

ARTICLE



Tailored support may reduce mental and relational impact of infertility on infertile patients and partners



BIOGRAPHY

Jacky Boivin is Professor of Health Psychology at the School of Psychology, Cardiff University. She leads the Cardiff Fertility Studies Research Group. Together with collaborators she has led pioneering research into the psychosocial aspects of fertility and produced many tools for patient support in fertility care.

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KEY MESSAGE

This study demonstrated that the impacts of the infertility journey varied across journey stages and by patient or partner experience, and that mental health, relational strain and daily activities probably have bidirectional effects. These findings strongly support the need for tailored patient care throughout the infertility journey targeted at differing patient and partner needs.

ABSTRACT

Research question: What is the psychological impact of infertility on infertile patients and partners of infertile patients?

Design: This online, international, quantitative survey assessed the impact of infertility on mental health, relationships and daily activities for 1944 respondents. Respondents were male or female infertile patients ($n = 1037$) or partners to infertile patients ($n = 907$; not necessarily partners of the patient sample) and were recruited at different stages of the treatment journey.

Results: The most common emotions were 'sadness' at infertility diagnosis and 'anxiety' during treatment. Emotions differed in nature and intensity throughout the journey. Envy of others who achieved pregnancy was frequently reported by women. More than half of respondents (60.4%; $n = 1174$) perceived the infertility journey to have impacted their mental health, and 44.1% ($n = 857$) of respondents sought mental health support. More patients reported mental health impacts (70.1%, $n = 727$) than partners (49.3%, $n = 447$). One in three respondents indicated that their relationship had suffered due to the infertility diagnosis. Of these respondents, 55.0% ($n = 409$) strongly agreed that infertility caused an emotional strain. Patients more often than partners

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KEYWORDS

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reported a detrimental impact on daily activities. Respondents most commonly agreed with statements regarding an 'effect on work-life balance'.

Conclusion: Treatment journey stages are defined by their impact profile, which differs between infertile patients and partners of infertile patients. Negative impacts are diverse (mental health, relational, daily activities). There was disparity between the number of respondents reporting mental health issues and the number seeking mental health support. This indicates the need for support services tailored to different treatment stages.

INTRODUCTION

Infertility is a significant clinical issue, estimated to affect 8–12% of couples around the world in 2015 (Kumar and Singh, 2015). This rises to one in four couples in some developing countries, according to the World Health Organization (WHO) in 2004 (World Health Organization, 2004). Infertility is becoming increasingly common, which may partly be due to the modern trend to delay pregnancy until later in life (Inhorn and Patrizio, 2015). Infertility is defined as the failure to establish a clinical pregnancy after 12 months of regular, unprotected sexual intercourse or due to an impairment of a person's capacity to reproduce either as an individual or with his/her partner (Zegers-Hochschild et al., 2017). This can have a profound emotional and physiological impact on couples trying to achieve pregnancy, often exacerbated by the complex fertility treatment pathway, which can be daunting to navigate.

Infertility diagnosis and fertility treatments can have a significant impact on the mental health of patients, as is well documented in the literature (Abdishahshahani et al., 2020; Hasanpoor-Azghdy et al., 2014; Masoumi et al., 2019). A meta-analysis found that some degree of mild, moderate or severe depression affected 50% of infertile couples between 2006 and 2011, having increased from 44% of infertile couples between 2000 and 2005 (Masoumi et al., 2013). A 2018 study highlighted anxiety as an impact of the infertility journey and estimated a prevalence in infertile couples of 50% (Maroufizadeh et al., 2018). Some studies have suggested that these effects on mental health may result in secondary disorders with an impact on sexual intercourse and therefore reduce the likelihood of a successful pregnancy (Palomba et al., 2018; Podolska and Bidzan, 2011; Rooney and Domar, 2018). However, this theory remains unconfirmed.

Previous studies have indicated that relationships with partners are reported to become less stable with increasing

duration of infertility and number of unsuccessful treatment courses (Tao et al., 2012). The issue of continuing with treatment is reportedly a source of contention within couples, due to the substantial personal and financial costs involved (Daniluk, 2001). This can have serious implications for mental and social well-being, particularly as the partner is seen as the most important source of support during infertility treatment (Tao et al., 2012).

Infertility treatment can also have an impact on the daily lives of patients, including both work and leisure pursuits (Bouwman et al., 2008; Collins, 2019). The out-of-pocket costs (costs paid by the user) and time commitment of treatments affect the ability of patients to carry out their daily routines, which may result in social withdrawal. This reduction in social engagement is thought to be impacted by stigmatization of infertility by others and feelings of inferiority in comparison to peers (Wirtberg et al., 2006).

The majority of research into the impacts of the infertility journey considers only female patient perspectives, despite suggestions that there are sex differences in adjustment to fertility treatment programmes and in perceptions of the aspects of the patient-partner relationship (Kroemeke and Kubicka, 2018; Tao et al., 2012). Therefore, studies often neglect the perspectives of males overall, and the partners of patients considering fertility treatment. This gap in current literature means that there is an unmet need in understanding the impact of infertility in key demographics of people experiencing this burden.

The aim of this study was to explore the association between the stages of the infertility journey and the mental health, daily lives and relationships of male and female infertile patients and their partners. This was part of a larger cross-sectional study that aimed to explore the overall time taken to progress through the infertility journey and the impact it had on all aspects of the lives of patients and partners (Domar et al., 2021).

MATERIALS AND METHODS

Study design

This study was conducted with male and female patients who had previously received a medical infertility diagnosis and partners to infertile patients, and used a quantitative questionnaire to define the impacts of the infertility journey. An initial non-systematic literature review was conducted to explore understanding of fertility and the physical, emotional, psychosocial and financial impact of the treatment journey on infertile patients and partners. This highlighted areas for further research and informed the development of a quantitative, international, 30-minute online survey, which was used in the present study. The survey was developed in English and translated into local languages. All translations were validated by national linguists. Data were collected from 15 March to 17 May 2019. Respondents and their responses were anonymised.

The initial recruitment target was 1980 respondents who were either infertile patients or partners to infertile patients (but not necessarily partners to the patient sample). This was based on 110 patients and 110 partners from each of the nine countries included (Australia, Canada, China, France, Germany, Italy, Spain, UK and USA). Male and female respondents were included as patients and partners to infertile patients.

All respondents reported either having been directly diagnosed with infertility by a medical professional (patient) or being a partner of someone diagnosed with fertility issues (partner). Further sub-quotas were included to recruit respondents at different stages of the 'treatment journey', and respondents were recruited following self-report of either a professional infertility diagnosis, medical consultation or one or more cycles of fertility treatment. The treatment journey was defined according to the following stages: received a medical diagnosis but did not explore a consultation (diagnosis stage), received a consultation but did not enrol in treatment (pretreatment),

received fertility treatment and achieved live birth (treatment/birth) and received at least one cycle of treatment and were unsuccessful (treatment/no birth). The medical treatment for respondents who had received at least one treatment cycle was either assisted reproductive technology (ART), intrauterine insemination (IUI) or donor gametes.

An e-mail invitation was sent to respondents through data collection partner M3 Global Research to ask them to participate in the survey about their experiences with infertility. This alerted the respondent to the duration and general topic of the survey and the honorarium amount. This also provided additional guidance on what was required. Respondents were informed that responses were confidential and provided in aggregate. M3 Global Research holds both ISO 20252 (Market Research Standards) and ISO 27001 (Information Security Standards) and all e-mail invitations complied with these guidelines.

A screener was included at the start of the survey to exclude respondents who did not meet the screening criteria. Respondents who progressed to the survey were over 18 years old and had received, or had a partner who had received, a medical diagnosis of infertility under the age of 50 (see Supplementary Materials for full screening criteria). Respondents who completed the full survey were provided with an honorarium (compliant with relevant guidelines).

Respondents were initially asked to recount their emotional responses to diagnosis and treatment and could select between 21 pre-specified emotional responses. These responses were then grouped into four theoretical categories for further analysis: 'overwhelmed and panic', 'depression and defeat', 'stigma' and 'isolation'. Respondents were then asked whether the infertility journey impacted their mental health (yes/no) and whether they were recommended, or sought, mental health support. Those who sought mental health support were asked to select their sources of support from a pre-specified list of eight responses. Following this, respondents who indicated that the infertility journey had a negative impact on their relationship with their partner were presented with nine statements regarding relationship impacts and reported their level of agreement on a scale of 1 (do not

agree) to 7 (strongly agree). Respondents who indicated that their infertility diagnosis had a negative impact on their activities of daily living were presented with seven statements on the impact on daily activities and reported their level of agreement on a scale of 1 (do not agree) to 7 (strongly agree). Further details of methods used in the exploratory factor analysis are outlined in the section below.

Ethical approval was not required for this survey study as per the European Pharmaceutical Market Research Association (EphMRA) Code of Conduct 2017 (<https://www.ephmra.org/media/1785/ephmra-2017-code-of-conduct-october-2017.pdf>).

Statistical analysis

Exploratory factor analysis on emotional response items was conducted to identify the core emotional profile that characterized the responses of patients and partners at the time of infertility diagnosis versus during treatment. Data were screened for multivariate assumptions (normality, linearity, homogeneity and homoscedasticity), and all assumptions were met with slight linearity problems. Fewer than nine multivariate outliers were detected using Mahalanobis distance and removed from the respective analyses. Bartlett's test indicated correlation adequacy, and the Kaiser–Meyer–Olkin test indicated sampling adequacy. A parallel analysis and screen plot examination was performed, and a four-factor model was tested. Maximum likelihood estimation was used with varimax rotation. The final models were constructed using all 20 emotional response questions for all respondents, patients and partners (both at diagnosis and during treatment) and applying the criterion that loadings must be ≥ 0.3 . The root mean squared error was ≥ 0.05 , indicating a good fit for the data for the respective models. The mean scores for each factor are also reported.

Paired *t*-tests were then performed to detect differences between emotions reported by respondents at the diagnosis stage and those at the treatment stage. Chi-squared test was used to determine the association between seeking mental health support and: seeking treatment, emotional response to the treatment journey, and outcome of treatment (i.e. whether treatment was successful). Summary scores were created for rankings of the impact on relationships

and daily activities, and *t*-tests were performed to analyse differences between the two scores. A further *t*-test detected associations between seeking mental health support and impacts on relationships and daily activities. An analysis of variance (ANOVA) test analysed the relationship between the type of support sought and relational and daily impacts.

A separate cluster analysis was run using Jaccard distances and hierarchical clustering to identify respondent groups reporting common sets of emotional responses. Additionally, Welch's *t*-test was used to determine the impact of seeking mental health support on the ability to carry out daily tasks.

The *P*-value threshold used to determine statistical significance for all statistical tests was $P = 0.05$.

RESULTS

Patient characteristics

In total, data were available from 1944 respondents including infertile patients ($n = 1037$) and partners to infertile patients ($n = 907$; but not necessarily partners of the patient sample). Both male and female respondents were recruited as patients and partners to infertile patients. Respondents were recruited from nine countries (Australia, Canada, China, France, Germany, Italy, Spain, UK and USA).

FIGURE 1 shows the number of respondents recruited at each stage of the infertility journey. Of the initial 1944 recruited, 1232 were in the pretreatment group. Of those in the pretreatment group, 836 recorded that they had received treatment and 189 were planning to move forward with treatment in the future. There were 95 respondents who had discontinued their treatment for a reason other than having achieved pregnancy.

As shown in **TABLE 1**, respondents were, on average, in their mid-30s, heterosexual and partnered (more detailed demographic and fertility information is presented in Supplementary Table 1). Eligibility for treatment funding was assessed for respondents who sought treatment, with the highest proportion of respondents reporting coverage by private health insurance (see Supplementary Table 2 for more information).

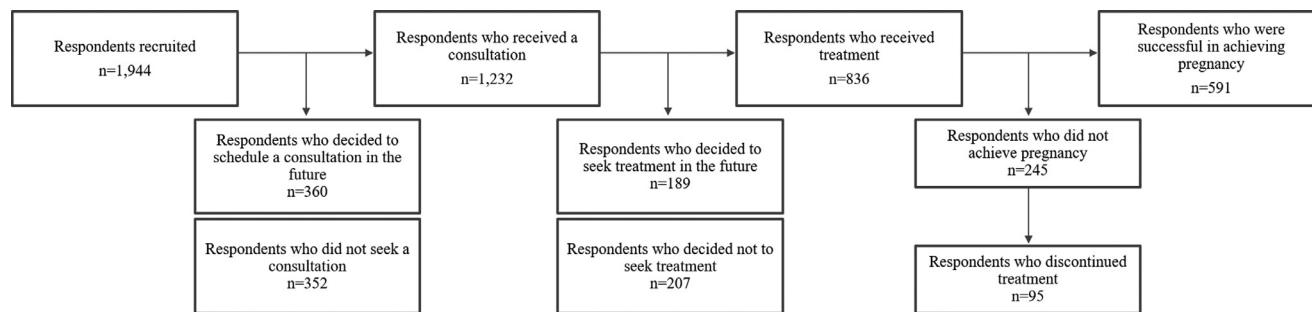


FIGURE 1 Flow diagram showing the number of respondents reporting at each stage of the infertility journey.

Emotional responses to diagnosis and treatment

The most common emotions were 'sadness' at diagnosis and 'anxiety' during treatment (see Supplementary Table 3 for more information). There were four main clusters of emotions frequently reported together: 'worry' and 'anxiety'; 'anxiety', 'frustration' and 'overwhelmed'; a mix of many different emotions, excluding 'lost', 'loneliness' and 'panic'; and 'fear' and 'sadness'.

Chi-squared analysis revealed that the frequency of the following reported emotions was higher than statistically expected frequencies for respondents receiving mental health support: 'loneliness' ($P = 0.03$), 'shame' ($P = 0.003$), 'depression' ($P = 0.01$), 'panic' ($P = 0.03$), 'shock' ($P = 0.03$) and 'feeling defeated' ($P = 0.02$).

Exploratory factor analysis determined the core emotional response profiles at two stages of the treatment journey: at diagnosis and during treatment, respectively (further information can be found in Supplementary Table 4) **TABLE 2**. shows the components of each factor and their corresponding loading scores **FIGURE 2**. shows the core profiles of patients and **FIGURE 3** shows the core profiles of partners.

For patients, four main factors were highlighted, with 'depression and defeat', 'isolation' and 'stigma' significantly more intense at diagnosis than during treatment ($P \leq 0.001$). The fourth factor, 'overwhelmed and panic', showed no significant difference in intensity between the two treatment journey stages.

Six factors emerged for partners to infertile patients. Two of these,

'depression and defeat' and 'stigma', were consistent with the factors found in patients. However, unlike patients, the nature and intensity of the factors for partners differed between the two treatment journey stages. The only two factors reported at both stages were 'depressed', which was significantly more intense at diagnosis ($P \leq 0.001$), and 'fear', which was significantly more intense during treatment ($P \leq 0.001$).

Impact on mental health

Of the 1944 respondents, 60.4% ($n = 1174$) reported that the infertility journey, including infertility diagnosis, consultation, treatment and pregnancy, affected their mental health, as shown in **FIGURE 4**. Mental health effects were reported by a significantly higher proportion of respondents whose treatment was unsuccessful (71.4%, $n = 175$) than those who achieved pregnancy (60.6%, $n = 358$; $P = 0.003$). Analysis by subgroup revealed that a greater number of patients reported an impact on mental health (70.1%, $n = 727$) than partners (49.3%; $n = 447$), and a greater number of women reported effects on their mental health (65.8%, $n = 721$) than men (53.3%, $n = 451$).

Overall, 52.9% of respondents ($n = 1029$) were offered or recommended mental health support by a healthcare practitioner, and 44.1% ($n = 857$) reported seeking mental health support services during their infertility journey. Patients more frequently recorded that they were recommended (56.1%, $n = 582$) and sought (49.6%, $n = 514$) mental health support than partners (49.3% [$n = 447$] and 37.8% [$n = 343$], respectively).

Most countries demonstrated a greater proportion of respondents experiencing mental health effects than the proportion who sought mental health support, as shown in **FIGURE 4**. Australia reported the

TABLE 1 BASELINE CHARACTERISTICS OF OVERALL RESPONDENTS, PATIENTS AND PARTNERS

Patient characteristic	All ($n = 1944$)	Patient ($n = 1037$)	Partner ($n = 907$) ^a
Age			
Age in years, mean (SD)	35.8 (9.7)	35.0 (8.7)	36.6 (10.6)
Sex			
Male	43.6	33.8	54.7
Female	56.3	66.1	45.2
Marital status	All ($n = 1677$)	Patient ($n = 822$)	Partner ($n = 855$) ^a
Single	22.5	18.3	26.6
Married	66.7	72.0	61.6
Divorced	4.4	4.1	4.6
Widowed	1.1	0.9	1.3
Other	5.4	4.7	6.0
Sexual orientation			
Heterosexual	91.2	90.5	92.1
Homosexual	5.9	6.6	5.1
Other	2.9	3.0	2.9

Data are reported as % unless otherwise specified.

^a Partners were not necessarily partners of the patient sample.

TABLE 2 FACTOR COMPOSITION AND LOADING SCORE FOR THE EXPLORATORY FACTOR ANALYSES^a

Patients at diagnosis				Partners at diagnosis			
Depression and defeat	Overwhelmed and panic	Stigma	Isolation	Depression and defeat	Depressed	Stigma	Fear
0.3732	0.2666	0.2437	0.2126	0.2467	0.2363	0.09481	0.2602
Anger	Overwhelmed	Guilt	Loneliness	Anger	Anxiety	Guilt	Fear
Sadness	Anxiety	Shame	Isolation	Sadness	Depressed	Shame	Worry
Frustration	Fear	Embarrassment	Frustration	Hopelessness	Embarrassment		
Depressed	Worry		Hopelessness	Despair			
Hopelessness	Panic		Shock				
Envy			Envy				
Defeated			Defeated				
Patients during treatment				Partners during treatment			
Depression and defeat	Overwhelmed and panic	Stigma	Isolation	Anger and despair	Stigma and panic	Depressed	Fear
0.2133	0.2597	0.1678	0.1502	0.149	0.09308	0.176	0.3096
Anger	Overwhelmed	Guilt	Isolation	Anger	Loneliness	Sadness	Fear
Sadness	Anxiety	Shame	Frustration	Shame	Depressed	Worry	
Frustration	Fear	Embarrassment	Despair	Embarrassment	Hopelessness		
Lost	Worry		Defeated	Panic	Defeated		
Loneliness				Isolation			
Depressed							
Hopelessness							
Despair							
Envy							
Defeated							

^a Table shows which pre-specified emotional responses were used to create each factor. Loading scores for each constituent response range from -1 to 1, with higher scores indicating a greater influence on the overall factor. Loading scores relate to the bolded emotional components.

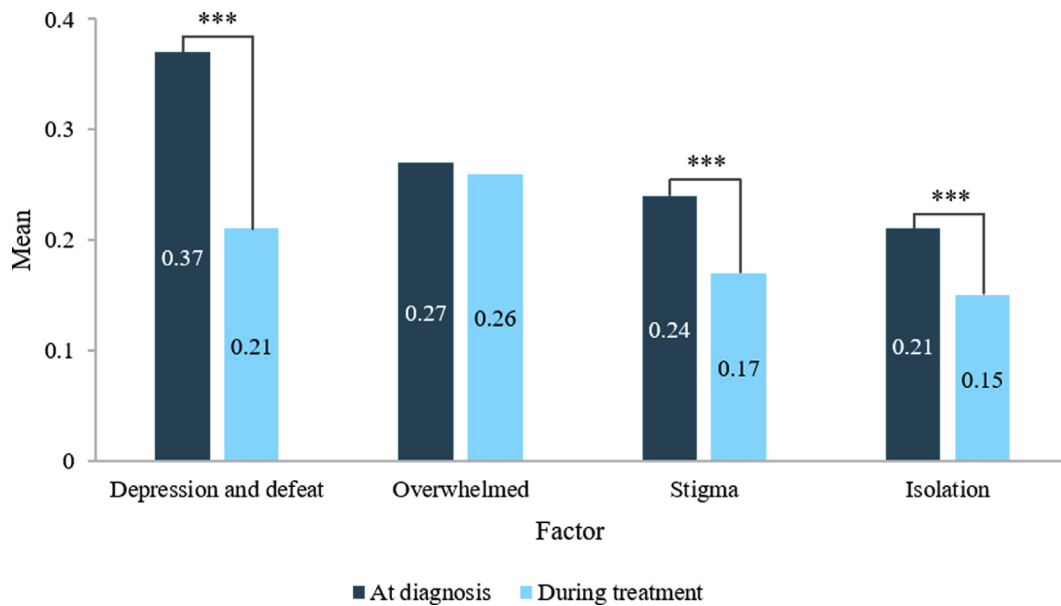


FIGURE 2 The emotional profile of patients at diagnosis and during fertility treatment.^a ^{***}*P* < 0.0001. ^aMean scores indicate the intensity of each emotional factor at diagnosis and during treatment; a greater mean score indicates a more intense emotion.

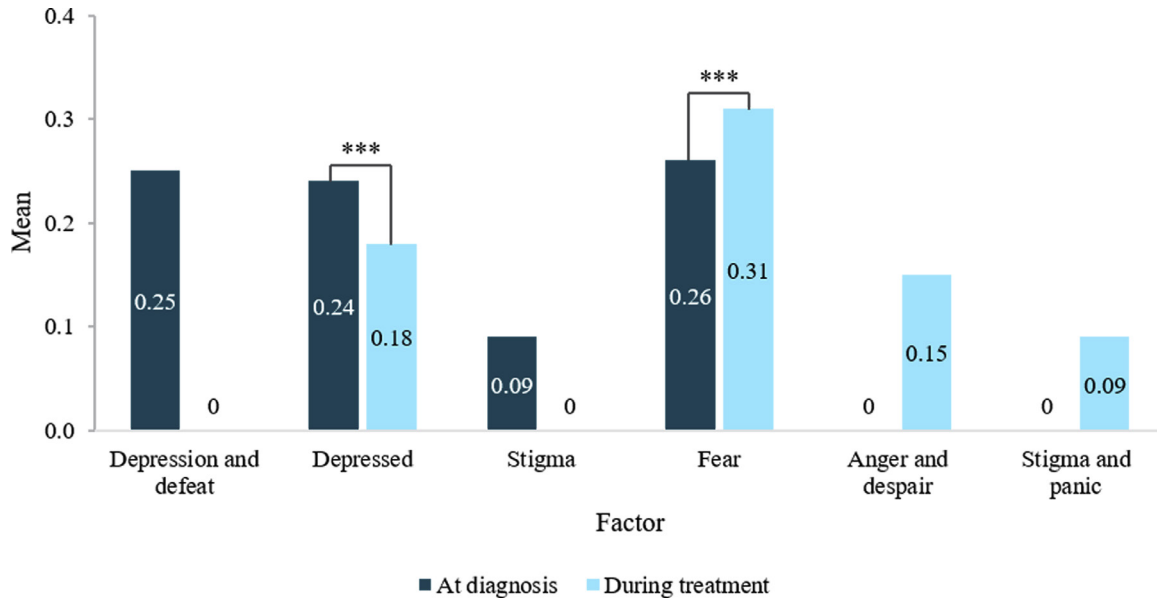


FIGURE 3 The emotional profile of partners of infertile patients at diagnosis and during fertility treatment.^{a,b} *** $P < 0.0001$. ^aPartners were not necessarily partners of the patient sample. ^bMean scores indicate the intensity of each emotional factor at diagnosis and during treatment; a greater mean score indicates a more intense emotion.

greatest difference between the two groups, where 64.5% of respondents ($n = 129$) reported mental health effects and 34.0% ($n = 68$) sought support. Notably, a higher percentage of respondents in Spain reported seeking mental health support services (43.2%, $n = 89$) than those experiencing effects on mental health (39.3%, $n = 81$).

Overall, a significantly higher proportion of respondents seeking mental health support had received fertility treatment (48.4%, $n = 415$) than those who did not seek support (38.7%, $n = 421$; $P < 0.0001$; TABLE 3). The most commonly reported source of support was ‘my partner’, reported by 45.4% of respondents ($n = 389$; TABLE 4).

The second and third most common responses comprised professional sources of support (‘support specialist, such a psychologist, therapist, social worker, etc.’, 43.3% ($n = 371$) and ‘my healthcare provider’, 41.5%, $n = 356$). Only 21.7% of respondents ($n = 186$) sought support from ‘a local support group’.

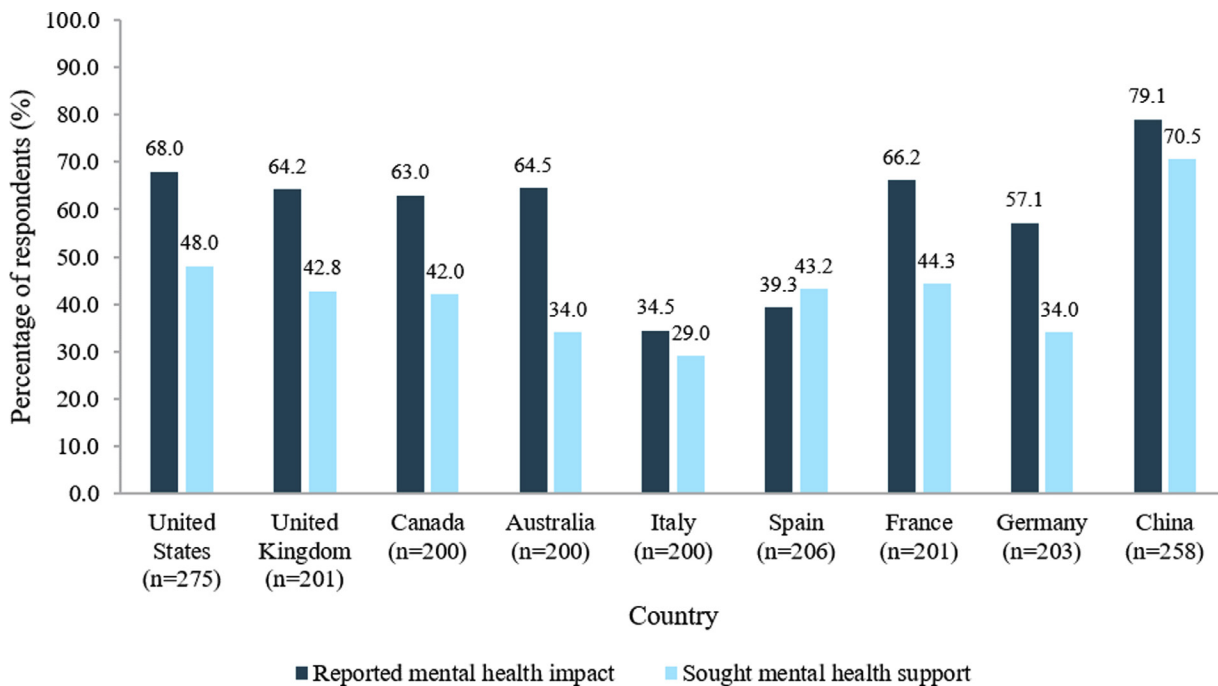


FIGURE 4 Percentage of overall respondents who reported an impact of the infertility journey on their mental health and percentage who sought mental health support, by country.

TABLE 3 PERCENTAGE OF OVERALL RESPONDENTS, PATIENTS AND PARTNERS RESPONDING WITH 'YES' TO QUESTIONS ABOUT MENTAL HEALTH AND SUPPORT SERVICES

Question	Percentage of respondents selecting 'yes' (%)		
	Overall respondents (n = 1944)	Patients (n = 1037)	Partners (n = 907) ^a
Did [your/your partner's] fertility journey (diagnosis, treatment, conception, etc.) have any effect on your mental health?	60.4	70.1	49.3
Were you offered or recommended mental health support by any healthcare practitioner?	52.9	56.1	49.3
At any point during [your/your partner's] fertility journey, did you seek any support services (such as therapy, group support, etc.) for your mental health?	44.1	49.6	37.8

^a Partners were not necessarily partners of the patient sample.

Life impacts

Regarding the impact of the infertility journey on relationships, the statement most strongly agreed with overall was '[My/my partner's] fertility diagnosis and subsequent treatment impacted our relationship emotionally' (see Supplementary Tables 5 and 6 for responses to individual items). Supplementary Figure 1 shows that 55.0% (n = 918) of respondents agreed strongly with this statement. There was little difference between patient and partner responses.

The overall summary scores showed that patients reported a greater impact of infertility on daily activities than their relationships, although this result was not significant (FIGURE 5). The most strongly agreed with statement relating to the impact of infertility diagnosis on daily activities was '[My/my partner's] fertility diagnosis began to impact my work-life balance', with a higher average ranking among patients than partners (see Supplementary Table 7 for responses to individual items).

Supplementary Figure 2 shows that the highest proportion of respondents agreed strongly with '[My/my partner's] fertility diagnosis began to impact my work-life balance' (49%; n = 800). The rating of the extent to which infertility diagnosis impacted daily living was significantly higher among all respondents who sought mental health support than those who did not (P = 0.004).

Respondents who sought mental health support (n = 857) reported significantly higher negative impacts on relationships and daily activities than those who did not seek mental health support (P = 0.004). Diverse forms of support were sought (TABLE 4). Among those who sought support, the type of support sought was not significantly associated with extent of relational impact (F(dfs) = 1.652, P = 0.105) or daily impacts (F(dfs) = 1.705, P = 0.092; FIGURE 6).

DISCUSSION

Overall, this study demonstrated that the impacts of the infertility journey varied

across journey stages and by patient or partner experience. The variation in the nature of impacts experienced are probably influenced by differences in treatment journey stage and individual differences between respondents.

Previous research has indicated that the experience of infertility may vary by sex and by stage of infertility treatment (Bhat and Byatt, 2016; Nagórska et al., 2019). However, this study demonstrates these differences systematically in a large respondent sample across both patient and partner and male and female subgroups, and across two different stages of the treatment journey (at diagnosis and during treatment). These findings provide an indication of the impact that the infertility treatment journey has on these subgroups, and highlights the need for further research into the varying support requirements for these impacted individuals.

Exploratory profile analyses showed that the emotions experienced differed in nature and intensity between infertility

TABLE 4 PERCENTAGE OF RESPONDENTS SEEKING EACH TYPE OF MENTAL HEALTH SUPPORT

Type of mental health support	Overall respondents (n = 857)	Patients (n = 514)	Partners (n = 343) ^a
Support specialist, such as psychologist, therapist, social worker, etc.	43.3	44.0	42.3
A local support group	21.7	21.8	21.6
Online support, such as an online support group, online forums	31.7	32.9	30.0
Family, who have NOT had experience with fertility treatment(s)	20.1	21.4	18.1
Friends, who have NOT had experience with fertility treatment(s)	19.8	19.1	21.0
My partner	45.4	49.0	39.9
My healthcare provider	41.5	41.1	42.3
Friends or family who have had experience with fertility treatment(s)	34.0	34.6	32.9
Other	0.7	0.3	1.0

Data are reported as %.

^a Partners were not necessarily partners of the patient sample.

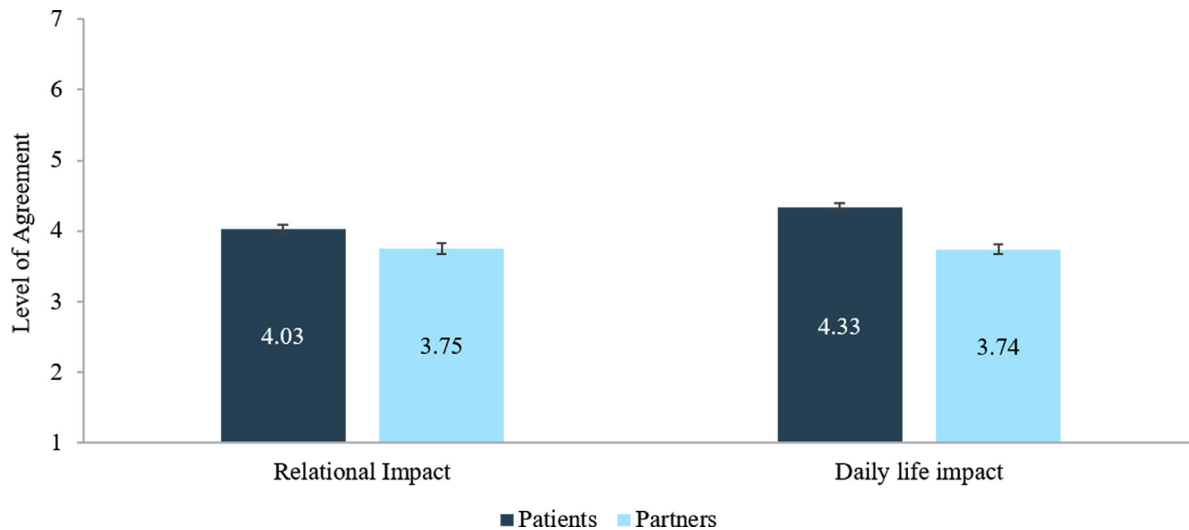


FIGURE 5 Summary scores for questions regarding the impact of infertility diagnosis on patient–partner relationships and on daily activities.^{a,b} Error bars show the SEM for relational and daily life impacts. ^aRespondents ranked statements from 1 (do not agree at all) to 7 (completely agree). ^bPartners were not necessarily partners of the patient sample.

diagnosis and treatment. These results indicate that negative feelings should be specifically addressed by healthcare professionals and tailored to the individual's needs during the stage of the treatment journey at which the feelings are most significant, to avoid long-term effects. Additionally, a wider support system should be available to infertile patients and their partners, including both counsellors and patient support tools. For patients experiencing isolation or loneliness, there could be increased education by the healthcare professional team around the availability of patient

support groups or online forums to enable patients to connect with others experiencing similar emotions.

There was a large disparity between the number of respondents reporting an impact on mental health and the number who sought mental health support. Further research should be conducted in this area to determine the reason for these findings as it is unclear whether patients and partners are resilient to mental health issues or whether there is a need for more accessible support that is not currently being met.

Generally, the proportion of respondents reporting mental health effects increased with each unsuccessful treatment cycle, with the lowest percentage among those who received one cycle and were successful (51.0% of patients [$n = 80$] and 41.0% of partners [$n = 29$]). This indicates that the impact on mental health increases with treatment duration and number of unsuccessful attempts and therefore there should be a greater emphasis on mental health support for couples who have undergone multiple treatment cycles.

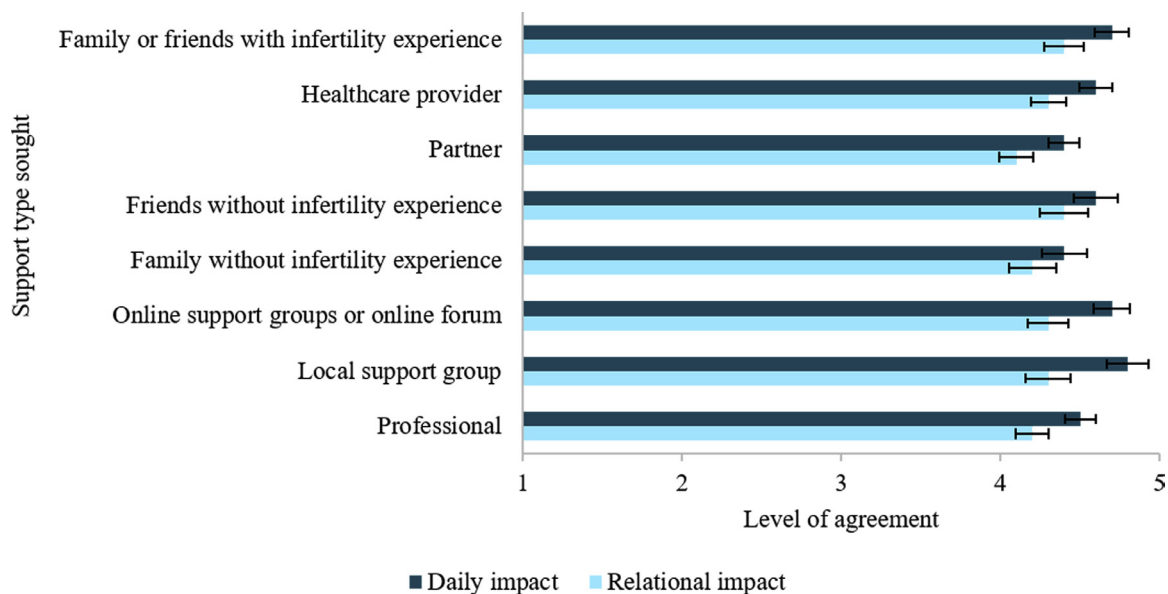


FIGURE 6 Summary scores for relational and daily impact by type of mental health support sought.^{a,b} Error bars show the SEM for relational and daily life impacts. ^aRespondents ranked statements from 1 (do not agree at all) to 7 (completely agree). ^bPartners were not necessarily partners of the patient sample.

Further analyses showed that the proportion of respondents reporting significant impacts on relationships and daily activities also increased with number of treatment cycles received. These negative impacts were reported most frequently among those enrolled in two or more cycles, reinforcing the idea that fertility treatment and lack of success can contribute to long-lasting effects in the lives of patients and their partners (Bhat and Byatt, 2016). Respondents who sought mental health support were more likely to report negative impacts of the infertility journey on their daily lives, suggesting that disruptions to daily activities and mental health impacts were linked and can potentially be alleviated with appropriate mental health support and counselling.

However, respondents self-managed the negative impacts to some extent. Respondents reported seeking support when treatment negatively impacted their relationship or daily life, more so when impacts were stronger. The type of support sought varied from professional to informal, with healthcare providers, online forums and partners used most frequently. In this cross-sectional study it was not possible to evaluate the direction of causality, as those who experienced greater impacts may have been able to seek more help, but equally, seeking support may increase the recognition of the negative impacts of infertility. No form of support was used more frequently than others, suggesting that the type of support sought may be driven by preference more than its efficacy in reducing negative impacts. Patients should be encouraged to think about preferred sources of support at the start of treatment, in preparation for challenges to be encountered.

A novel aspect of this study was the inclusion of partners to infertile patients. Although infertility is often a dyadic diagnosis, one person is usually categorized as the 'patient' and the other the 'partner'. Partners are often male, as found in this study, but as accessibility increases, individuals of either sex could be considered part of this subgroup. The impact of infertility on partners or men probably differs from the impact on infertile patients or women. The perspectives of both partners and men are largely neglected in infertility research and in care (Palomba et al., 2018; Sormunen et al., 2020). This study provided a unique insight into the

experiences of partners and how they differ from those of patients.

Reported emotions varied between patient and partner, and between male and female subgroups. The greatest difference was in reported 'envy of family, friends, and others who have been able to conceive', which was more commonly reported by patients than partners and by women than men both at diagnosis and during treatment. Similarly, patients more often reported 'isolation' than partners, which may suggest that the widespread availability of general support, including online social forums, may not be effective in alleviating these feelings. This supports previous findings of feelings of envy and resentment towards others who have a child, sometimes leading to social isolation, in the infertile female population (Sormunen et al., 2020). A recent study exploring the impact of fertility clinic closures due to the pandemic reported similar feelings of resentment towards others achieving pregnancy among mostly female infertile patients who had been denied access to treatment due to clinic closure during COVID-19 (Boivin et al., 2020). However, previous research exploring the impacts of envy in infertile patients is limited. These results indicate the need for further research to inform the development of more widely available support services tailored specifically to the different emotional needs of patients and partners.

The significant association between some of the emotions reported at diagnosis and the decision to seek mental health support suggests that experiencing these negative emotions throughout the treatment journey may impact on mental health and increase the likelihood of seeking support. However, the data do not show when respondents began to experience mental health issues and these issues may have been experienced prior to beginning their infertility journey. Patients more frequently experienced an impact on mental health than partners, which may negatively impact on further procreation failures (Palomba et al., 2018; Pasch et al., 2016; Podolska and Bidzan, 2011). Therefore, patients should be offered specialized support to alleviate the mental health burden and increase the chances of achieving pregnancy.

Although a higher percentage of women reported mental health effects (65.8%, $n = 721$) than men (53.3%, $n = 451$), the similarity in the percentages seeking

support suggests that both sexes benefit from the range of support services offered (Nagórka et al., 2019). The most common source of support was 'my partner', and while support from friends and family is important, this highlights a need for better provision of or education around availability of external sources of support offered by the healthcare professional team and a wider support group.

Overall, men indicated effects on the patient-partner relationship to be more significant compared with women. Conversely, an impact on work-life balance was more frequently reported by patients than partners. This reflects previous findings that the fertility treatment journey negatively affects the work lives of patients (Agustus et al., 2017), and shows that partners' work lives were not as significantly impacted, whereas relational impacts affected partners more substantially than patients. This further highlights the disparity between patients and partners, indicating that different support is required by each subgroup.

The strengths of this study lie in its consideration of the currently under-researched perspectives of partners to infertile patients, and of male patients and partners. This allowed comparisons to be drawn between male and female, and patient and partner responses, to highlight subgroups for further research. The study included a large sample size of 1944 respondents and had broad inclusion criteria.

A limitation of this study is that the anonymous questionnaire did not allow for response validation, for example with verification of diagnoses by medical professionals. There was little constriction on the recall period, allowing for long periods of time to have passed since the respondents' diagnoses but results also replicated well-established findings, strengthening the validity of the results. Respondents were unable to ask clarifying questions and the instrument used was not validated. Furthermore, recruitment of individual respondents into either the patient or partner subgroup meant that it was not possible to run sub-analyses of patient-partner pairs.

This study demonstrates that both infertile patients and their partners experienced a significant impact on their mental health, relationships with partners

and activities in their daily lives. These results highlight the need for improved patient care throughout the fertility treatment journey, and for the effects on partners to be taken into consideration.

The significant feelings of envy and social isolation at infertility diagnosis and the disparity between the number of respondents who experienced mental health effects and the number who sought support indicates the need for greater awareness and accessibility for support services for patients and their partners. It is likely that mental health effects were linked to impacts on relationships and daily activities. Therefore, it is possible that increased access to mental health support could reduce the negative impacts on the lives of patients and their partners.

Disparities in the reported impacts of the infertility journey between subgroups (patients versus partners, those at diagnosis versus those undergoing treatment, males versus females) indicate the need for tailored support during different stages of the treatment journey to alleviate the negative impact on mental health, relationships and daily lives during the treatment stage at which the impacts are most significant.

DATA AVAILABILITY

The data underlying this article will not be shared publicly.

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SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.rbmo.2022.01.015.

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