Medical, demographic and psychological correlates of fear of cancer recurrence (FCR) morbidity in breast, colorectal and melanoma cancer survivors with probable clinically significant FCR seeking psychological treatment through the ConquerFear study

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Abstract

Purpose

Despite the prevalence of fear of cancer recurrence (FCR), understanding of factors underlying clinically significant FCR is limited. This study examined factors associated with greater FCR morbidity according to a cognitive processing model, in cancer survivors who screened positively for clinically significant FCR seeking psychological treatment through the ConquerFear trial.

Methods

Participants had completed treatment for breast, colorectal or melanoma cancer 2 months to 5 years previously and scored ≥13/36 on the Fear of Cancer Recurrence Inventory-Short Form (FCRI-SF). Hierarchical regression analyses examined associations between demographic, medical and psychological variables, namely metacognitions (MCQ-30), post-traumatic stress symptoms (IES-R), and FCR (FCRI total score).

Results

Two hundred and ten (95%) of 222 cancer survivors consented to the ConquerFear trial completed the baseline questionnaire. Participants were predominantly (89%) breast cancer survivors. The final regression model accounted for 68% of the variance in FCR (demographic and medical variables 13%, metacognitions 26%, post-traumatic stress symptoms 28%). Negative metacognitive beliefs about worry and intrusive post-traumatic stress symptoms were significant individual correlates of FCR, but negative beliefs about worry did not significantly moderate the impact of intrusions on FCR morbidity.

Conclusions

Results provide partial support for the cognitive processing model of FCR. Psychological factors were found to play an important role in FCR morbidity after controlling for demographic/medical factors. More intrusive thoughts and negative beliefs about worry were strong independent predictors of FCR morbidity. Cancer survivors with clinically significant FCR may benefit from assessment for intrusive thoughts and metacognitions and delivery of trauma- and/or metacognitive-based interventions accordingly.

Keywords

Fear of cancer recurrence; cancer; survivorship; supportive care; metacognitions; post-traumatic stress

Introduction

Fear of cancer recurrence (FCR), defined as "fear, worry or concern relating to the possibility that cancer will come back or progress," [1; p3266] is pervasive amongst cancer survivors. Approximately 50% of adult cancer survivors experience moderate to high FCR levels [2]. High FCR does not appear to diminish over time and is associated with greater psychological distress, impaired quality of life and increased healthcare utilisation [2]. Up to 79% of survivors report an unmet need for help dealing with FCR [2].

Considerable debate has centred on how to best define and assess FCR in general and clinically significant FCR in particular [1,3-5]. FCR levels are thought to exist on a continuum [1], with low levels potentially serving an adaptive function by maintaining cancer survivors' vigilance for signs of recurrence. Conversely, clinically significant FCR is thought to be characterised not only by high levels of fear/worry, but also negative consequences, including excessive distress, functional impairment, maladaptive coping and future planning difficulties [1]. While almost all cancer survivors experience FCR to some degree, factors related to the manifestation of clinically significant FCR are poorly understood. This is now recognised as a research priority [1,5,6].

Numerous studies have investigated factors associated with *high* FCR (but not clinically significant FCR specifically), with few consistent correlates identified. Two systematic reviews reported that only younger age and greater physical symptoms were strongly associated with high FCR [2,7]. Other sociodemographic (e.g. female gender, low education), medical (e.g. later cancer stage and chemotherapy treatment), and psychological (e.g. lower optimism and social support) factors have been inconsistently associated with high FCR [2,7]. Few studies have elucidated correlates of clinically significant FCR, particularly psychological factors. Most previous research has included cancer survivors with varying FCR levels and primarily focused on demographic and medical factors (e.g. treatment type).

Only three studies have specifically investigated correlates of clinically significant FCR as indicated by a diagnostic interview or screening measure. Regarding medical and demographic correlates, Simard and Savard [8] found that participants identified as having clinically significant FCR (Semi-Structured Interview

on Fear of Cancer Recurrence (SIFCR) score ≥5) were significantly more likely to be married and use psychotropic medication. The remaining two studies found no difference in characteristics of breast/prostate [9] or colorectal [10] cancer survivors above versus below screening cut-offs for clinically significant FCR of ≥13 on the Fear of Cancer Recurrence Inventory-Short Form (FCRI-SF) and ≥14 on the Cancer Worry Scale respectively. These studies were likely underpowered (n=60-76), particularly considering the proportion of participants who screened positively for clinically significant FCR in each study (38-44%). Also, some of those who screened positively may not actually have had clinically significant FCR, due to sensitivity limitations of the screening tools/cut-offs used. Research by our group and others suggests that a higher FCRI-SF cut-off (≥22) may better identify likely cases of clinically significant FCR [11].

Methodological limitations aside, the lack of clear relationships between demographic or medical factors and clinically significant FCR is perhaps unsurprising considering recent theoretical developments suggesting a greater role of psychological factors in the aetiology of clinically significant FCR [12-15]. For example, the cognitive processing model of FCR [12] posits that while it is normal for all cancer survivors to experience intrusive thoughts about recurrence, it is individuals with positive or negative metacognitions (beliefs about worry) who are most likely to consequently develop clinically significant FCR. This is because cancer survivors with unhelpful metacognitions may develop a cognitive attentional style characterized by rumination, self-focused attention and threat monitoring [16], making them more likely to experience greater FCR morbidity in response to cancer-related stressors (e.g. intrusive thoughts). The term FCR morbidity is used in this paper to denote the negative consequences of FCR, such as distress, poor coping and functional impairment, which are likely to be associated with clinically significant FCR.

To date, few attempts have been made to test theoretical predictions from the cognitive processing model of FCR which have important implications for the clinical understanding and management of FCR. One prior study found that in 63 early-stage breast/prostate cancer survivors, those with FCRI-SF scores ≥13, suggestive of clinically significant FCR, reported significantly higher Metacognitions Questionnaire-30 total and subscales scores, including negative and positive beliefs about worry, compared to participants with non-clinical FCR [9]. While these results highlight the potential importance of metacognitions in clinically significant FCR, this study did not measure other important factors thought to interact with FCR according to

the cognitive processing model, such as intrusive thoughts about recurrence [12]. Nor did statistical analyses control for potential covariates (e.g. age, gender and cancer type/stage). Consequently, the relative importance of psychological factors such as metacognitions in the aetiology and maintenance of clinically significant FCR remains unclear.

The present study aimed to test hypotheses from the cognitive processing model of FCR, by examining the relationships between intrusions and metacognitions and FCR morbidity in a sample of survivors who screened positively for clinically significant FCR, while controlling for medical and demographic variables. Specifically, based on the cognitive processing model [12] and previous research [9,17,18], we hypothesised that metacognitions (particularly negative beliefs about worry) and post-traumatic stress symptoms (particularly intrusive thoughts) would explain more of the variance in FCR morbidity than medical and demographic factors. Further, we predicted that metacognitions would moderate the relationship between the severity of intrusions and FCR morbidity. Greater FCR morbidity was expected for those with more negative metacognitive beliefs about worry in response to intrusive thoughts.

Methods

Setting

Participants were drawn from the ConquerFear study [19,20], which recruited from 17 clinical sites around Australia, primarily in major metropolitan centres, and two online databases of cancer research volunteers (Breast Cancer Network Australia Review and Survey Group, and Register4) from 2013 to 2016. Potentially eligible survivors were informed about the ConquerFear study by their treatment team or responded to study advertisements. A researcher phoned interested survivors, explained the study and (e)mailed the FCRI severity subscale for participants to complete and return. Those who met the eligibility criteria below and for whom a therapist was available were sent a baseline questionnaire, which provided the data for this analysis.

Participants

Adult patients were eligible to participate if they met criteria for entry into the ConquerFear study:

- a confirmed past diagnosis of Stage 0-III breast cancer, Dukes stage A-C colorectal cancer (corresponding to TNM staging I – IIB and IIIA), or stage IA – IIB melanoma;
- completed all hospital-based adjuvant treatments 2 months to 5 years previously;
- received treatment with curative intent and were disease free at time of invitation;
- scored ≥13 on the FCRI severity subscale used to screen for clinically significant FCR [8];
- sufficient English to give informed consent and engage with study interventions.

Survivors with current severe depression, psychosis or cognitive impairment and those receiving psychological treatment were excluded. Participants completed the baseline questionnaire prior to randomisation within a multi-site parallel randomised controlled trial of an intervention for FCR (ConquerFear) [19]. Primary ethics approval was obtained from the Cancer Institute NSW Clinical Research (HREC/12/CIC/17) and SESLHD (HREC/13/POWH/731) Ethics Committees.

Measures

Multiple measures were utilised in the completed RCT of ConquerFear [19,20] from which the sample for this study/analysis was derived. Only measures of FCR and correlates of theoretical interest were included in the current analysis of baseline (i.e. pre-intervention) data from ConquerFear participants.

Primary Outcome

Fear of Cancer Recurrence was assessed using the 42-item FCRI [21] which includes subscales assessing FCR triggers, severity, psychological distress, functioning impairments, insight, reassurance, and coping strategies. The FCRI has demonstrated high: internal consistency (subscales α=0.71-0.94), test-retest reliability (subscales r =0.56-0.87) and convergent validity in large heterogeneous cancer survivor samples. Cronbach's alphas in our sample ranged from 0.61 (coping) to 0.90 (functional impairments). Respondents rate the degree to which symptoms/issues affected them over the past month on a Likert scale ranging from 0 ('not at all' or 'never') to 4 ('a great deal' or 'all the time'). Although there are potential issues with aggregating FCRI subscales [4], total FCRI score was used as the dependent variable, as it closely reflects proposed features of clinically significant FCR; namely related distress, functional impact, and maladaptive coping [1], rather than the level of fear indicated by the FCRI-SF [3,4]. Total scores can range from 0-168; higher scores indicate greater FCR morbidity.

Potential correlates of FCR

Demographic and medical variables assessed are listed in Table 1.

Metacognitions were evaluated using the 30-item MCQ-30 which asks participants to indicate their general agreement (1 'do not agree' to 4 'agree very much') with statements expressing beliefs about worry ("my worrying could make me sick") hypothesised to play a key role in the development and maintenance of clinically significant FCR according to our cognitive processing model [12]. The MCQ-30 comprises five subscales: cognitive confidence ("I do not trust my memory"), positive beliefs about worry ("Worrying helps me cope"), cognitive self-consciousness ("I constantly examine my thoughts"), negative beliefs about worry ("My worrying is dangerous for me"), and need to control thoughts ("Not being able to control my thoughts is a sign of weakness"). The MCQ-30 has been validated in the cancer setting and demonstrated acceptable construct and convergent validity and adequate to excellent internal consistency (subscale α=0.73-0.91) [17]. Subscale scores range from 6-24; total scores range from 30-120. Higher scores indicate more dysfunctional metacognitions.

Post-traumatic stress symptoms (representing cancer related-stressors in our model) were assessed using the 22-item Impact of Event Scale Revised (IES-R), which asks participants to rate how distressing they find a list of difficulties sometimes experienced after a stressful life event (i.e. cancer) from 0 'Not at all' to 4 'Extremely.' The IES-R has three subscales: intrusion ("I thought about it when I didn't mean to"), avoidance ("I stayed away from reminders about it") and hyper-arousal ("I felt watchful and on guard"). Higher scores indicate greater morbidity (total score range 0-12, subscales 0-4).

Statistical Analyses

Sample Size

The main study was powered to detect differences in the primary outcome (FCRI Total) between trial arms (see protocol [19]). For this paper we used the rule of thumb for regression models of a 10:1 participant to variable ratio [22].

Analyses

Hierarchal multiple linear regression was used to examine associations of FCRI total scores with demographic and medical (Step 1) and psychological factors (metacognitions, MCQ-30 subscales; and post-

traumatic stress symptoms, IES-R subscales; Steps 2 and 3 respectively). We included MCQ-30 and IES-R subscale rather than total scores to provide a more theoretically and clinically useful depiction of FCR correlates, but power limitations prevented the evaluation of all interactions of theoretical interest between MCQ-30 and IES-R subscales. The interaction between the MCQ-30 negative beliefs about worry subscale and the IES-R intrusion subscale was examined in Step 4, as these constructs represent key components of the cognitive processing model of FCR [12] and have previously separately been shown to be highly related to FCR [10,18]. Likelihood ratio tests were used to assess whether the variables added in each new step improved model fit compared to the previous step. Tolerance was examined to assess multicollinearity. Values were all above the widely accepted cut-off of 0.2 [23].

Results

Of 704 potentially eligible patients invited to participate in the ConquerFear trial, 533 were contactable, of whom 222 consented and were randomised. Two hundred and ten of 222 (95%) consented survivors completed the baseline questionnaire. Lack of time and low perceived need for help were the most common refusal reasons. The majority of participants were women (95%) with breast cancer (89%), 65% were in a relationship, 81% had children, and 49% were university educated. Mean age at diagnosis was 50.2 years and median time since diagnosis was 28 months. Cancer stage was fairly evenly distributed (21% Stage 0-1, 38% Stage 2, 24% Stage 3). Almost all (98%) participants had undergone surgery, 79% had chemotherapy, 78% radiotherapy and 60% were currently undergoing hormone therapy. Approximately half (45%) had seen a cancer care team member in the past month and 37% had an appointment in the coming month (see Table 1).

Table 1

FCRI total scores were normally distributed (Mean=84.0, SD=23.3, Range=31-138; see Table 2).

Table 2

Correlates of FCR morbidity

Significant results of the hierarchical multiple regression analysis which included 203 participants with complete data are shown in Table 3. Full univariate and multivariate results can be seen in the online supporting information. Participant sociodemographic and medical characteristics (Model Step 1) explained

13% of the variance in FCR morbidity. Having had an appointment with the cancer care team in the previous month was the only significant individual correlate (B=7.04; 95% CI: 0.64, 13.44; p=0.03), but this did not remain significant when psychological variables were added in Step 2. The addition of metacognitions (MCQ-30 subscales; Step 2) independently accounted for an additional 26% of variance in FCR morbidity ($p<0.0001$). The negative beliefs about worry subscale was the only significant individual correlate ($\beta=9.34$; 95% CI: 5.91, 12.76; $p<0.0001$). The addition of post-traumatic stress symptoms (IES-R subscales; Step 3) independently accounted for a further 28% of variance in FCR morbidity ($p<0.0001$). The intrusion ($\beta=9.71$; 95% CI: 5.86, 13.56; $p<0.001$) and avoidance ($\beta=4.70$; 95% CI: 1.95, 7.44; p=0.01) subscales were significant individual correlates, along with more negative beliefs about worry ($\beta=3.56$; 95% CI: 0.86, 6.27; p=0.01). Adding the interaction between negative beliefs about worry and intrusions (Step 4) did not improve model fit (p=0.12). Age, negative beliefs about worry, intrusions, avoidance and hyperarousal were significant individual correlates of FCR morbidity in the final model (see Table 3).

Table 3

Discussion

The aim of this study was to investigate theoretically predicted relationships between metacognitions, intrusive thoughts and FCR morbidity in cancer survivors with probable clinically significant FCR seeking psychological treatment. As expected, results supported an important role of metacognitions (particularly negative beliefs about worry), and post-traumatic stress symptoms (particularly intrusions) in predicting FCR morbidity. These results provide partial support for a novel cognitive processing model of FCR [12]. However, the hypothesized relationship whereby metacognitions moderated the relationship between intrusions and FCR morbidity was not supported. Consistent with previous literature, demographic and medical characteristics were only weakly related to FCR.

Interestingly, negative beliefs about worry were the only type of metacognitions that showed a significant relationship with FCR morbidity in the final model. It is known that almost all survivors think about the possibility of their cancer recurring from time-to-time [12]. These results suggest that those who hold negative beliefs about worry (and consequently attempt to suppress these thoughts) are more likely to experience greater distress and functional impact when worries about cancer recurrence arise. Further, the belief that worry is harmful may even cause some survivors concern that worry itself might cause cancer recurrence [24].

The lack of associations between FCR and other metacognitions (e.g. cognitive confidence and positive beliefs about worry) diverges from previous quantitative research [9,17,18] and the cognitive processing model of FCR [12]. Our study differs from previous work in two ways. Firstly, we sampled only people who had screened positively for clinically significant FCR (whereas previous studies have included people with varying FCR levels). Secondly, we used more sophisticated multivariate analyses. Indeed, in univariate analyses positive beliefs about worry were associated with FCR morbidity, but these relationships were not significant in multivariate analyses. This suggests that negative beliefs about worry may be more central to greater FCR morbidity than other metacognitive beliefs, at least in people with probable *clinically significant FCR*. This is consistent with qualitative findings suggesting that coping strategies associated with negative

beliefs about worry, such as avoidance/distraction, may be more common in survivors with clinically significant FCR (80%) versus those with non-clinical FCR [6].

The relationships found between post-traumatic stress symptoms and FCR fit with the cognitive processing model of FCR, and are consistent with recent qualitative work which identified "Having cancer-related thoughts and imagery that were difficult to control, daily and recurrent, lasted 30 minutes or more [and] increased over time" as hallmarks of clinically significant FCR [6; p4207]. However, due to the cross-sectional nature of this analysis, it is difficult to disentangle whether post-traumatic stress symptoms are antecedents or consequences of heightened FCR.

Interestingly, although negative beliefs about worry and level of intrusion were significant individual correlates of FCR, their interaction did not explain any additional variance beyond those two factors separately (i.e. the impact of intrusions on FCR morbidity was not significantly moderated by metacognitions, as predicted). This suggests that negative beliefs about worry and intrusions both make important but independent contributions to FCR morbidity in those with clinically significant FCR. Further research investigating mediators and moderators of the impact of intrusions and metacognitions on FCR morbidity is needed, like that of Cook et al [25] which found that metacognitions cause and maintain more general emotional distress in cancer survivors both directly and indirectly by driving worry. Further insight into how metacognitions contribute to FCR morbidity in survivors with clinically significant FCR could be gained by looking at how maladaptive metacognitions manifest. Measures such as the Cognitive Attentional Syndrome-1 [26,27], which assesses metacognitive beliefs together with coping strategies linked with those beliefs, may provide some useful insight.

The implications of this study are that both metacognitions and intrusive thoughts should be assessed in cancer survivors with probable clinically significant FCR who present for treatment. Those found to have negative metacognitions about worry would benefit from a therapy incorporating meta-cognitive therapy. Meta-cognitive therapy refers to a therapy in which the target of cognitive therapy is not the cognitions (i.e. intrusions themselves), but rather the appraisal of that intrusion (e.g. the worry about cancer returning will cause a recurrence). The recent ConquerFear study included meta-cognitive therapy as a component of the

five-session treatment and showed that the intervention was superior to a relaxation-based intervention at post-treatment and six month follow-up [20].

However, these results also suggest that clinically significant FCR levels are strongly associated with post-traumatic stress symptoms. Recent meta-analyses [e.g. 28] indicate that trauma-focused cognitive-behaviour therapy (of which there are many variants) is efficacious in managing post-traumatic stress disorder. These results suggest that including some trauma-focused strategies might further augment the efficacy of existing cognitive-behavioural approaches, which have been shown to reduce FCR [29-31].

Study Limitations

While the large sample of cancer survivors who screened positively for clinically significant FCR was a study strength, the relatively low response rate and large proportion of participants who were female, had breast cancer, and were highly educated limits generalizability to other cancer survivors. However, as our study is focused on testing theoretical relationships between FCR and other psychological variables, which are not strongly related to demographic or medical characteristics, the representativeness of the demographic and medical characteristics of our sample versus cancer survivors generally is less critical. Our study sample is unique in that all participants had been screened positively for clinically significant FCR levels and sought psychological treatment by volunteering for an RCT, however such patients may differ from unselected cancer patients [32]. Due to limitations of the FCRI severity scale as a screening measure for clinically significant FCR [3,11] some included participants may have had non- or sub-clinical FCR levels. To minimise participant burden and risk of dropout from the ConquerFear trial, we did not assess all variables reported in the literature to contribute to clinically significant FCR (e.g. past traumatic life events [12] or intolerance of uncertainty [14] or high FCR more generally (e.g. physical symptoms [2]). Further the direction of relationships between FCR and related variables cannot be determined from this cross-sectional analysis. Structural equation modelling could have been used to control for measurement error when examining relationships between FCR and the other psychological constructs evaluated. However, seeing as this was one of the first studies to test theoretical predictions from the cognitive processing model of FCR and that not all constructs in the model were assessed, this may have limited the interpretability and generalizability of our results, as well as comparison with previous literature [33]. Also, we could not infer

causality due to the cross-sectional nature of our data, so regression was used instead. Structural equation modelling of data from prospective studies could be used to identify factors that cause and maintain clinically significant FCR over time in future. We also acknowledge that the amount of statistical testing has likely increased our type I error rate to greater than the nominal 0.05, therefore interpretation of results requires caution.

Conclusions

This study provides one of the largest and most comprehensive assessments of factors associated with FCR morbidity among cancer survivors with likely clinically significant FCR to date. Consistent with previous research, psychological factors were more highly related to FCR than demographic or medical factors. High levels of post-traumatic stress symptoms, particularly intrusions and negative metacognitions about worry, were strongly associated with greater FCR morbidity among those with clinically significant FCR, as predicted by a cognitive processing model of FCR [12]. Future research should explore other psychological factors to guide identification and treatment of clinically significant FCR.

Compliance with Ethical Standards

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Conflict of Interest: The authors declare that they have no conflict of interest.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards."

Informed consent: Informed consent was obtained from all individual participants included in the study.

Data Availability: The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Table 1. Sample demographic and medical characteristics*

Variable	Level	n (%) (N=210)
Gender	Female	200 (95%)
Age	Mean (SD)	52.8 (10.1)
Relationship Status	Never Married	25 (12%)
	Married/de facto	137 (65%)
	Widowed	7 (3%)
	Divorced/separated	41 (20%)
Education	Year 10 or below (intermediate)	32 (15%)
	Year 12 (leaving)	24 (11%)
	Vocational certificate/diploma	52 (25%)
	University degree	52 (25%)
	Higher degree (postgraduate)	50 (24%)
Employment Status	Missing	2 (1%)
	Full-time employed	56 (27%)
	Part-time employed	62 (30%)
	Self-employed	12 (6%)
	Unemployed	16 (8%)
	Student	1 (1%)
	Retired/pensioner	37 (18%)
	Home duties	24 (11%)
Country of Birth	Australia	137 (65%)
	Other	73 (35%)
Language other than	Missing	2 (1%)
English at home	No	181 (86%)
Children?	Yes	171 (81%)
Months since diagnosis	Median (IQR)	28.3 (16.0 - 42.1)
Age at diagnosis	Mean (SD)	50.2 (10.4)
Cancer Type	Breast	186 (89%)
	Colorectal	19 (9%)
	Melanoma	5 (2%)
Cancer Stage	Missing/Unknown	23 (11%)
	0	3 (1%)
	1	45 (21%)
	2	84 (40%)
	3	54 (26%)
Previous Treatment:	Chemotherapy	166 (79%)
	Herceptin	38 (18%)
	Hormonal Therapy	122 (58%)
	Other	3 (1%)
	Radiotherapy	163 (78%)
	Surgery	205 (98%)
Current Treatment	Missing	2 (1%)
	No, I have completed all treatment	74 (35%)
	Yes, hormonal therapy	126 (60%)
	Yes, Other	8 (4%)
Recent Appointment	Missing	2 (1%)
	Yes, in the last week	26 (12%)
	Yes, in the last 2 weeks	22 (11%)
	Yes, in the last month	49 (23%)
	Yes, in the last 3 months	76 (36%)
	>3 months ago	35 (17%)
Next Appointment	Missing	3 (1%)
	In the next week	11 (5%)
	In the next 2 weeks	20 (10%)
	In the next month	46 (22%)
	In the next 3 months	73 (35%)
	In the next 12 months	51 (24%)
	None scheduled	6 (3%)

Abbreviations: SD, Standard Deviation; IQR, Interquartile Range. *All variables were assessed via a self-report questionnaire, although cancer stage was confirmed via medical record review when unclear.

Table 2. Descriptive statistics for study outcomes (n=210)

Outcome (Questionnaire)	Subscale	Possible range	Mean (SD)
Fear of Cancer Recurrence (FCRI)	Total	0-168	83.9 (23.3)
	Coping strategy	0-36	19.0 (5.6)
	Functioning Impairments	0-24	8.1 (5.6)
	Insight	0-12	3.1 (3.1)
	Psychological Distress	0-16	8.0 (3.9)
	Reassurance	0-12	3.2 (2.5)
	Severity	0-36	22.2 (5.5)
	Triggers	0-32	20.4 (5.7)
Post-traumatic Stress Symptoms (IES-R)	Total	0-12	3.6 (2.1)
	Avoidance	0-4	1.4 (0.8)
	Hyper-arousal	0-4	1.0 (0.9)
	Intrusion	0-4	1.3 (0.8)
Metacognitions (MCQ-30)	Total	30-100	57.9 (12.7)
	Cognitive Confidence	6-24	11.7 (4.4)
	Need to control thoughts	6-24	10.2 (3.5)
	Negative beliefs about worry	6-24	12.8 (4.3)
	Positive beliefs about worry	6-24	9.3 (3.4)
	Cognitive self-consciousness	6-24	13.9 (4.1)

Abbreviations: SD, Standard Deviation; FCRI, Fear of Cancer Recurrence Inventory; MCQ-30, Metacognitions Questionnaire-30; IES-R, Impact of Event Scale Revised.

Table 3. Significant correlates of FCR morbidity in multiple hierarchical regression

	Step 1			Step 2			Step 3			Step 4		
Variable	**B[a]**	**95% CI**	**p-value**	**B[a]**	**95% CI**	**p-value**	**B[a]**	**95% CI**	**p-value**	**B[a]**	**95% CI**	**p-value**
Age (years)			0.06			0.51			0.07	-2.23	-4.46, -0.01	0.049
Language spoken at home (1=Other, ref; 0=English)			0.10			0.69			0.83			
Cancer type (1=Other, ref; 0=Breast)			0.60			0.20			0.24			
Chemotherapy treatment (1=Yes, ref; 0=No)			0.85			0.45			0.61			
Radiotherapy treatment (1=Yes, ref; 0=No)			0.21			0.91			0.56			
Herceptin treatment (1=Yes, ref; 0=No)			0.81			0.73			0.50			
Time (days) since diagnosis			0.35			0.33			0.13			
Recent appointment (1=Outside past month, ref; 0=Inside past month)	7.04	0.64, 13.44	0.03			0.06			0.58			
Next appointment (1=Outside next month; ref, 0=Inside next month)			0.11			0.41			0.21			
MCQ-30 Cognitive Confidence						0.06			0.37			
MCQ-30 Positive Beliefs about Worry						0.45			0.78			
MCQ-30 Cognitive Self-Consciousness						0.21			0.77			
MCQ-30 Negative Beliefs About Worry				9.34	5.91, 12.76	<0.001	3.56	0.86, 6.27	0.01	3.59	0.91, 6.27	0.01
MCQ-30 Need to Control Thoughts						0.20			0.78			
IES-R Intrusion							9.71	5.86, 13.56	<0.001	9.95	6.13, 13.77	<0.001
IES-R Avoidance							4.70	1.95, 7.44	0.01	4.00	1.20, 6.79	0.01
IES-R Hyperarousal									0.05	3.98	0.61, 7.34	0.02
MCQ-30 Negative Beliefs About Worry x IES-R Intrusion										-2.03	-3.91, -0.15	0.12
Model Statistics												
R^2		0.13			0.39			0.67			0.68	
R^2 Change					0.26			0.28			0.01	
Likelihood Ratio Test					<0.0001			<0.0001			0.12	

[a] Standardised coefficients (β) are provided for all continuous variables; CI, Confidence Interval, MCQ-30, Metacognitions Questionnaire-30; IES-R, Impact of Event Scale Revised