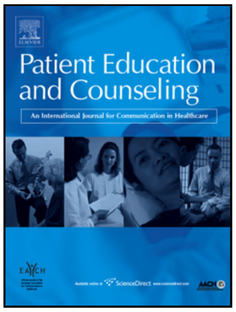

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Patient centered care in infertility health care: Direct and indirect associations with wellbeing during treatment

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Abstract

Objective: To investigate whether different dimensions of Patient Centered Care (PCC) were directly associated with wellbeing or indirectly, via lower concerns about medical procedures and/or increased tolerability of treatment.

Methods: Cross-sectional study with 322 women and 111 men undergoing fertility diagnosis or treatment recruited online and in clinical setting. Participants completed questionnaires that assess PCC (PCQ-Infertility), wellbeing (BSI Anxiety and Depression subscales, FertiQoL Relational Domain), treatment concerns (CART Procedural Concerns scale) and tolerability (FertiQoL Tolerability Domain) and they filled a socio-demographic and fertility data file.

Results: All dimensions of PCC were positively associated with better wellbeing except for organization of care. Information provision and continuity of care were indirectly associated with better wellbeing, the first via lower treatment concerns and the second via higher treatment tolerability. Competence, accessibility, continuity and communication were indirectly associated with better wellbeing via higher treatment tolerability.

Conclusions: Patient centered care promotes wellbeing during treatment. PCC is directly associated to wellbeing but also indirectly. The mode of action of the different PCC dimensions on wellbeing varies.

Practical implications: To promote patients' wellbeing during treatment clinics should provide treatment related information and allow patients to establish a stable clinical relationship with a **trustworthy** and competent physician.

Keywords: Infertility, Patient centered care, Anxiety, Depression, FertiQoL, Quality of life

1. Introduction

Around 9% of the worldwide childbearing population suffers from infertility and 56% of these seek fertility care to conceive [1]. Fertility clinics have mainly been concerned with maximizing chances of success for patients but more recently several infertility specialists have called attention to delivery of care to improve quality of life (QoL)[2], treatment compliance [3-5] and overall patient wellbeing during treatment [6]. Patient centered care (PCC) refers to care that is respectful of and responsive to individual patient preferences, needs and values [7, 8]. Research has shown that PCC is related to higher QoL and lower anxiety and depression [9]. However, it has yet to investigate which specific dimensions of PCC are relevant and the processes through which they can influence wellbeing.

In infertility care there is a growing conviction that patient evaluations of the care received should be considered alongside other typical treatment outcome indicators such as pregnancy or live birth rates [8]. One of the reasons for this is that pregnancy or birth rates only measure quality of care indirectly, as they are affected by many other factors such as the patient lifestyle or prognosis [10]. Process indicators that focus on the patients' treatment experience such as PCC are considered to be more direct measures of quality of care [11] and provide useful information to improve care [12]**.** Patients themselves express the wish for PCC [13, 14], are willing to trade-off a higher success rate for patient-centeredness and indicate that PCC is an important criteria when selecting fertility clinics in hypothetical trade-off scenarios [15].

At the interpersonal level PCC can be conceptualized as the characteristics that health professionals should have when relating to patients (e.g., communication skills, respect) whereas at the organizational level it is the characteristic that should be present in the health system (e.g., accessibility to treatment, organization of care) [16]. The Picker Institute developed one of the most comprehensive approaches to PCC at the organizational level that also integrates interpersonal aspects of care [17]. Through focus group methodology and literature review eight dimensions of care were identified: accessibility; respect for patients' values, preferences and needs; information, communication and education; involvement of family and friends; continuity and transition; coordination and integration of care; physical comfort; and emotional support and alleviation of fear and anxiety [17-19]. Recently, Dancet and colleagues replicated the Picker Institute methodology to generate a detailed description of PCC in infertility care that is based on patient perspective [13, 14]. Results from this work provided empirical support for the Picker Institute framework and identified a further two dimensions: competence of clinic and staff as well as attitude of and relationship with staff. This model of PCC was subsequently validated in an international sample of 48 patients from four European countries using focus groups [20].

Insert Figure 1 here

This body of work has been extremely valuable to increase awareness about the importance of PCC in infertility care and to reach higher precision in the definition and operationalization of this construct. However, to better organize infertility care to promote patients' wellbeing during treatment we need to know which specific PCC dimensions are more strongly associated with it and how. Figure 1 depicts how the different dimensions of PCC may be associated with patients' wellbeing during treatment. First, there may be a direct relationship between PCC and wellbeing (shown by solid bold line in Figure 1). One study sampling 427 female patients from 29 Dutch fertility clinics already showed that PCC is directly associated with better QoL and psychological wellbeing (anxiety and depression) [9]. However, the study used an overall score of PCC and did not differentiate between the different PCC dimensions, so it is still not known which specific PCC dimensions are directly associated with wellbeing. Second, PCC may be indirectly associated with wellbeing (shown by dotted and dashed lines in Figure 1). In broad terms, more positive experiences regarding interpersonal aspects of PCC may be indirectly associated with wellbeing via lower patients' concerns about treatment (see dashed arrows in Figure 1). Research shows that patients experience distress due to treatment procedures (e.g., injections for hormonal stimulations) [21], the uncertainty of the outcome [22] and the experience of failure [23]. Aspects of communication, information provision and patient involvement in decision-making could decrease patients' concerns and address misconceptions about treatment [3], thus possibly contributing to better wellbeing. Third, more positive experiences regarding organizational aspects of PCC may be indirectly associated with wellbeing via higher tolerability of treatment (see dotted lines in Figure 1). Infertility medical exams and treatments are technically complex and involve repeated monitoring (e.g., through ultrasound scans) and regular visits to clinics. As such they often result in significant disruptions to the daily routine and professional lives of patients [24, 25]. Perfecting organizational aspects of care could improve wellbeing by minimizing onerous demands of treatment.

In this study we investigated whether dimensions of PCC were directly associated with patients' individual and relational wellbeing during treatment. In addition, we investigated if the dimensions of PCC were indirectly associated with wellbeing, by being associated with patients' concerns about treatment procedures and/or tolerability of treatment, which in turn were associated with wellbeing.

2. Materials and Methods

2.1. Study Participants

A total of 222 questionnaires were submitted online but nine duplicates (same email address provided) were excluded. At the clinic setting 233 participants filled and returned questionnaires (response rate 49%).

The final sample consisted of 322 (74.4%) women and 111 (25.6%) men. Table 1 shows socio-demographic and clinical characteristics of the sample. Women were in their early thirties and men in their mid-thirties. Participants were with their partners for about seven years and were trying to conceive for about four years. Current medical engagement was in 28% diagnostic testing, 18% medication to induce ovulation, 7% intra-uterine insemination, 15% waiting list for Assisted Reproductive Technologies (ART) and 32% ART. Participants recruited online were more educated (Mean = 14.94 years, SD = 3.47 versus Mean = 11.33, SD = 3.37, t (348) = 9.819, $p < .001$), had a higher socioeconomic status ($\chi^2[433,3] = 46.873$, $p < .001$), more frequently lived in urban areas ($\chi^2[433,1] = 78.990$, $p < .001$), were at more advanced treatment stages ($\chi^2[433,4] = 16.195$, $p < .01$) and had done more ART cycles (Mean = 1.21, SD = 1.53 versus Mean = 0.52, SD = 0.87, t (417) = 5.644, $p < .001$) than participants recruited at the clinic.

2.2. Measures

Participants completed a questionnaire pack that included the following measures. Socio-demographic information included gender, age, relationship duration, educational (years and had college or university education [no, yes]), socioeconomic status (three categories defined in terms of achieved education level and current occupation: low, e.g. non-specialized workers; medium, e.g. small business owners, high school teachers; high, e.g. government or private companies administrators, lawyers) and area of residence (urban, rural). Fertility information (self-reported) included duration of infertility, number of previous fertility treatments, parity (0, >1) and current stage of treatment (diagnostic examination, medication/injections, intra uterine insemination (IUI), waiting list for ART, ART).

Patient-centered care: Patient Centeredness Questionnaire – Infertility [PCQ-Infertility ,26]. This 46 items questionnaire is divided into eight dimensions. Four dimensions capture interpersonal aspects of PCC: communication (7 items, e.g., 'Was staff honest and clear about what you can expect from fertility care?'), respect for patients' values (7 items, e.g., 'How often did your physician show an interest in your personal situation?'), patient involvement (3 items, e.g., 'Was decision-making shared with you, if preferred?') and competence (6 items, e.g., 'Did the physician(s) seem competent to you?'). Three dimensions capture organizational aspects: accessibility (2 items, e.g., 'Was it a problem for you to contact staff if you had any questions?'), continuity and transition (6 items, e.g., 'How often did you have an appointment with the same physician?') and organization (e.g., 'How much time passed between your first hospital visit and the moment you received your treatment plan?'). Finally, information (11 items, e.g., 'Were different treatment options discussed with you?', 'Did you receive an overview of your treatment plan with a time schedule?') captures both interpersonal and organizational aspects. Higher scores (range 0–3) indicate higher level of patient-centeredness. In the present sample the reliability coefficient, Cronbach's alpha, ranged from .66 to .85. Only 'continuity and transition' presented an alpha inferior to .70.

Individual wellbeing: Anxiety and depression scales of the Brief Symptom Inventory [BSI, 27]. These subscales assess six anxiety (e.g., nervousness or shakiness inside) and six depressive symptoms (e.g., feeling sad) experienced during the previous week. Items scores were summed. Higher scores (range 0-24) indicate higher frequency in symptoms. In the present sample Cronbach's alpha were .87 and .88 for the anxiety and depression scales, respectively.

Relational wellbeing: Relational domain of the FertiQoL tool [2], a 6 items scale that assesses the extent to which the partnership (e.g., sexuality, communication) has been affected by fertility problems. Higher scores (range 0-100) indicate better QoL. Cronbach alpha in the present sample was .70.

Concerns about treatment: Procedural Concerns scale of the Concerns of Women Undergoing Assisted Reproductive Technologies (CART) instrument [28]. Although this six-item scale was designed only for ART, its items assess concerns that are present in most fertility treatments such as concerns with pain, side effects from hormones and recovery time. Higher scores (range 1-3) indicate more concerns. Chronbach's alpha in the present sample was .74.

Tolerability of treatment: Tolerability subscale of the FertiQoL Treatment Module [2], comprising four items that assess the impact of treatment (physical and mood effects, disruptions to daily activities, complexity of treatment; e.g., 'Does infertility treatment negatively affect your mood?'). Higher scores (range 0-100) indicate better QoL. Chronbach's alpha in the present sample was .75.

2.3. Procedures

Ethical approval was obtained from the Research Ethics Committees of the Coimbra University Hospitals.

Men and women undergoing fertility diagnosis or treatment at fertility clinics in Portugal (from January 2011 to February 2012) were recruited online and at clinical setting. Online recruitment was done through a web survey that was advertised on a major Portuguese patient advocacy group website. A Facebook Cause was also created and advertised among all Friends of the advocacy group. The clinical setting consisted of the Human Reproduction Service of a large central university hospital where patients were consecutively invited to participate in the study. Inclusion criteria were being married or cohabiting adults (heterosexual relationship, prerequisite to access fertility care in Portugal) and ability to read and write in Portuguese. A total of 478 patients were eligible for the study and thus invited to participate. All participants received a consent form explaining the research objectives, the participants' role and the researchers' obligations. Patients were reassured that acceptance or refusal to participate in the study had no influence on their current or future infertility care and that the staff would not be informed of their decision about participation. While participants recruited online could only fill the questionnaire online, participants recruited at the clinic could choose between filling it online or on paper. In the latter case, participants were given the survey in an envelope and instructed to complete it at the clinic while waiting for their appointment or at home and return it to the clinic in a pre-addressed sealed envelope.

2.4. Statistical Analysis

In total 446 questionnaires were collected, but 13 (0.3%) were excluded because they were identified as outliers (> or < than mean ± 3.29SD) based on age, relationship duration or time trying to conceive.

Data were analyzed using SPSS v.20. Preliminary reliability analysis showed that one item of the continuity and transition subscale of the PCQ-Infertility ('Was one staff member assigned to you to contact any time you had any questions or problems, e.g., a nurse?') presented a low corrected item-total correlation (.076) with the subscale and was thus not considered. When considering only the six remaining items the subscale internal consistency was .66 (cf. Materials section).

Preliminary correlational analyses between the study variables were made. We then used the INDIRECT macro for the SPSS software developed by Hayes and Preacher (macro downloadable at http://www.afhayes.com/spss-sas-and-mplus-macros-and-code.html) to ascertain direct and indirect effects of PCC on wellbeing [29]. The macro was developed to test if an independent variable (IV) causes an effect on an intervening or mediator variable

(M), which in turn causes an effect on the dependent variable (DV) [30]. If a significant *indirect effect* is found it is concluded that the mediator(s) variable(s) explain(s) the relationship between IV and DV through a relationship of causality. The term indirect effect is used instead of the classical term ‘mediation’ [31] because we are testing more than one mediator [29]. If a significant *direct effect* is found it means that the IV causes the DV controlling for all mediator (and/or other covariate) variables investigated.

In the present study the IV was PCC, the DV was wellbeing, the Ms were treatment concerns and tolerability. Figure 1 depicts the direct and indirect associations tested. We tested a total of 24 models that corresponded to the eight dimensions of PCC on the three wellbeing outcome variables. In light of the number of models tested, bootstrap methods with bias-corrected and accelerated 95% confidence intervals [32] were used (with 5000 samples) because they reduce Type I error. Indirect effects were considered significant if the 0 value was not contained in the confidence intervals (CI) [33]. Following Shrout and Bolger [34] recommendations, we did not consider that the *total effect* of the IV on the DV (i.e., the effect of the IV on the DV before inserting the mediator variable[s] in the model) had to be statistically significant to ascertain the existence of indirect effects (but is reported). Direct effects were ascertained by standard significance testing. All variables in the model were transformed to standard scores (i.e., z-scores) to facilitate interpretation of results. Years of education was inserted as covariate because previous research showed that patients’ report of PCC varied significantly according to their education [26].

Because the cross-sectional design of the study does not allow inferring the direction of causality, we also tested the reverse causality relationships of the hypothesized indirect effects. For this purpose, we tested 24 new models in all equal to the first ones tested but in which we swapped the independent and dependent variables. The absence of significant reverse indirect effects points for increased (but not definitive) confidence in the causal direction of associations reported in the results section.

3. Results

3.1. Preliminary Analyses

Table 2 presents descriptive statistics and correlations between the study variables. All mean scores for the different PCC dimensions, treatment tolerability and concerns were within one standard deviation of the means scores reported in the validation studies of these instruments with infertile patients [2, 26, 28] (for PCC-organization no mean and standard deviations scores were reported in the validation study). Anxiety and depression mean scores were also within one standard deviation of the means scores reported in the Portuguese general population [35]. Relational QoL mean scores were above the ones reported on the international validation of the FertiQoL [2]. Significant associations were found between PCC dimensions, treatment tolerability, concerns and wellbeing.

3.2. Anxiety

Figure 2 presents direct and indirect associations found between PCC and at least one measure of wellbeing.

Insert Figure 2 here

Table 3 presents direct, indirect and total effects of PCC on anxiety. As can be observed in the column ‘Direct effect [IV → Anxiety, controlling for M]’, direct effects were only found for information, meaning that more positive experiences regarding information were associated with lower anxiety. As can be observed in the column 'Indirect effect [IV → Anxiety, via M]', an indirect effect was also found for information. This indicated that more positive experiences regarding information were associated with lower concerns about treatment (see column IV → M) and lower concerns were associated with lower anxiety (see column M → Anxiety). Finally, an indirect effect was also found for continuity and transition, which indicated that more positive experiences regarding this dimension were associated with higher tolerability of treatment and higher tolerability was associated with lower anxiety. Explained variance in the models (R^2) ranged from 18 to 20%.

3.3. Depression

Table 4 presents direct, indirect and total effects of PCC on depression. Direct effects were found for communication, respect for patients' values, competence, information and involvement meaning that more positive experiences on these dimensions of PCC were associated with lower depression. In addition, indirect effects were found for information and for continuity and transition. More positive experiences regarding information were associated with lower concerns about treatment and these were associated with lower depression. In addition, more positive experiences regarding continuity and transition were associated with higher tolerability of treatment and this was associated with lower depression. Explained variance ranged from 8 to 10%.

3.4. Relational Quality of Life

Table 5 presents direct, indirect and total effects of PCC on relational QoL. Direct effects were found for communication, respect for patients' values, competence, information and involvement meaning that more positive experiences on these dimensions of PCC were associated with higher relational QoL. Indirect effects were found for accessibility, communication, competence and tolerability. This means that more positive experiences of PCC in these dimensions were associated with higher tolerability of treatment and this was associated with higher relational QoL. Explained variance ranged from 8 to 11%.

3.5. Testing of reverse models

The reverse indirect effects of the ones reported were never significant (data not shown). Overall the explained variance of the reverse models tested was lower, ranging from 2 to 5% for anxiety, 1 to 7% for depression and 2 to 9% for relational QoL.

4. Discussion and conclusion

4.1. Discussion

Patient centered care is associated with wellbeing during treatment. Results from this study show that all dimensions of PCC (except organization) were associated with patient anxiety, depression or relational QoL. PCC has differential associations to wellbeing. Associations regarding interpersonal dimensions of PCC suggest that the interactions and relationships patients establish with health professionals directly affect their wellbeing. Organizational aspects of care seem to be less relevant for patient wellbeing and to operate via increasing patients' tolerance of treatment. Finally, information is also relevant for patient's wellbeing and operates by decreasing their concerns about the medical procedures. Clinics can use these findings to increase the fit between PCC provided at different points in treatment and their patients' needs.

Almost all dimensions of PCC were associated with patient anxiety, depression or relational QoL. Although our findings concern the specific context of infertility care, there is no reason to expect the link between PCC and wellbeing to be different in other health settings. Therefore these results reinforce previous empirical evidence about the importance of providing PCC in health care settings [17] and suggest that obtaining patient views about the PCC they receive may be an adequate way of identifying factors that could improve the quality of care delivered [26, 36]. Indeed, infertile patients are no different from other patients in that all are aware of which aspects of treatment are demanding [37] and able to identify those dimensions of care that improve their treatment experience [13, 14, 17]. However, as already noted elsewhere [9], it may also be that more distressed patients may make more negative evaluations of the PCC received. If clinics are to use patient reports of PCC for purposes of service evaluation they have to consider the possibility that different patient groups may have different perceptions of care. For instance, in infertility care, women who achieved a live birth with IVF have more positive recall of the treatment experience than women who did not [37].

Our results show that the various PCC dimensions are differentially associated with wellbeing and therefore their mode of action differs. The provision of high quality information had direct and indirect effects on anxiety and depression. Direct effects may result from the simple increase in medical knowledge [38]. Indirect effects were associated with decreased concerns about treatment procedures (e.g., undergoing surgery, side-effects from anesthesia, pain). This association is in line with past research showing that information provision was considered a top priority for patients in different European countries [20]. Developing and delivering informative leaflets that address common patient concerns is a simple measure that does not require many organizational changes and can have immediate benefits for patients and clinics alike. Indeed, more informed and less distressed patients will be in a better condition to make treatment related decisions and to comply with treatment recommendations [39, 40] . Delivering information at the start of treatment can also be useful to avoid treatment rejection due to misconceptions and/or unattended concerns [4]. However, recent research shows that only 57% of infertile patients receive the minimal degree of information recommended by clinical guidelines to be given prior and during treatment [41]. Clinics can use the PCQ-Infertility to assess and target the most problematic issues regarding information provision. Is this study these were how to access psychosocial support (Mean 0.71, SD = 1.22) and side effects from medication (Mean = 1.00, SD = 0.92).

Continuity of care was related with wellbeing via increased tolerability of treatment, as we expected organizational dimensions of care to be. Continuity of care refers to an enduring personal relationship between the patient and clinician that is characterized by personal trust and responsibility [42]. In routine care it implies that clinics must organize care so that patients have regular contact with the same physician and do not receive contradictory information or recommendations from the clinical staff [13, 26]. Continuity of care has received very little attention in the field of infertility care [13] and this may be because it is not directly (or very weakly) associated with patients wellbeing, which may have led researchers and professionals to undervalue its importance. In this study, continuity was associated with higher patient tolerability of treatment. Because tolerability of treatment is associated with patients' intentions to undergo more recommended treatment [2, 45], promoting continuity may also result in higher treatment compliance.

Other interpersonal dimensions of care associated with wellbeing were respect, involvement, communication and competence (the latter two showed direct and indirect associations, via treatment tolerability). These dimensions reflect what patients consider being the humane [46] and competent doctor, who shows respect and personal interest for the patient and knows what he/she is doing. Most likely such a portrait is not specific to infertility care, as it can be expected that any patient in any health setting will express the desire to be consulted by caring and competent physicians [46]. However, results suggest that in infertility care these characteristics may be especially important. For example, at times when patients are dealing with treatment failure [for which the outcome emotion is depression, 47] or to foster the partnership during the protracted treatment process. It is known that the couples' relationship becomes increasingly strained as treatment extends in time [48], but this study showed that, by lessening the onerous aspects of treatment, (at least) part of the intra couple strain may also be alleviated. Although the above listed PCC dimensions point for individual skills and/or personality traits, it does not mean that infertility clinics cannot try to promote them in their staff. A recent study showed that training in emphatic skills improves the quality of patients-physicians interactions. Thirteen infertility physicians attended a two-days training program in emphatic communication skills and were evaluated by 2146 patients before and after the training. Patients reported an increase in satisfaction regarding the quality of the information provided by the physicians and the level of expertise they showed during the consultation at the clinic [49].

This study involved 433 patients from public and private clinics in Portugal. The socio-demographic profile of participants is in line with previous studies in Portugal [50] and Europe [26]. The sample size and statistical analysis including the testing of reverse models increases confidence that the direction of the observed causal links is as hypothesized. The sample included 36 couples and non-independence of couple data may result in the overestimation of negative associations and underestimation of positive association [51]. However, given the low percentage of couples (16.6%), such bias should be negligible. This group of patients did not differ from the remaining patients in any of the study variables but tolerance of treatment (74.4 (16.4) versus non-couple 66.3 (20.1), $p < .001$).

4.2. Conclusion

Patient centered care is an important component of care in any health setting [17]. It promotes individual and relational wellbeing during treatment. In the specific case of infertility care, PCC is directly associated to wellbeing but also indirectly, via lower patients concerns and higher tolerability of treatment. Information provision is important to address patients' concerns about treatment and continuity in care can contribute to make treatment less onerous for patients.

4.3. Practical Implications

Clinics interested in promoting their patients' wellbeing during treatment should provide patients with the opportunity to access relevant information related with their fertility treatment process and to establish an ongoing relationship with a physician who is trustworthy and competent. Clinics that implement such policies may expect improved patient wellbeing but possibly also higher treatment compliance, which, in turn, would be associated with higher treatment success rates [5].

Conflict of interest

There is no conflict of interest or financial support that could create a potential conflict of interest.

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Table 1. Descriptive statistics for the socio-demographic and clinical characteristics of the sample (N=433)

Characteristics	**Total** *N*= 433	**Women** *n* = 322	**Men** *n* = 111	t/X^2
Socio-demographic				
Age (years), mean (SD)		32.93 (3.59)	34.86 (4.28)	4.636***
Relationship duration (years), mean (SD)	7.26 (3.34)	7.16 (3.28)	7.56 (3.52)	1.079
Years of education, mean (SD)	13.27 (3.86)	14.02 (3.38)	11.14 (4.36)	5.448***
College or University Education, n (%)	199 (46.7)	177 (55.7)	22 (20.4)	40.335***
Socioeconomic status, n (%)				
Low	170 (39.4)	100 (31.2)	70 (63.1)	
Medium	225 (52.1)	192 (59.8)	33 (29.7)	35.996***
High	37 (8.6)	29 (9.0)	8 (7.2)	
Area of residence, n (%)				
Rural	150 (35.0)	97 (30.5)	53 (48.2)	11.221**
Urban	278 (65.0)	221 (69.5)	57 (51.8)	
Clinic				
Infertility duration (years), mean (SD)	4.42 (2.40)	4.46 (2.41)	4.29 (2.35)	0.560
Number of previous treatments, mean (SD)				
IUI	0.45 (1.09)	0.44 (1.07)	0.46 (1.14)	0.158
IVF/ICSI	0.85 (1.27)	0.94 (1.35)	0.59 (0.95)	2.848**
Children, n (%)	46 (10.7)	36 (11.3)	10 (9.1)	0.411
Treatment stage, n (%)				
Diagnostic testing	120 (28.4)	84 (26.4)	36 (34.3)	
Medication/injections	74 (17.5)	55 (17.3)	19 (18.1)	
IUI	28 (6.6)	20 (6.3)	8 (7.6)	3.666
Waiting to start ART	65 (15.4)	52 (16.4)	13 (12.4)	
ART	136 (32.1)	107 (33.6)	29 (27.6)	

Note: SD = standard deviation, IUI = Intra Uterine Insemination, IVF = *In Vitro* Fertilization, ICSI = Intra-Cytoplasmic Sperm Injection, ART = Assisted Reproductive Technologies. T and Chi-square statistics compare women and men. * *p*< .05. ** *p* < .01. *** *p* < .001.

Table 2. Descriptive statistics and correlations among study variables (N = 433)

	Mean (SD) [range]	Correlations											
		2	3	4	5	6	7	8	9	10	11	12	13
1. PCC-Communication	2.20 (0.71) [0-3]	.715***	.785***	.686***.	387***	.503***	.314***	.613***	.164**	-.155**	-.137**	-.167**	.262***
2. PCC-Respect	1.83 (0.75) [0-3]		.705***	.592***.	354***	.478***	.225***	.572***	.104	-.128*	-.072	-.124*	.219***
3. PCC-Involvement	2.10 (0.80) [0-3]			.604***.	365***	.478***	.260***	.585***	.102	-.125*	-.080	-.130*	.254***
5. PCC-Competence	2.17 (0.47) [0.7-3]				.393***	.568***	.424***	.564***	.126*	-.143**	-.122*	-.139**	.190***
4. PCC-Accessibility	2.14 (0.84) [0-3]					.324***	.195***	.391***	.159***	-.142**	-.076	-.017	.057
6. PCC-Continuity	2.31 (0.55) [0.7-3]						.335***	.461***	.178**	-.108*	-.118*	-.117*	.057
7. PCC-Organization	1.26 (1.01) [0-3]							.208***	-.007	-.009	-.024	-.018	-.046
8. PCC-Information	1.87 (0.68) [0-3]								.073	-.153**	-.092	-.091	.216***
9. Tolerability of treatment	68.46 (19.51) [0-100]									-.389***	-.386***	-.278***	.259***
10. Concerns about treatment	1.93 (0.43) [1-3]										.266***	.191***	-.126***
11. Anxiety	5.57 (4.99) [0-23]											.808***	-.261***
12. Depression	4.60 (5.04) [0-23]												-.371***
13. Relational quality of life	78.67 (15.58) [20.8-100]												

Note: $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$, SD = standard deviation, PCC = Patient Centered Care. Range for response scale on PCQ-Infertility dimensions is zero to three.

Table 3. Associations between patient centered care dimensions, mediators and anxiety to test direct and indirect effects

Patient centered care dimension (IV)	Mediator (M)	IV → M	M → Anxiety (DV)	**Direct effect** IV → Anxiety, controlling for M	**Indirect effect** IV → Anxiety, via M	**Total effect** IV → Anxiety	R^2
		B (*SE*)	*B* (*SE*)	*B* (*SE*)	*B* (*SE*) [BCa 95% CI]	*B* (*SE*)	
Communication	Tolerability	.09 (.06)	**-.26 (.06)*****	-.11 (.06)	-.02 (02) [-.064 .003]	**-.15 (.06)***	.18
	Concerns	-.11 (.06)	**.22 (.06)*****		-.02 (.02) [-.063 .001]		
Respect	Tolerability	.06 (.06)	**-.26 (.06)*****	-.10 (.06)	-.02 (.02) [-.053 .014]	**-.13 (.06)***	.18
	Concerns	-.09 (.06)	**.23 (.06)*****		-.02 (.02) [-.059 .006]		
Involvement	Tolerability	.07 (.06)	**-.29 (.07)*****	-.08 (.06)	-.02 (.02) [-.062 .010]	-.12 (.06)	.18
	Concerns	-.07 (.06)	**.21 (.06)*****		-.02 (.02) [-.050 .008]		
Competence	Tolerability	.10 (.06)	**-.24 (.06)*****	-.11 (.06)	-.02 (.02) [-.064 .002]	**-.16 (.06)***	.18
	Concerns	-.11 (.06)	**.24 (.06)*****		-.02 (.02) [-.066 .003]		
Accessibility	Tolerability	.11 (.06)	**-.30 (.07)*****	-.02 (.06)	-.03 (.02) [-.081 .001]	-.07 (.06)	.20
	Concerns	-.08 (.06)	**.24 (.06)*****		-.02 (.02) [-.059 .007]		
Continuity	Tolerability	**15 (.06)***	**-.26 (.07)*****	-.06 (.06)	**-.04 (.02) [-.088 -.011]**	-.11 (.06)	.18
	Concerns	-.08 (.06)	**.25 (.06)*****		-.02 (.02) [-.064 .011]		
Organization	Tolerability	.06 (.06)	**-.26 (.07)*****	.00 (.06)	-.01 (.02) [-.046 .017]	-.01 (.06)	.17
	Concerns	.00 (.06)	**.24 (.06)*****		.00 (.02) [-.031 .034]		
Information	Tolerability	.08 (.06)	**-.27 (.06)*****	**-.13 (.06)***	-.02 (.02) [-.066 .014]	**-.17 (.06) ****	.20
	Concerns	-.13 (.06)	**.23 (.06)*****		**-.03 (.02) [-.066 -.004]**		

Note: All analyses were conducted controlling for years of education, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$, IV = independent variable, M = mediator, DV = dependent variable, SE = standard error, BC = bias corrected and accelerated, CI = confidence interval, Tolerability = tolerability of treatment, Concerns = concerns about treatment. Direct effects were considered significant when p < .05 and indirect effects were considered significant when the bias-corrected confidence interval did not contain the 0 value [33]. Bold indicates significant effects found.

Table 4. Associations between patient centered care dimensions, mediators and depression to test direct and indirect effects

Patient centered care dimension (IV)	Mediator (M)	IV → M	M → Depression (DV)	IV → Depression, controlling for M (Direct effect)	IV → Depression, via M (Indirect effect)	Total IV → Depression	R^2
		B (*SE*)	*B* (*SE*)	*B* (*SE*)	*B* (*SE*) [BCa 95% CI]	*B* (*SE*)	
Communication	Tolerability	.09 (.06)	-.13 (.07)	**-.17 (.06)****	-.01 (.01) [-.046 .002]	**-.19 (.06)****	.10
	Concerns	-.11 (.06)	**.14 (.06)***		-.01 (.01) [-.045 .001]		
Respect	Tolerability	.06 (.06)	-.14 (.07)	**-.15 (.06)***	-.01 (.01) [-.040 .005]	**-.17 (.06)****	.09
	Concerns	-.09 (.06)	**-.15 (.06)***		-.01 (.01) [-.046 .003]		
Involvement	Tolerability	.07 (.06)	-.13 (.07)	**-.14 (.06)***	-.01 (.01) [-.045 .003]	**-.16 (.06)****	.08
	Concerns	-.07 (.06)	**.13 (.07)***		-.01 (.01) [-.038 .004]		
Competence	Tolerability	.10 (.06)	-.11 (.07)	**-.15 (.06)***	-.01 (.01) [-.046 .002]	**-.18 (.06)****	.09
	Concerns	-.10 (.06)	.16 (.06)		-.02 (.01) [-.049 .001]		
Accessibility	Tolerability	.11 (06)	-.18 (.07)	.03 (.06)	-.02 (.01) [-.060 .001]	-.00 (.06)	.09
	Concerns	-.08 (.06)	.17 (.07)		-. 01 (.01) [-.046 .005]		
Continuity	Tolerability	**.15 (.06)***	-.13 (.07)	-.05 (.06)	**-.02 (.02) [-.064 -.001]**	-.08 (.06)	.08
	Concerns	-.06 (.06)	**.17 (.07)****		-.01 (.01) [-.050 .008]		
Organization	Tolerability	.05 (.06)	-.13 (.07)	-.03 (.06)	-.01 (.01) [-.037 .006]	-.04 (.06)	.06
	Concerns	.00 (.06)	**.14 (.06)***		.00 (.01) [-.021 .025]		
Information	Tolerability	.08 (.06)	**-.14 (.07)***	**-.13 (.06)***	-.01 (.01) [-.046 .006]	**-.16 (.06)***	.09
	Concerns	-.13 (.06)	**.16 (.06)***		**-.02 (.01) [-.055 -.002]**		

Note: All analyses were conducted controlling for years of education, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$, IV = independent variable, M = mediator, DV = dependent variable, SE = standard error, BC = bias corrected and accelerated, CI = confidence interval, Tolerability = tolerability of treatment, Concerns = concerns about treatment. Direct effects were considered significant when p < .05 and indirect effects were considered significant when the bias-corrected confidence interval did not contain the 0 value [33]. Bold indicates significant effects found.

Table 5. Associations between patient centered care dimensions, mediators and relational quality of life (QoL) to test direct and indirect effects

Patient centered care dimension (IV)	Mediator (M)	IV → M	M → Relational QoL(DV)	IV → Relational QoL, controlling for M (Direct effect)	IV → Relational QoL, via M (Indirect effect)	Total IV → Relational QoL	R^2
		B (*SE*)	*B* (*SE*)	*B* (*SE*)	*B* (*SE*) [BCa 95% CI]	*B* (*SE*)	
Communication	Tolerability	**.13 (.06)***	**.16 (.07)***	**.26 (.06)*****	**.02 (.02) [.001 .068]**	**.29 (.06)*****	.11
	Concerns	-.12 (.06)	-.08 (.07)		.01 (.01) [-.004 .041]		
Respect	Tolerability	.09 (.06)	**.17 (.07)***	**.22 (.07)****	.02 (.01) [-.002 .056]	**.24 (.07)*****	.10
	Concerns	-.10 (.06)	-.09 (.07)		.01 (.01) [-.002 .039]		
Involvement	Tolerability	.10 (.06)	.11 (.08)	**.24 (.06)*****	.01 (.01) [-.003 .050]	**.26 (.06)*****	.09
	Concerns	-.08 (.06)	-.09 (.07)		.01 (.01) [-.003 .035]		
Competence	Tolerability	**.12 (.06)***	**.17 (.07)***	**.21 (.07)****	**.02 (.02) [.001 .070]**	**.24 (.07)*****	.10
	Concerns	-.10 (.06)	-.10 (.07)		.01 (.01) [-.002 .041]		
Accessibility	Tolerability	**13 (.06)***	.16 (.08)	.04 (.06)	**.02 (.02) [.001 .069]**	.07 (.07)	.06
	Concerns	-.09 (.06)	-.13 (.07)		.02 (.01) [-.002 .044]		
Continuity	Tolerability	**.15 (.06)***	.19 (.07)	.03 (.07)	**.03 (.02) [.002 .082]**	**.07 (.07)***	.06
	Concerns	-.06 (.07)	-.10 (.07)		.01 (.01) [-.004 .040]		
Organization	Tolerability	.04 (.06)	**.19 (.07)***	.01 (.06)	.01 (.01) [-.011 .045]	.01 (.07)	.05
	Concerns	.00 (.06)	-.09 (.07)		-.00 (.01) [-.019 .014]		
Information	Tolerability	.11 (.06)	**.17 (.07)***	**.23 (.07)*****	.02 (.02) [-.001 .064]	**.26 (.07)*****	.10
	Concerns	-.12 (.06)	-.09 (.07)		.01 (.01) [-.002 .041]		

Note: All analyses were conducted controlling for years of education, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$, IV = independent variable, M = mediator, DV = dependent variable, SE = standard error, BC = bias corrected and accelerated, CI = confidence interval, Tolerability = tolerability of treatment, Concerns = concerns about treatment. Direct effects were considered significant when p < .05 and indirect effects were considered significant when the bias-corrected confidence interval did not contain the 0 value [33]. Bold indicates significant effects found.

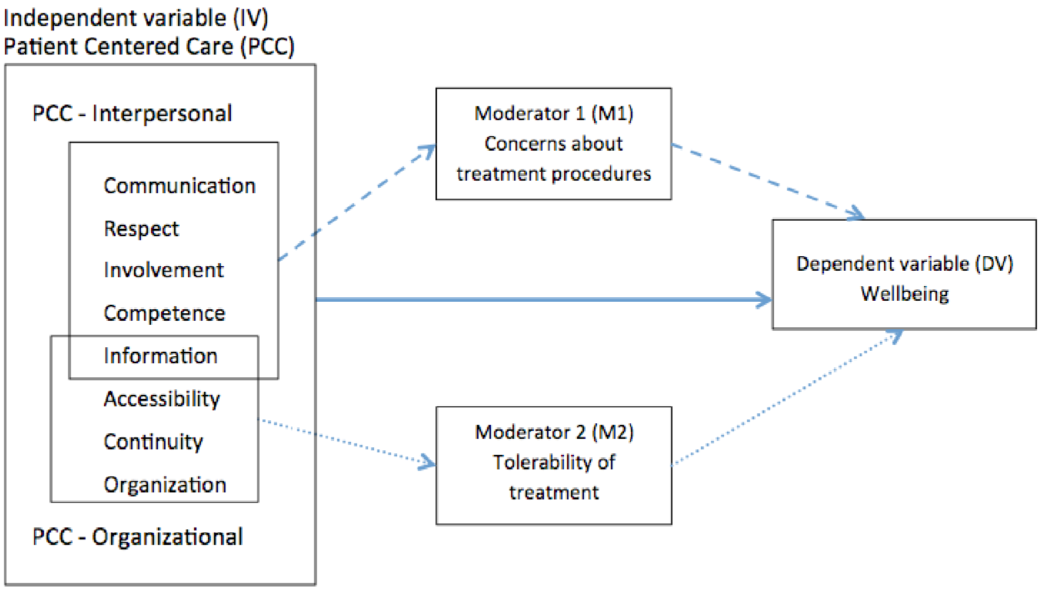

Figure 1. Direct and indirect associations hypothesized between the independent variable (IV) Patient Centered Care (PCC) and the dependent variable (DV), wellbeing. The study hypotheses were that all PCC dimensions would be directly associated with wellbeing (full arrow); PCC dimensions that capture interpersonal aspects of care would be indirectly associated with wellbeing (dashed arrows), via concerns about treatment (Moderator 1, M1); and PCC dimensions that capture organizational aspects of care would be indirectly associated with wellbeing (dotted arrows), and via tolerability of treatment (Moderator 2, M2).

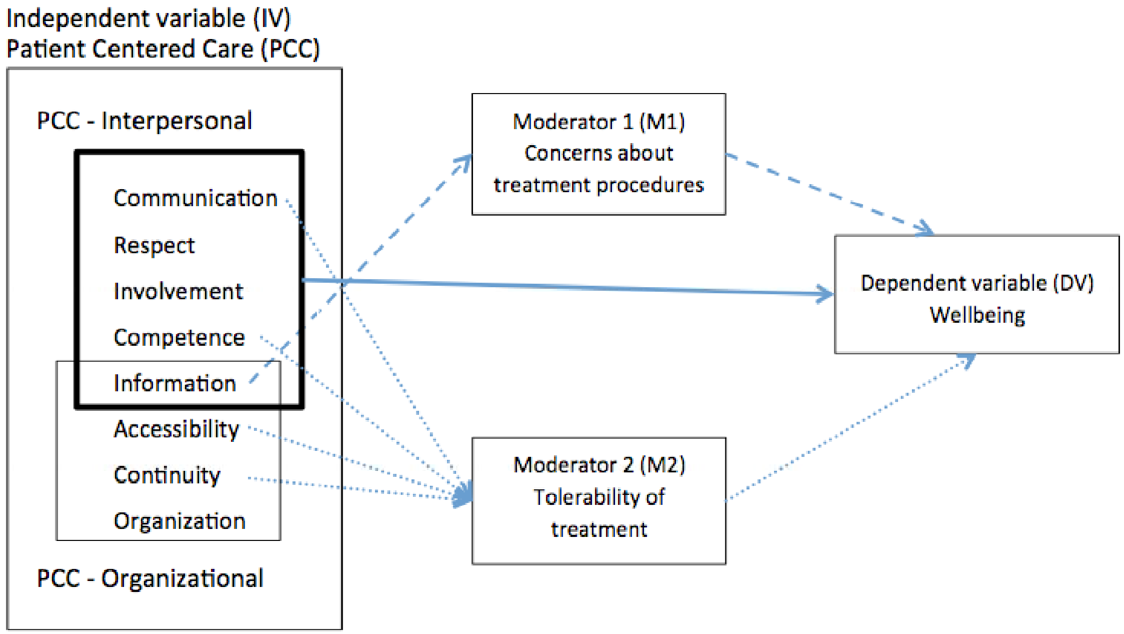

Figure 2. Direct and indirect associations found between Patient Centered Care (PCC, Independent Variable, IV) and at least one measure of wellbeing (Dependent Variable, DV). All PCC dimensions that capture interpersonal aspects of care were directly associated with wellbeing (full arrow). Information was indirectly associated with wellbeing (dashed arrow), via concerns about treatment (Moderator 1, M1). Communication, competence, accessibility and continuity were indirectly associated with wellbeing (dotted arrows), via tolerability of treatment (Moderator 2, M2).