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Female cancer patients' perceptions of the fertility preservation decision-making process: An exploratory prospective study

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ABSTRACT

Purpose: To assess female cancer patients' perceptions of the fertility preservation decision-making process and to examine the effect of clinicians' support on the decision quality.

Methods: A total of 71 patients participated in this longitudinal study with two assessment time points (before cancer therapy, after cancer therapy). Self-report measures assessed the decision-making process, the decision quality and the clinicians' support.

Results: A less positive experience in the decision-making process was associated with higher decisional regret and lower decisional satisfaction. In the group that decided not to pursue FP, participants who perceived higher oncologist's support reported higher decisional satisfaction.

Conclusions: A higher quality decision is positively associated with a better experience in the decision-making process. The oncologist's support is crucial for the decisional satisfaction of patients who decide not to pursue FP.

Implications for psychosocial providers: Psychologists may be important in helping patients to adequately cope with the FP decision so that they can make a high-quality decision.

KEYWORDS

cancer; decision-making process; fertility preservation; oncology; high-quality decision; healthcare providers support

Background

The decision of whether to undergo fertility preservation (FP) is highly complex for newly diagnosed female cancer patients of childbearing age. This decision is usually made under high psychological distress because patients need to simultaneously address the recent cancer diagnosis and their anticipation of cancer therapy (Quinn, Vadaparampil, & Jacobsen, 2010). Additionally, the FP decision needs to be made quickly, and the time constraint potentially exposes the patient to great

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anxiety (Hill, Nadler, & Mandel, 2012). This is a complex decision, yet female cancer patients/survivors recognize the importance of being informed and being able to decide regarding FP (Garvelink, Ter Kuile, & Bakker, 2013). Female survivors who had the opportunity to make a FP decision retrospectively perceived the healthcare providers' attitudes (i.e., their tendency to undervalue FP) and time constraints (Ehrbar, Urech, & Alder, 2016) as barriers in the FP decision-making process (Bastings, Baysal, & Beerendonk, 2014). Taking into account the literature regarding choice certainty (Kiani, Corthell, & Shadlen, 2014), it is possible to hypothesize that little time to decide can negatively affect patients' degree of certainty about their decision.

Studies have examined women's perceptions of the FP decision-making process retrospectively. However, such perceptions may be subject to recall bias or modified through the influence of other variables (e.g., FP technique outcomes) (Gilovich & Medvec, 1995). In contrast, at the time of the FP decision, patients' perceptions can also be affected by other variables, namely, the experience of psychological distress due to the cancer diagnosis and treatments (Quinn et al., 2010). Thus, it is important to assess these perceptions both at the time of the FP decision and later to understand if these perceptions are stable or change over time.

Quality of the FP decision

In accordance with the literature regarding complex health decisions (O' Connor, Stacey, & Entwistle, 2003), a high-quality decision concerning FP is a decision in which the patient has been informed, the patient's personal values have been honored and the patient is satisfied with the process (Lee et al., 2011). According to Berry and colleagues (2012) a high-quality decision results in low decisional regret (i.e., distress or remorse after a healthcare decision) (Brehaut, O'Connor, & Wood, 2003) and high decisional satisfaction (i.e., compliance with the selected option) (Holmes-Rovner, Kroll, & Schmitt, 1996). Regret is believed to be the result of a poor-quality decision (Brehaut et al., 2003) that, in contrast to a high-quality decision (Lee et al., 2011), is characterized by a lack of information provided to the patients and the undervaluation of their values and preferences. Decisional regret also appears to be associated with other important decisional outcomes such as patients' later dissatisfaction with the decision (Brehaut et al., 2003), and is cited as a key component of quality-of-life concerns for reproductive age cancer survivors (Deshpande, Braun, & Meyer, 2015).

The key role of the healthcare professional in helping the female patient to make a high-quality FP decision is clear (O' Connor et al., 2003). This idea is consistent with the international clinical guidelines that highlight the important roles of healthcare professionals in oncology and reproductive medicine in informing all cancer patients of childbearing age of their infertility risk and FP options and in

supporting these patients as they make their decisions regarding FP (Almeida-Santos, Sousa, & Teixeira, 2017; Loren, Mangu, & Beck, 2013).

Healthcare providers' support

Multiple studies have found a relationship between female cancer patients' negative experiences with the support provided by the oncologist (i.e., no referral to the reproductive medicine doctor, lack of information received, no opportunity to ask questions) (Kim et al., 2013; Peate, Meiser, & Friedlander, 2011) and the reproductive medicine doctor (i.e., not receiving sufficient information, lack of time during the appointment, no opportunity to ask questions) (Bastings et al., 2014) and the presence of decisional conflict (i.e., the difficulty patients have with choosing an option regarding a medical decision) (O' Connor, 1993) during the decision-making process. However, few studies have examined the long-term impact of the FP decision-making process, namely, on patients' later perceptions of the quality of the FP decision.

The study by Letourneau and colleagues (2011) (Letourneau, Ebbel, & Katz, 2012) was one of the first to provide evidence of the association between the FP decision-making process and the participants' perceptions of the quality of the FP decision and showed that receiving FP counseling from a fertility specialist and an oncologist resulted in patients' lower future regret about the FP decision than receiving counseling from only an oncologist. These results are consistent with a recent study reporting that counselling with a fertility specialist lessens future decisional regret (Benedict, Thom, & Kelvin, 2015). Moreover, it is important to note that both studies (Benedict et al., 2015; Letourneau et al., 2012) found that patients who pursued FP treatments had even lower regret scores than those who declined FP.

To our knowledge, no study has assessed the association between female cancer patients' satisfaction with oncologists' and reproductive medicine doctors' counselling and their levels of FP decisional satisfaction and regret. There is only one study that has already explored the association between female cancer survivors' satisfaction with the oncologists' FP counseling and their decisional regret, and has found that a more satisfactory counselling was associated with lower regret (Chan, Letourneau, & Salem, 2017). However, the survivors' satisfaction with oncologists' FP counseling was assessed retrospectively (several years after the FP decision), and only the survivors' satisfaction with the amount of information received about infertility risk was considered/assessed.

The present study

In light of the literature, this prospective study focused on understanding patients' perceptions of the FP decision-making process (i.e., pressure to select a specific option, time available to make a decision, certainty about the decision) and of the FP decision quality (decisional regret, decisional satisfaction) while taking into

account the time of the assessment (T1–at the time of the FP decision, T2–after the end of cancer therapy) and the patients' FP decision (to pursue vs. not to pursue FP). Moreover, this study aimed to examine the association between the patients' perceptions of the healthcare providers' support in the FP decision-making process and their perceptions of the FP decision quality, and whether this association differed based on the FP decision.

Methods

Procedures

This study was approved by the Ethics Committee of the [Coimbra Hospital and University Centre] a large [Portuguese] university-based hospital, and followed the ethical standards and procedures for research involving human subjects of the Helsinki Declaration (World Medical Organization 2008) and the American Psychological Association (American Psychological Association 2010).

Inclusion criteria for the present study were female gender, age between 18 and 40 years old, and a recent diagnosis of cancer and need to undergo gonadotoxic cancer therapy.

In Portugal, female FP techniques have been available since 2010 and National Health System covers all FP procedures for all cancer patients, with no exceptions, in public health institutions (Assembleia da República Portuguesa 2015). In spite of the existence of several public and private health institutions that perform female FP techniques, the [Coimbra Hospital and University Centre] is the only public hospital that offers all the female FP techniques, ovarian tissue cryopreservation included, and this is one of the reasons why there are patients from all over the country being referred to this hospital (Melo, Canavarro, & Almeida-Santos, 2017). According to the recent Portuguese guidelines for FP (Almeida-Santos et al., 2017), patients need to be informed by their oncologists about cancer-related infertility risk and FP and to be referred to a FP consultation with a reproductive medicine doctor at the same institution or in one of the available health institutions that perform female FP procedures.

Between May 2013 and December 2016, patients who were referred to the [Portuguese Centre for Fertility Preservation of Coimbra Hospital and University Centre] to make a decision regarding FP were consecutively recruited and informed about this study (i.e., research goals and participants' and researchers' roles) by the researcher during their first visit to the center. Patients who agreed to participate signed an informed consent form.

The study had a longitudinal design with two assessment time points. The first assessment time point (T1) occurred after recruitment, when participants were required to make a decision about whether to pursue FP. Participants were given the assessment protocol in an envelope and were instructed to return it to the researchers in a preaddressed stamped envelope after completion. A total of 110 participants were contacted, of whom 28 did not return the questionnaires

(response rate: 74.54%). When the cancer therapy ended, the participants were asked to complete the second assessment protocol (T2) online (hosted by Limesurvey®). Eleven participants did not complete the online questionnaire (response rate: 86.58%). Participation was voluntary, and no remuneration was provided. Motives for not responding to the questionnaire were not systematically evaluated at either assessment time. In the present study, only the participants who completed both assessment protocols were considered. The final sample comprised 71 participants.

The assessment protocol included a questionnaire that the researchers developed. At T1, the participants' personal and clinical information, perceptions of the FP decision-making process (i.e., pressure to select a specific option, time available to make a decision and certainty about the decision) and perceptions of the support provided by the oncologist and the reproductive medicine doctor in the FP decision-making process were assessed. At T2, the patients' current perceptions of the decision-making process and two self-report questionnaires assessing their decisional regret and satisfaction with the decision were also included. The full assessment protocols were piloted with 10 female cancer survivors, and revised for clarity and comprehensibility. The completion times for the protocols were 5 and 10 minutes for T1 and T2, respectively.

Measures

Personal and clinical information

Personal information included age, involvement in a committed relationship and whether the patient had children. Clinical data included self-reported information regarding the cancer type and FP decision (i.e., not to pursue vs. to pursue FP; and the selected FP technique).

Perceptions of the FP decision-making process

Participants' perceptions of the FP decision-making process were assessed with three questions: 1) Pressure to select a specific option was addressed as "Do you think you were pressured to select a specific option regarding FP?"; 2) The time available to make a decision was addressed as "Do you think you had enough time to make a decision about FP?"; and 3) Certainty about the decision was addressed as "How certain are you about your selected option regarding FP?". Each question was answered on a visual analogic scale ranging from 0 (*I was not pressured at all, I did not have enough time at all, I am not certain at all*) to 100 (*I was extremely pressured, I totally had enough time, I am totally certain*).

Perceptions of the quality of the FP decision

To evaluate the participants' perceptions of the quality of the FP decision, two self-report measures were included.

The Decision Regret Scale (original version: Brehaut et al., 2003; Brehaut et al., 2003) was used to assess the participants' current regret regarding the FP decision. Respondents were asked to indicate their agreement with five items (e.g., "It was the right choice") using a 5-point Likert scale from 1 (*Strongly agree*) to 4 (*Strongly disagree*), and two of the items were reverse-scored. Higher scores represent greater regret about the FP decision. In the present sample, Cronbach's alpha was .86.

The Satisfaction with Decision scale (original version: Holmes-Rovner et al., 1996; Holmes-Rovner et al., 1996; Portuguese version: Martinho and colleagues, 2014; Martinho, Martins, & Angelo, 2014) was used to evaluate the participants' current satisfaction with their FP decision. This scale contained six items (e.g., "I am satisfied that this was my decision to make") that were answered using a 5-point Likert scale ranging from 1 (*Strongly disagree*) to 5 (*Strongly agree*). Higher scores indicate greater satisfaction with the FP decision. Cronbach's alpha in the present sample was .91.

Perceptions regarding the healthcare providers' support in the FP decision-making process

Participants' perceptions regarding the support provided by the oncologist and the reproductive medicine doctor in the FP decision-making process were evaluated with the question "How supported did you feel by the following healthcare providers in the decision-making process regarding FP?", which was answered for each healthcare provider using a 5-point Likert scale from 0 (*Not at all*) to 4 (*Extremely*).

Statistical analyses

Statistical analyses were performed using the IBM Statistical Package for the Social Sciences, version 23.0 (Chicago, IL, USA). Concerning cancer type, this variable was categorized taking into account participants' answers regarding their cancer diagnosis. The less frequent cancer sites/types (i.e., gynecological and nasopharyngeal cancers) were recoded together in the category of "Other". Comparison tests (t, χ^2 and Fisher exact tests) were used to explore the differences between the participants according to their FP decision in terms of personal and clinical information and their decisional regret and satisfaction.

An ANOVA with repeated-measures was used to compare the participants' perceptions of the FP decision-making process (i.e., pressure to select a specific option, time available to make a decision, certainty about the decision), with time (T1, T2) as a within-subjects factor and the FP-decision group (not to pursue FP vs. to pursue FP) as a between-subjects factor. The effect size measures are reported.

Associations between variables were examined using Spearman's bivariate correlations.

Finally, moderation analyses were conducted to determine whether the association between oncologists' support in FP decision and participants' decisional regret and satisfaction was different according to the FP decision. These moderation models were tested using PROCESS computation tool, which is a SPSS macro that tests interaction effects (moderation) generating conditional effects that allow to test the significance of the simple slopes. Data for plotting each slope was also generated and graphical representations of the interaction effects were presented (Hayes, 2013). Significant interactions are graphically displayed for a better visualization of the results.

Results

Participants

A total of 71 female cancer patients participated in the present study. Table 1 presents the personal and clinical characteristics of the sample as well as a comparison between patients who decided to undergo FP and those who decided not to undergo FP. More participants who decided not to pursue FP had children compared with those who decided to pursue FP. No significant differences were found in other personal or clinical characteristics as a function of participants' FP decision. Comparing the respondents ($n = 71$) and the non-respondents at T2 ($n = 11$), no significant differences were found in terms of personal or clinical characteristics at T1.

Table 1. Sample characteristics at T1.

		Participants' decision regarding FP				
	Total ($N = 71$)	Not to pursue FP ($n = 18$)	To pursue FP ($n = 53$)	t / χ^2	p value	d / V
Personal information						
Age (in years), *M* (*SD*)	31.42 (4.40)	31.50 (4.10)	31.40 (4.41)	0.088	.930	0.023
Involvement in a committed relationship, *n* (%)				1.914	.209	0.165
No	17 (24.30)	2 (11.80)	15 (28.30)			
Yes	53 (75.70)	15 (88.20)	38 (71.70)			
Presence of children, *n* (%)				9.313	<.01	0.362
No	57 (80.30)	10 (55.60)	47 (88.70)			
Yes	14 (19.70)	8 (44.40)	6 (11.30)			
Clinical information						
Cancer type, *n* (%)				4.051	.220	0.249
Breast	53 (74.60)	12 (66.70)	41 (77.40)			
Hematologic	7 (9.90)	4 (22.20)	3 (5.70)			
Digestive	4 (5.60)	1 (5.60)	3 (5.70)			
Other	7 (9.90)	1 (5.60)	6 (11.30)			
Selected FP technique, *n* (%)						
Embryo cryopreservation[a]			5 (9.40)			
Oocyte cryopreservation			47 (88.70)			
Ovarian tissue cryopreservation			5 (9.40)			

[a]Some participants ($n = 4$) decided to preserve their fertility using more than one technique.

Table 2. Perceptions about the FP decision-making process: Descriptive statistics and main and interaction effects.

		Decision regarding FP		Main and interaction effects					
				Time effect		Group effect		Time x Group effect	
	Total ($N = 71$) *M* (*SD*) Min-Max	Not to pursue FP ($n = 18$) *M* (*SD*)	To pursue FP ($n = 53$) *M* (*SD*)	*F* (*p*)	η (Hill et al., 2012)	*F* (*p*)	η (Hill et al., 2012)	*F* (*p*)	η (Hill et al., 2012)
Pressure				11.173 (.001)	.143	6.239 (.015)	.085	0.157 (.693)	.002
T1	28.46 (35.63) 0.00–100.00	43.63 (39.51)	23.89 (33.43)						
T2	13.71 (24.99) 0.00–100.00	26.00 (33.07)	10.00 (21.00)						
Time available				.134 (.716)	.002	15.125 (< .001)	.184	2.758 (.101)	.040
T1	64.41 (36.38) 0.00–100.00	33.38 (38.59)	73.77 (30.25)						
T2	57.80 (36.63) 0.00–100.00	40.19 (34.66)	63.11 (35.84)						
Certainty				9.564 (.003)	.150	1.883 (.176)	.034	2.282 (.137)	.041
T1	96.09 (8.49) 57.00–100.00	96.13 (7.84)	96.07 (8.81)						
T2	85.80 (28.90) 0.00–100.00	76.33 (31.54)	89.27 (27.46)						

Note. F ratios were generated from Pillai's trace statistics.

Perceptions of the FP decision-making process and quality of the FP decision

Table 2 presents the participants' perceptions of the FP decision-making process at T1 and T2 along with the main (time, FP-decision group) and interaction (time x FP-decision group) effects. The results showed that the participants perceived significantly more pressure to select a specific option ($p <. 01$) and higher certainty about the decision ($p <. 01$) at T1 than at T2. The perception of the time available to make a decision was similar at the two assessment time points. Regarding group differences, participants who decided not to pursue FP reported more pressure to decide than those who decided to pursue FP ($p <. 05$), and participants who decided not to pursue FP reported less time available than those who decided to pursue FP ($p <. 001$). No significant interaction effects were found.

Table 3 presents the participants' differences in the perceived quality of the FP decision at T2, according to the FP decision and the association between these perceptions and those of the FP decision-making process. Globally, at T2, participants reported low decisional regret and high decisional satisfaction, and higher decisional regret regarding the FP decision was strongly associated with less decisional satisfaction ($r = -.78$, $p <. 001$). Moreover, participants who decided not to pursue FP presented significantly higher decisional regret ($p <. 01$) at T2 and lower decisional satisfaction ($p <. 05$) with their FP option than participants who decided to pursue FP.

Participants' perceptions of the quality of the FP decision were weakly to strongly associated with their perceptions of the FP decision-making process. Higher decisional regret was moderately associated with more perceived pressure to select a specific option at T1 and T2 and with less perceived time available to make a decision at T2, and regret was strongly associated with less certainty about the decision at T2. Higher decisional satisfaction was moderately associated with less perceived pressure at T1 and T2, moderately to strongly associated with more perceived time to make a decision at T1 and T2 and strongly associated with certainty about the decision at T2 (Table 3).

Interaction effects of the FP decision and healthcare providers' support on the quality of the decision

Table 4 presents the regression models examining the main and interaction effects of the FP decision and support provided by the oncologist and reproductive medicine doctor in the FP decision-making process on FP decisional regret and satisfaction. Neither decisional regret nor decisional satisfaction showed to differ according to the personal and clinical sample characteristics, namely age [regret: $U = 561.50$, $p = 0.501$; satisfaction: $U = 517.00$, $p = 0.228$], involvement in a committed relationship [regret: $U = 403.00$, $p = 0.480$; satisfaction: $U = 380.00$, $p = 0.306$], parity [regret: $U = 279.00$, $p = 0.061$; satisfaction: $U = 310.00$, $p = 0.174$], cancer diagnosis [regret: $\chi^2(3) = 3.75$, $p = .289$; satisfaction: $\chi^2(3) = 5.64$, $p = 0.131$], and time between T1 and T2 [regret: $t(63.73) = -0.92$, $p = 0.358$;

Table 3. Regret and satisfaction with the FP decision at T2: Comparison between participants who decided not to pursue FP with those who decided to pursue FP and associations with the participants' perceptions about the FP decision-making process.

		Decision regarding FP					Perceptions about FP decision-making process					
							Pressure, *r*		Time, *r*		Certainty, *r*	
	Total ($N = 71$) *M* (*SD*) Min-Max	Not to pursue FP ($n = 18$) *M* (*SD*)	To pursue FP ($n = 53$) *M* (*SD*)	*t*	*p* value	*d*	T1	T2	T1	T2	T1	T2
Decisional regret	1.40 (0.59) 1.00–3.60	1.76 (0.80)	1.28 (0.45)	3.102	**.003**	0.740	.32**	.28*	−.22	−.36**	−.12	−.61**
Decisional satisfaction	4.54 (0.68) 2.00–5.00	4.08 (0.94)	4.69 (0.48)	−2.653	**.015**	0.817	−.28*	−.25*	.24*	.51**	.12	.67**

*$p < .05$. **$p < .01$.

Table 4. Effects of FP decision and of the support provided by the oncologist and the reproductive medicine doctor on decisional regret and satisfaction ($N = 71$).

	Decisional regret Overall model: $R^2 = .11$ $F_{3,55} = 2.34$		Decisional satisfaction Overall model: $R^2 = .35$ $F_{3,55} = 10.00^{***}$	
	B (SE)	*t*	*B (SE)*	*t*
Support provided by the ONCO	−0.09 (0.15)	−0.60	0.59 (0.15)	4.00***
Decision (1: To pursue FP)	−0.44 (0.51)	−0.86	2.18 (0.52)	4.20***
	ΔR (Hill et al., 2012) = .00		ΔR (Hill et al., 2012) = .11***	
Support provided by the ONCO x Decision	0.01 (0.17)	0.04	−0.53 (0.17)	−3.10**
	Overall model: $R^2 = .11$ $F_{3,59} = 2.53$		Overall model: $R^2 = .27$ $F_{3,55} = 7.34^{***}$	
	B (SE)	*t*	*B (SE)*	*t*
Support provided by the REP	−0.01 (0.17)	−0.03	0.48 (0.18)	2.65*
Decision (1: To pursue FP)	−0.18 (0.66)	−0.27	1.73 (0.70)	2.46*
	ΔR (Hill et al., 2012) = .00		ΔR (Hill et al., 2012) = .03	
Support provided by the REP x Decision	−0.08 (0.21)	−0.40	−0.37 (0.22)	−1.68

*$p < .05$. **$p < .01$. ***$p < .001$.
Note. ONCO = Oncologist, REP = Reproductive medicine doctor.

satisfaction: $t(69) = -0.36$, $p = 0.721$]. Thus, no variables were controlled in the regression analyses. No significant main or interaction effects for the participants' decisional regret were found (Table 4).

The interaction effect between the support provided by the oncologist in the FP decision-making process (Total sample: $M = 2.81$, $SD = 1.07$, 0–4) and the FP decision on the participants' decisional satisfaction was significant (ΔR (Hill et al., 2012) = .11). Conditional effect analyses suggested that the association between the support provided by the oncologist and decisional satisfaction was significant for the group that decided not to pursue FP ($b = 0.59$, $SE = 0.15$, $t = 4.00$, $p <$. 001) but not for the group that decided to pursue FP ($b = 0.07$, $SE = 0.08$, $t = 0.90$, $p = .373$). As shown in Figure 1, in the group that decided not to pursue FP, those perceiving higher support by the oncologist in their FP decision-making process reported higher satisfaction with their FP decision. The interaction effect between the support provided by the reproductive medicine doctor (Total sample: $M = 3.29$, $SD = 0.75$, 1–4) and the FP decision on the participants' decisional satisfaction was non-significant (Table 4). The support provided by the reproductive medicine doctor was significantly associated with decisional satisfaction for all participants regardless of whether they decided to pursue FP ($b = 0.48$, $SE = 0.18$, $t = 2.65$, $p <$. 05).

Discussion

In the present exploratory study, female cancer patients generally reported a positive experience with their FP decision-making process. Despite the documented

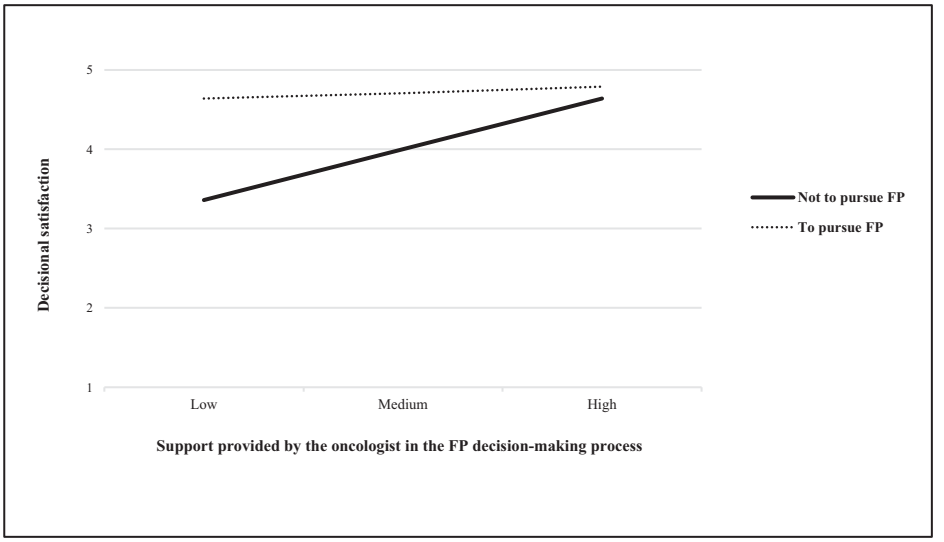

Figure 1. Support provided by the oncologist in the FP decision-making process and FP decisional satisfaction.

complexity of the female FP decision-making process (Quinn et al., 2010), these patients generally expressed low levels of pressure to make a specific choice, sufficient time to decide and high levels of certainty about the final FP decision at both assessment time points.

We also found that patients' perceptions of this decision-making process can change over time, which may be due to new information or experiences acquired since the moment of the FP decision. First, these patients may no longer feel as emotionally overwhelmed after cancer therapy as they did at the time of the cancer diagnosis and FP decision, potentially resulting in perceptions of lower levels of pressure after cancer than at the time of the FP decision. Second, patients' FP outcomes, fertility status after cancer therapy and/or acquisition of new information about the FP techniques may also result in lower levels of certainty about the selected FP option after cancer therapy in comparison with their certainty at the moment of the decision. Lastly, it is also important to note that these results may be justified by the presence of recall bias.

In our study, the results regarding patients' generally positive experience with their decision-making process together with their high levels of decisional satisfaction and low levels of regret after cancer therapy suggest that the appropriate conditions for making a high-quality FP decision were provided. One of these conditions was the support of the oncologist and reproductive medicine doctor throughout the decision-making process given that, in general, patients reported feeling supported by these clinicians. The support provided by the reproductive medicine doctor in particular was critical for all patients' decisional satisfaction regardless their FP decision, which may be due to the provision of hope toward cancer recovery when focusing the discussion with patients in their fertility and

pregnancy after cancer therapy. This finding may be also due to the specific role of this clinician in providing detailed FP information, namely, the pros and cons of each technique, their procedures and success rates, and in implementing the patients' FP choice.

However, our study suggests that the appropriate conditions for promoting an informed and high-quality FP decision-making process were not equally provided to the patients in our cohort who decided not to preserve their fertility compared to those who decided to pursue FP. This result is in accordance with a recent study from Letourneau and colleagues (Letourneau, Sinha, & Wald, 2017) which showed that patients who decided not to pursue FP tended to have less time to make this decision with the fertility specialist, taking into account that they tended to be referred one week later for this FP consultation than those who decided to pursue FP. Our results also showed that, after cancer therapy, patients who decided not to pursue FP perceived their decision as lower in quality than patients who decided to pursue FP, which we may be due to a more negative experience during the decision-making process (i.e., more pressure and less time to decide) rather than to their decision to not pursue FP. Although existing studies have documented higher levels of decisional regret in the patients who decided not to pursue FP relative to those who decided to pursue FP (Letourneau et al., 2012), they hypothesized that this worse outcome was associated with the decision itself. Thus, to our knowledge, this is the first study to report the stronger association between the decision quality and the patients' experience during the decision-making process than with the choice to not pursue FP.

The support provided by the oncologist was specifically important for the patients who decided not to pursue FP. It is possible that patients who decided to pursue FP had a better experience regarding their decision-making process, resulting in a higher-quality decision and decisional satisfaction, regardless of their oncologist's support in their FP decision. In contrast, patients who decided not to pursue FP faced more pressure to make a specific FP choice and perceived less time to make an informed decision, and it may be that patients who felt more supported by their oncologist in their decision not to pursue FP were more satisfied with their decision than those who felt less supported by this healthcare professional. This is consistent with other oncology care studies that have reported the importance of the oncologists' support of cancer patients during all cancer-related decision-making processes (Peddie, Porter, & Barbour, 2012).

This study highlighted the importance of providing all female cancer patients with the appropriate conditions to have a positive experience during the FP decision-making process (without pressure to select a specific choice, with time and with the opportunity to discuss information with clinicians and other members of their support systems and to reflect on their values and preferences), resulting in a high-quality FP decision with high satisfaction in the future. This is important for all female cancer patients regardless of their FP decision but seems to be particularly critical for patients who are more predisposed to deciding not to preserve

their fertility. Reasons not to pursue FP need to be deeply examined in future studies as our study's results suggest that they may regret this decision later. However, despite our study did not directly address this question, we can speculate about some reasons for these patients' decisions. It is possible that some patients who faced difficulties in adaptively coping with the burden of the decision-making process may have decided not to preserve their fertility as an avoidance strategy of selecting their preferred FP technique, and, after cancer therapy, they may have perceived this experience more negatively than patients who were able to apply adaptive coping mechanisms to select an FP procedure (Lazarus & Folkman, 1984). Moreover, patients may have decided not to pursue FP in order to avoid more medical interventions, or because these procedures were against their religious beliefs. It would also be important to develop future studies with larger (e.g., more patients who decided not to pursue FP) and more diverse (e.g., patients from other countries) samples, and including other variables most probably are contributing for greater explanation of variance in the regression models, namely regarding decisional regret.

Study limitations

Our study is relevant for several reasons. First, to our knowledge, this is the first prospective study on female cancer patients' experiences with their FP decision-making process and clarifies the association between these experiences and the FP decision quality (i.e., decisional regret, decisional satisfaction). Second, the present study adds novel information regarding female FP, namely, the prospective assessment of patients' perceptions of the FP decision-making process.

Despite these contributions, there are limitations to be considered. First, the sample size was small, especially the group of patients who did not undergo FP. However, it is important to note that it was possible to detect differences between patients who decided to pursue FP and those who decided not to pursue it, showing the adequate power of the conducted statistical analyses. Second, the participants were recruited from only one Portuguese clinic, which may limit the generalizability of our results. Third, the time passed between the two assessment time points varied widely across patients, which is expected due to the variability of cancer treatments and its duration (e.g., different cancer treatment protocols with a variable number of chemo and/or radiotherapy sessions).

Furthermore, it would be important to assess in future studies the influence of cancer treatments and cancer stage on the patients' FP decision. It would also be important to examine other variables that concerning patients' perceptions about their FP decision-making process, besides the pressure to make a specific choice, the time to decide and the degrees of certainty regarding the selected choice. Future research should also assess other variables that may have influence participants' perceptions, namely, their emotional status, the desire to have children, the changes in their relationship status between the two assessment time points, their

fertility status after cancer therapy, their sources of pressure to select a specific FP option and participants' reasons to decide not to pursue FP and for any decisional regret and their decisional satisfaction. Finally, it would also be useful to consider the role of the patients' partner in the FP decision-making process.

Implications for clinical practice and psychosocial providers

Learning more about the experiences of female cancer patients during their FP decision-making process is extremely important for the optimization of care to enable high-quality FP decisions. The time to decide is critical. Good communication between the oncology and reproductive medicine clinicians is necessary to improve the timing of referral of the patients to the reproductive medicine doctor after the cancer diagnosis and before therapy. In Portugal, the patients' referral by their oncologists to an FP consultation with a reproductive medicine doctor is not always effective, which can result in a delay of FP discussion with patients by the fertility specialist, and in the impossibility to perform any FP technique due to constraints related with the beginning of cancer therapy.

There should be implemented institutional procedures that allow the timely and more direct contact of the oncologist with the fertility specialist. This will allow patients to be adequately informed about their infertility risk and FP options, to discuss these matters with clinicians and other members of their support system (e.g., partner, family), to have the opportunity to consider their options while reflecting on their own values and beliefs without being so pressured to select a specific choice due to the imminence of the beginning of cancer therapy and, finally, to select an option with more certainty and implement it. Moreover, a timely referral is important to give patients the opportunity to more adaptively cope with their diagnosis, medical treatment and psychological issues associated with FP, to adequately handle their psychological distress symptoms and to select an FP option less emotionally overwhelmed, shocked and/or worried about the information provided about the cancer diagnosis and infertility risk (Lawson & Klock, 2010).

These psychosocial issues suggest the important role of the psychologist in helping patients to more adequately cope with the FP decision so that they can make a choice that is based on the medical information and their values and preferences and not based on their emotional status, and in helping them to anticipate their adaptation to their specific FP decision throughout the cancer treatment process and thereafter (Bradford & Woodard, 2017; Lawson & Klock, 2010; Melo et al., 2017). Moreover, the psychologist may also be valuable in interacting with medical teams to improve their understanding about patients' needs regarding FP decision-making process and its outcomes in terms of future patient decisional satisfaction and regret. Taking into account that these hypotheses were not assessed in the present study, future research is needed to make conclusions regarding the role of the psychologist.

Reproductive medical and psychological counseling throughout the cancer treatment process and during survivorship should also be implemented. Firstly, it seems to be important to provide reproductive monitoring to cancer patients/survivors over time and to promote informed reproductive decisions after cancer therapy with consideration of the FP option previously selected. Secondly, the ongoing psychological counselling can enable patients to discuss, across time, their perceptions regarding their FP decision-making process, namely their certainty regarding the selected option, taking into account new reproductive information that can be acquired and their new experiences. These encounters with the psychologist may be important opportunities to prevent patients' FP decisional regret and psychological distress FP-related in the long-run.

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