.

Results

Demographic and descriptive statistics

The average age of our sample was 35 years [M = 35.12, standard deviation (SD) = 6.60] and the average length of infertility was 6.5 years. The majority of the participants identified as experiencing female factor infertility (59.1%), but the sample also included people who experienced male factor infertility (13.3%), and infertility related to conditions in both a male and female partner (9.3%). The remaining portion of the sample (18.3%) had unexplained infertility. A portion of our sample reported having not yet undergone any medically assisted treatment (39.5%); however, the majority had attempted treatment for their infertility (e.g. ovulation inducing drugs, corrective surgeries, IUI, IVF). Approximately one-third (36.2%) of the participants had undergone one to three treatments, 20.6% of our sample had undergone four to nine treatments, 4.7% had undergone 10–15 treatments, and 3.6% had undergone as many as 19 treatments for their infertility. The majority of the sample was white (84.1%), but there were also Black (8.6%), Asian (2.7%), Hispanic (1%) and multiracial (3.7%) participants. Most participants were in a relationship with a member of the opposite sex (95.7%), and participants had been in these relationships for an average of 9.4 years (SD = 6.50). The majority of our sample had a bachelor's degree (29.2%), a graduate degree (24.6%) or an associate's degree (16.3%), but we also sampled people who had attended college without completing a degree (15.9%), people who had a high school diploma (11.3%) and people who did not finish their high school education (2.3%). The sample included a range of income levels. Specifically, 35.6% of the sample had household incomes of < $49 999, 23.6% were between $50 000 and $74 999, 16.9% were between $75 000 and $99 999 and 23.6% had household incomes over $100 000.

The average scores the responses regarding disclosure strategies, perceived support quality and quality of life are summarized in Table I.

Covariates

We wanted to control for the influence of income in our analyses. Infertility treatments can be prohibitively expensive for some people, and people's economic status cannot only influence their access to treatment, but also their experience of supportive communication. Indeed, prior research has reported that social support may be most effective for people with moderate to high socioeconomic status and least effective for people from lower economic strata. Participants completed one item to measure their household income in this study (1 = < $20 000; 7 = ≥ $150 000; M = 4.07, SD = 1.67, which corresponds to an average household income of slightly > $50 000 to $74 999). We also wanted to control for how long the participants had been coping with

Table I Descriptive statistics for disclosure strategies, perceived support quality and quality of life.

	M	SD
Strategy for disclosure		
Direct	4.98	1.79
Third party	3.45	1.74
Incremental	4.13	1.62
Humor	3.68	1.87
Entrapment	3.01	1.72
Indirect media	3.17	1.71
Perceived support quality	3.51	1.04
Quality of life		
Fertility	60.23	18.86

Strategies for disclosure were based on a 7-point Likert-style scale; perceived support quality was based on a 5-item Likert-style scale, fertility quality of life was based on a range from 24 to 120, and general quality of life produced scores indicating a higher presence of each variable.
SD, standard deviation.

Table II Associations between main variables and perceived support quality from family and friends.

	Beta	Standard error
Income	0.09**	0.04
Years infertile	−0.02*	0.01
Strategy for disclosure		
Direct	0.10**	0.04
Third party	0.09	0.05
Incremental	−0.02	0.05
Humor	0.01	0.04
Entrapment	−0.05	0.06
Indirect media	−0.08	0.06

*$P < 0.05$; **$P < 0.01$.

their infertility. As previously described, infertility can be a long-lasting and intense stressor. Because the resources in people's social networks may be more easily exhausted by prolonged or traumatic stressors (Kahn and Antonucci, 1980), we included 'length of infertility' as a covariate in our models (M = 6.15, SD = 5.93). The last covariate we included in our analyses was the type of infertility people experienced, specifically male factor or female factor infertility. The experience of infertility may differ depending whether the physiological cause lies within the male or female. In addition, females have been found to disclose more about the experience of infertility, in general, than men; therefore, we added type of infertility as a covariate in our models.

We first posited that the manner in which people disclose information about their infertility is associated with perceived quality of support. Specifically, we predicted that direct disclosures elicit more positive associations with perceived support quality than indirect disclosures. This hypothesis was tested by examining the influence of the six different strategies for disclosure on perceived support quality. The only strategy of disclosure that was significantly associated with perceived support quality was direct disclosure (Table II). More specifically, the direct disclosure of experiences related to infertility was positively and significantly associated with the perception of quality of social support the women receive. None of the other strategies for disclosure were associated with variations in perceived support quality. We also observed significant effects for the covariates in this analysis, such that people with higher incomes perceived that they received higher quality support and people who have been coping with infertility for longer periods of time perceived lower quality support.

We next examined whether the different styles of disclosing information about infertility were associated with quality of life. These analyses were tested with two measures: a measure of women's fertility quality of life and overall quality of life. The results of these tests indicated that perceived support quality and income levels were both positively associated with quality of life both in relation to the infertility experience and overall. Strategies of disclosure that focused on entrapment and use of indirect media were significantly and negatively associated with fertility quality of life. Other strategies of disclosure, including direct disclosures were not associated with fertility quality of life (Table III). However, direct disclosures and incremental disclosures were both positively and significantly associated with women's overall quality of life. In contrast, the use of humor was negatively associated with overall quality of life. These results indicate that the manner in which women disclose information about their infertility has implications for their fertility quality of life, and that direct and incremental disclosures are positively associated with overall quality of life.

The final set of analyses examined whether perceived support quality mediates the influence of strategies for disclosing information about infertility on life quality. In other words, people's strategies of disclosing information about their infertility may influence well-being, in part, because they elicit quality social support. Accordingly, we examined the indirect effects of strategies of disclosure on quality of life through perceived support quality as the multiplicative product of two separate associations: (i) between strategies of disclosure and perceived support quality and (ii) between perceived support quality and quality of life. In particular, we employed bootstrapping procedures to generate estimates of the indirect effects, standard errors of these estimates, and 95% bias-corrected confidence intervals surrounding these effects based on 10 000 bootstrapped samples from the data (Table IV). Results are interpreted to be significant if the associated confidence interval does not include zero.

For both measures of quality of life (i.e. fertility quality of life and overall quality of life), the indirect associations for only the strategy of direct disclosure with quality of life through perceived support quality were significant. Support quality mediated the influence of direct disclosure on women's quality of life, and direct disclosures were the only strategy of disclosing information that had a significant indirect effect with quality of life (Table IV). This effect is particularly noteworthy for the model predicting fertility quality of life, which exhibited a non-significant main effect with direct disclosures. The non-significant main effect combined with the significant indirect effect suggests that perceived support quality fully mediates the association between direct disclosures and fertility quality of life. Perceived support quality, on the other hand, emerged as a partial mediator of the influence between direct disclosures and overall quality of life. Both of these effects suggest that quality of life for

Table III Associations for strategies of disclosure and perceived support quality with quality of life.

Main variables	Beta	Standard error
Dependent variable: quality of life related to the infertility experience		
Income	1.23*	0.59
Years infertile	0.16	0.17
Support quality	5.22***	0.93
Strategy for disclosure		
Direct	0.42	0.57
Third party	1.03	0.79
Incremental	−1.14	0.76
Humor	1.18	0.63
Entrapment	−3.77***	0.92
Indirect media	−2.57***	0.89
Dependent variable: overall quality of life		
Income	0.06*	0.03
Years infertile	0.01	0.01
Support quality	0.20***	0.04
Strategy for disclosure		
Direct	0.06*	0.03
Third party	0.03	0.04
Incremental	0.07*	0.04
Humor	−0.08**	0.03
Entrapment	−0.04	0.04
Indirect media	−0.03	0.04

*P < 0.05; **P < 0.01; ***P < 0.001.

Table IV Indirect effects of strategies for disclosure on quality of life through perceived support quality.

Strategy of disclosure	Beta	Standard error	95% Confidence interval
Dependent variable: quality of life related to the infertility experience			
Strategy for disclosure			
Direct	0.54	0.22	(0.18, 1.05)
Third party	0.45	0.27	(−0.02, 1.07)
Incremental	−0.11	0.28	(−0.70, 0.41)
Humor	0.06	0.23	(−0.38, 0.55)
Entrapment	−0.27	0.36	(−1.04, 0.38)
Indirect media	−0.39	0.31	(−1.05, 0.17)
Dependent variable: overall quality of life			
Strategy for disclosure			
Direct	0.20	0.01	(0.10, 0.30)
Third party	0.02	0.01	(−0.01, 0.04)
Incremental	−0.01	0.01	(−0.03, 0.02)
Humor	0.01	0.01	(−0.02, 0.02)
Entrapment	−0.01	0.02	(−0.04, 0.01)
Indirect media	−0.01	0.02	(−0.04, 0.01)

women is enhanced when they perceive that they obtain effective support by directly disclosing information about their infertility.

Discussion

Research suggests that social support can buffer the negative effects of stress for a variety of issues, infertility in particular. In this study, we examine communicative behaviors that might increase the chances of eliciting quality social support, and show how those behaviors and the perceived quality of support people receive are associated with quality of life. This information is important to therapists, but can also be disseminated by doctors and other health-care providers when counseling is not sought or is unavailable to the couple.

To ascertain social support, individuals need to reveal features of the stressor. Psychological research as far back as Pennebaker (1989) demonstrated that concealing thoughts and emotions about important events exacerbates stress. From an applied perspective, psychologists suggest that finding ways to communicate emotions during a traumatic stressor helps foster resilience and adversity (Fazio et al., 2008). There are a variety of ways women can disclose details about their infertility, but results suggest that doing so in a face-to-face and direct manner might coincide with the perception of higher quality support. Our tests of mediation revealed that the effect of direct disclosures on fertility quality of life was fully mediated by perceptions of support quality. Perceived support quality also partially mediated the effect of direct disclosures on overall quality of life. In other words, direct disclosures maintained a significant and positive association with both perceived support quality and quality of life in our sample of infertile women. Taken together, our two mediation analyses suggest that direct disclosures correspond with positive support from social network members, which in turn, corresponds with increased quality of life. Our findings indicate that direct disclosures might be the most effective strategy for garnering quality support and, ultimately, quality of life; however, the association between disclosing and quality of life is mediated by whether the disclosure garnered quality comfort. Future studies need to validate this finding by conducting longitudinal studies to ascertain whether the perception of support yields direct disclosures, if direct disclosures elicit support, or if there is a more nuanced interplay between these variables.

Results for the indirect strategies for revealing infertility-related information (i.e. strategies that were not in-person, not clear and/or lacked immediate responses) offer an interesting story. Firstly, all indirect strategies except incremental disclosures are not correlated or correlate negatively with outcome variables. These findings suggest that disclosing in most indirect ways does not coincide with perceptions of quality support but might also be detrimental to people's quality of life. The one exception is incremental disclosures, which were positively associated with overall quality of life, suggesting that testing the waters before disclosing fully might effectively improve overall quality of life. This result is theoretically consistent with the conceptual focus of incremental disclosure. Incremental disclosure is the practice of sharing small pieces of information at a time to gauge reactions before disclosing further. The most common way to incrementally disclose is in face-to-face interactions because doing so allows a discloser to monitor the reactions of the person receiving the sensitive information. In this way, incremental disclosure is a similar, albeit more cautious, form of direct disclosure. Both direct disclosures and incremental disclosures

involve the support seeker directly revealing information, and this might be the mechanism that enables support providers to succeed in their comforting efforts. In other words, perhaps the fact that both of these disclosures likely happen in real time, giving the support seeker and provider the chance to immediately clarify, adjust and read each other, are the features that enable effective support.

The findings suggested that humorous disclosures negatively coincided with overall quality of life. Existing research suggests that, if used in an affiliative way, humor can be a way to develop and maintain networks for support and, ultimately, well-being (Kuiper and McHale, 2009). In practice, humor that is well timed is also a way to foster connection and alleviate the emotional burdens of a stressor (Fazio and Fazio, 2005). Our results align with Kuiper and McHale (2009) suggesting that if humor is used in a self-defeating matter, it can actually be an obstacle to achieving quality of life and be disruptive to social network maintenance. One feature of humor is that it might inhibit clarity (e.g. 'Is this not a big deal to the person?' or 'Should I laugh it off and avoid the topic?'). We believe that the use of humor might hinder the ability of support providers to read the severity of a stressor, leaving them in an ambiguous position for how to console someone coping with infertility. Although using humor might be a relatively low risk way to disclose information about a stressor and offer immediate comfort in a hard situation, our results reveal that it might coincide with decreased overall quality of life, perhaps because its ambiguity inhibits a support provider from assessing the severity of a situation.

Other indirect strategies might inhibit support providers from gathering relevant information about the stressor that is bothering a person in need of comfort. Specifically, entrapment and indirect media were negatively associated with fertility quality of life. Entrapment is the act of leaving hints or reactively disclosing in response to a negative situation (e.g. argument, insensitive comment). Firstly, support providers could experience negative emotions in response to being disclosed to in an unexpected way, such as feeling hurt that the disclosure was communicated in that form, or being aggravated that they are put on the spot without warning. Secondly, disclosing in a way that surprises or catches potential providers off guard might mean that their responses are reactive or not typical of their support provision. Providing support is a challenging enough endeavor in a normal interaction (Burleson, 2003), and being faced with unexpected, abrupt disclosures during an argument has the potential to magnify the complexity of the situation.

Taken together, our statistical analysis suggests that when people made the decision to reveal information, disclosing directly (i.e. face-to-face, clearly, verbally and with the chance for an immediate response) about infertility might be the only strategy of disclosure linked to effective social support. It was also one of only two strategies that seem to be positively associated with people's quality of life. Further, indirectly disclosing information about infertility to family and friends might actually negatively correlate with people's quality of life and infertility experience.

It should be noted that our study contains a number of limitations. Firstly, the study was cross-sectional in nature. Because of this design, directional influence cannot be ascertained. It is equally plausible that these women are disclosing more because they sense a supportive environment. Similarly, Greene's (2009) idea of anticipated reactions might predict the type of strategies chosen, as could Afifi and Steuber's (2009) ideas of assessment of risk and valence of the information. Other research examining the direction of association between support seeking and positive states suggests that it is more likely that seeking support contributes to positive states than vice versa (Williams and Mickelson, 2008). The model tested in this study, however, should be considered exploratory in nature, and longitudinal designs must be investigated to determine the interplay of support and disclosure.

Although intentional, our sample was entirely female. We focused on women because their support desires and disclosure patterns are significantly different to that of men. Because women document more emotional stress than men during infertility, we chose a female sample as a starting point in this Program of research. Future work needs to examine how the support process works within male samples, because research suggests that they disclose less frequently (Slade et al., 2007; Steuber and Solomon, 2011a) and thus might not be ascertaining sufficient support for this stressor.

Finally, we would like to offer an important caveat to our work. This research does not actually suggest that women should disclose information about their infertility. A plethora of research examines the conditions for which disclosure is likely or unlikely (see Afifi and Steuber, 2009; Steuber and Solomon, 2011a, 2011b, 2012). This research study examines potential communicative behaviors to use if women decide to reveal information, not whether they should reveal information. There are risks and benefits to disclosing private information, and it is important to note that revealing information, regardless of the strategy used, can result in negative outcomes.

Considered within the limitations of our research, our results suggest that when infertile women disclose to their social networks about their stressor in a direct manner, they perceive that they perceive higher quality social support. Direct disclosures also coincide with both general and fertility quality of life. This latter relationship is mediated by people's perceptions of the quality of the support they receive, such that direct disclosures coincide with perceptions of effective social support, which, in turn, are associated with enhanced quality of life. Indirect strategies of entrapment, humor, third-party disclosures and indirect mediums all coincided negatively with support quality and quality of life. Women coping with infertility may disclose information about their condition to receive comfort; however, the manner in which they disclose has important implications for the efficacy of the social support they receive and the quality of life they ultimately experience.

Acknowledgements

Authors' roles

K.R.S. and A.H. participated in the concept and design of the study and data collection. A.H. was responsible for data analysis. K.R.S. drafted the manuscript. K.R.S. and A.H. revised the drafts and approved of the final version of the manuscript.

Funding

Conflict of interest

None declared.

References

Abbey A, Andrews FM, Halman LJ. Gender's role in responses to infertility. *Psychol Women Q* 1991;**15**:295–316.

Afifi T, Steuber KR. The revelation risk model (RRM): factors that predict the revelation of secrets and the strategies used to reveal them. *Commun Monogr* 2009;**76**:144–176.

Barbee AP, Cunningham MR. An experimental approach to social support communications: interactive coping in close relationships. In: Burleson BR (ed). *Communication Yearbook 18*. Thousand Oaks, CA: Sage, 1995, 381–413.

Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol* 1986;**51**:1173–1182.

Bodie GD, Burleson BR, Jones SM. Explaining the relationships among supportive message quality, evaluations, and outcomes: a dual-process approach. *Commun Monogr* 2012;**79**:1–22.

Boivin J, Takefman J, Braverman A. The fertility quality of life (FertiQoL) tool: development and general psychometric properties. *Hum Reprod* 2011;**26**:2084–2091.

Brandes M, Van Der Steen JOM, Bokdam SB, Hamilton CJCM, De Bruin JP, Nelen WLDM, Kremer JAM. When and why do subfertile couples discontinue their fertility care? A longitudinal cohort study in a secondary care subfertility population. *Hum Reprod* 2009;**24**:3127–3135.

Burleson BR, MacGeorge EL. Supportive communication. In: Knapp ML, Daly JA (eds). *Handbook of Interpersonal Communication*, 3rd edn. Thousand Oaks, CA: Sage Publications, 2002, 34–424.

Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. *Psychol Bull* 1985;**98**:310.

Cousineau TM, Domar AD. Psychological impact of infertility. *Baillieres Best Pract Res Clin Obstet Gynaecol* 2007;**21**:293–308.

Derlega VJ, Winstead BA, Oldfield EC, Barbee AP. Close relationships and social support in coping with HIV: a test of sensitive interaction systems theory. *AIDS Behav* 2003;**7**:119–129.

Domar A, Gordan K, Garcia-Velasco J, La Marca A, Barriere P, Beligotti F. Understanding the perceptions of and emotional barriers to infertility treatment: a survey in four European countries. *Hum Reprod* 2012;**27**:1073–1079.

Fazio RJ, Fazio LM. Growth through loss: promoting healing and growth in the face of trauma, crisis, and loss. *J Loss Trauma* 2005;**10**:221–252.

Fazio RJ, Rashid T, Hayward H. Growth through loss and adversity: a choice worth making. In: Lopez SJ (ed). *Positive Psychology: Exploring the Best in People*. Westport, CN: Praeger, 2008, 1–27.

Greene K. An integrated model of health disclosure decision-making. In Afifi TD, Afifi WA (eds). *Uncertainty, Information Management, and Disclosure Decisions*. New York: Routledge, 2009, 226–254.

Greil AL, Slauson-Blevins K, McQuillan J. The experience of infertility: a review of recent literature. *Sociol Health Illn* 2010;**32**:140–162.

Hayes AF. Beyond Baron and Kenny: statistical mediation analysis in the new millennium. *Commun Monogr* 2009;**76**:408–420.

High AC, Solomon DH. Communication channel, sex, and the immediate and longitudinal outcomes of verbal person-centered support. *Commun Monogr* Available Online First. (2014a). .

High A, Steuber KR. Support gaps of type and source of support: an examination of the support perceptions of infertile women. *Commun Monogr* 2014;**81**:157–178.

Holter H, Anderheim L, Bergh C, Möller A. The psychological influence of gender infertility diagnoses among men about to start IVF or ICSI treatment using their own sperm. *Hum Reprod* 2007;**22**:2559–2565.

Jones SM. Attachment style differences and similarities in evaluations of affective communication skills and person-centered comforting messages. *West J Commun* 2005;**69**:233–249.

Kahn RL, Antonucci TC. Convoys over the life course: attachment, roles, and social support. *Life-span development and behavior* 1980;**3**:253–286.

Kuiper NA, McHale N. Humor styles as mediators between self-evaluative standards and psychological well-being. *J Psychol* 2009;**143**:359–376.

Lechner L, Bolman C, Van Dalen A. Definite involuntary childlessness: associations between coping, social support and psychological distress. *Hum Reprod* 2007;**22**:288–294.

MacKinnon DP, Lockwood CM, Williams J. Confidence limits for the indirect effect: distribution of the product and resampling methods. *Multivar Behav Res* 2004;**39**:99–128.

Martins MV, Peterson BD, Almeida V, Mesquita-Guimaraes J, Costa ME. Dyadic dynamics of perceived social support in couples facing infertility. *Hum Reprod* 2014;**29**:83–89.

Newton CR, Sherrard W, Glavac I. The fertility problem inventory: measuring perceived infertility-related stress. *Fertil Steril* 1999;**72**:54–62.

Olivius C, Friden B, Borg G, Bergh C. Why do couples discontinue in vitro fertilization treatment? A cohort study. *Fertil Steril* 2004;**81**:258–261.

Pasch LA, Dunkel-Schetter C, Christensen A. Differences between husbands' and wives' approach to infertility affect marital communication and adjustment. *Fertil Steril* 2002;**77**:1241–1247.

Pennebaker JW. Confession, inhibition and disease. In: Berkowitz L (ed). *Advances in Experimental Social Psychology*. Academic: New York, 1989, 211–244.

Peterson BD, Gold L, Feingold T. The experience and influence of infertility: considerations for couple counselors. *Fam J* 2007a;**15**:251–257.

Peterson BD, Newton CR, Feingold T. Anxiety and sexual stress in men and women undergoing infertility treatment. *Fertil Steril* 2007b;**88**:911–914.

Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav Res Methods* 2008;**40**:879–891.

Rajkhowa M, McConnell A, Thomas GE. Reasons for discontinuation of IVF treatment: a questionnaire study. *Hum Reprod* 2006;**21**:358–363.

Schmidt L. Infertility and assisted reproduction in Denmark. *Dan Med Bull* 2006;**53**:390–417.

Schmidt L, Holstein BE, Christensen U, Boivin J. 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. *Hum Reprod* 2005;**20**:3248–3256.

Servaty-Seib HL, Burleson BR. Bereaved adolescents' evaluations of the helpfulness of support-intended statements: associations with person centeredness and demographic, personality, and contextual factors. *J Soc Pers Relat* 2007;**24**:207–223.

Slade P, Emery J, Lieberman BA. A prospective, longitudinal study of emotions and relationships in in-vitro fertilization treatment. *Hum Reprod* 1997;**12**:183–190.

Slade P, O'Neill C, Simpson A, Lashen H. The relationship between perceived stigma, disclosure patterns, support and distress in new attendees at an infertility clinic. *Hum Reprod* 2007;**22**:2309–2317.

Steuber KR, Solomon DH. Relational uncertainty, partner interference, and infertility: a qualitative study of discourse within online forums. *J Soc Pers Relat* 2008;**25**:831–855.

Steuber KR, Solomon DH. Factors that predict married partners' disclosures about infertility to social network members. *J Appl Commun Res* 2011a;**39**:250–270.

Steuber KR, Solomon DH. "So, when are you two having a baby?" Managing information with social network members during infertility. In: Miller-Day M (ed). *Family Communication, Connections, and Health Transitions*. New York: Peter Lang Publishing, 2011b, 297–322.

Steuber KR, Solomon DH. Relational uncertainty, partner interference, and privacy boundary turbulence: explaining discrepancies in spouses' infertility disclosures. *J Soc Pers Relat* 2012;**29**:3–27.

Van den Broeck U, Holvoet L, Enzlin P, Bakelants E, Demyttenaere K, D'Hooghe T. Reasons for dropout in infertility treatment. *Gynecol Obstet Invest* 2009;**68**:58–64.

Vasaard D, Lund R, Pinborg A, Boivin J, Schmidt L. The impact of social relations among men and women in fertility treatment on the decision to terminate treatment. *Hum Reprod* 2012;**27**:3502–3512.

Verhaak CM, Smeenk JM, van Minnen A, Kremer JA, Kraaimaat FW. A longitudinal, prospective study on emotional adjustment before, during and after consecutive fertility treatment cycles. *Hum Reprod* 2005; **20**:2253–2260.

Williams SL, Mickelson KD. A paradox of support seeking and rejection among the stigmatized. *Pers Relat* 2008;**15**:493–509.