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Breast reconstruction effects coping mechanisms in breast cancer survivors

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Abstract:	Background Coping strategies used by women with breast cancer are vital for adjustment to their disease. Whilst it is clear that factors such as age at diagnosis, social support and ethnicity can influence coping mechanisms, there is currently no information about whether breast reconstruction changes mechanisms of coping for such patients. The aims of this study, therefore, were to determine how women who have had immediate breast reconstruction and mastectomy cope, compared to those who have mastectomy alone, and whether there are differences in coping mechanisms due to breast reconstruction surgery. Methods A retrospective cohort study, using a standardised questionnaire called the Brief Cope Scale. Inclusion criteria: all women who had had immediate breast reconstruction and mastectomy in Shropshire from 2003 to 2014 for ductal carcinoma in situ or node negative invasive breast cancer. Each patient was matched for year of diagnosis, adjuvant therapy and age to one woman who had mastectomy alone. Results 234 questionnaires were sent with a 58% response rate. Significantly more patients from the reconstruction cohort coped by active coping (T value 1.66, P value 0.04) compared to those in the mastectomy alone cohort. In contrast, significantly more patients in the mastectomy alone cohort coped by active venting compared to the reconstruction cohort (T value 1.71, P value 0.04). Conclusion This study indicates for the first time that breast reconstruction may alter coping mechanisms in breast cancer survivors. Awareness of these coping mechanisms will enable clinicians to provide appropriate, individualised support.

Breast reconstruction effects coping mechanisms in breast cancer survivors

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Conflict of Interest: Blossom Lake, Tamoor Usman, Sarah Rastall and Heidi Fuller declare that they have no conflict of interest.

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31 October 2014

Mrs Blossom Lake
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Dear Mrs Lake

Study title:	**The effect of breast reconstruction on coping mechanisms in breast cancer**
REC reference:	**14/WA/1174**
IRAS project ID:	**161504**

Thank you for your letter of 26 October 2014, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information was considered by a Sub-Committee of the REC at a meeting held on 30 October 2014. A list of the Sub-Committee members is attached.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this opinion letter. Should you wish to provide a substitute contact point, require further information, or wish to make a request to postpone publication, please contact the REC Manager, Mrs Tracy Biggs, Tracy.Biggs@Wales.nhs.uk.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database within 6 weeks of recruitment of the first participant (for medical device studies, within the timeline determined by the current registration and publication trees).

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non clinical trials this is not currently mandatory.

If a sponsor wishes to contest the need for registration they should contact Catherine Blewett (catherineblewett@nhs.net), the HRA does not, however, expect exceptions to be made. Guidance on where to register is provided within IRAS.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	*Version*	*Date*
Covering letter on headed paper [Covering letter]	1	12 September 2014
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Indemnity Certificate]		04 August 2014
IRAS Checklist XML [Checklist_22092014]		22 September 2014
IRAS Checklist XML [Checklist_26102014]		26 October 2014
Letters of invitation to participant [Covering letter]	2	26 October 2014
Other [Clarification of Statistics]	1	26 October 2014
Participant information sheet (PIS) [Participant Information Leaflet]	2	26 October 2014
REC Application Form [REC_Form_22092014]		22 September 2014
Referee's report or other scientific critique report [Scientific Review by Dr.Fuller]		08 August 2014
Referee's report or other scientific critique report Miss Sarah Rastall]		12 September 2014
Research protocol or project proposal [Research protocol]		22 August 2014
Summary CV for Chief Investigator (CI) [CVMrs Blossom Lake]		04 August 2014

Summary CV for supervisor (student research) [CV Dr Fuller]		11 August 2014
Validated questionnaire [Brief Cope questionnaire]		22 August 2014

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document *"After ethical review – guidance for researchers"* gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website: http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/

HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at http://www.hra.nhs.uk/hra-training/

14/WA/1174	**Please quote this number on all correspondence**

With the Committee's best wishes for the success of this project.

Yours sincerely

T.A. Biggs.

Professor Alex Carson
Chair

E-mail: tracy.biggs@wales.nhs.uk

Enclosures: *List of names and professions of members who were present at the meeting and those who submitted written comments*

"After ethical review – guidance for researchers"

Copy to: *Sponsor contact - Ms Nicola Leighton*

Lead NHS R&D contact - Ms Marian Adams, The Shrewsbury and Telford NHS Trust

Wales REC 4

Attendance at Sub-Committee of the REC meeting on 30 October 2014

Committee Members:

Name	*Profession*	*Present*	*Notes*
Professor Alex Carson	Retired	Yes	Lay Member
Dr Kath Clarke	Deputy Associate Chief of Staff, Nursing	Yes	Expert Member
Mr Philip Richards **SC Chair**	Associate Specialist - Surgery	Yes	Expert Member

Also in attendance:

Name	*Position (or reason for attending)*
Mrs Tracy Biggs	Research Ethics Committee Manager

Breast reconstruction effects coping mechanisms in breast cancer survivors

Abstract

Background Coping strategies used by women with breast cancer are vital for adjustment to their disease. Whilst it is clear that factors such as age at diagnosis, social support and ethnicity can influence coping mechanisms, there is currently no information about whether breast reconstruction changes mechanisms of coping for such patients. The aims of this study, therefore, were to determine how women who have had immediate breast reconstruction and mastectomy cope, compared to those who have mastectomy alone, and whether there are differences in coping mechanisms due to breast reconstruction surgery.

Methods A retrospective cohort study, using a standardised questionnaire called the Brief Cope Scale. Inclusion criteria: all women who had had immediate breast reconstruction and mastectomy in Shropshire from 2003 to 2014 for ductal carcinoma in situ or node negative invasive breast cancer. Each patient was matched for year of diagnosis, adjuvant therapy and age to one woman who had mastectomy alone.

Results 234 questionnaires were sent with a 58% response rate. Significantly more patients from the reconstruction cohort coped by active coping (T value 1.66, P value 0.04) compared to those in the mastectomy alone cohort. In contrast, significantly more patients in the mastectomy alone cohort coped by active venting compared to the reconstruction cohort (T value 1.71, P value 0.04).

Conclusion This study indicates for the first time that breast reconstruction may alter coping mechanisms in breast cancer survivors. Awareness of these coping mechanisms will enable clinicians to provide appropriate, individualised support.

Keywords: Breast reconstruction; breast cancer; survivors; coping behaviour; defence mechanisms

Abbreviations

BASO British Association Surgical Oncology

DCIS Ductal Carcinoma In Situ

QOL Quality of life

SATH Shrewsbury and Telford NHS Trust

Introduction

Breast cancer is the most common malignancy of women with 1.67 million new cases diagnosed world-wide each year and is the most common cancer in the United Kingdom [1]. Worldwide Breast Cancer survivors are the largest group of cancer survivors accounting for 22% of an estimated 14.5 million cancer survivors [2]. In the UK there are over 500,000 people alive today who have, or have had, a diagnosis of breast cancer [3].

"Coping" is a dynamic process of both thoughts and behaviour by which individuals manage the demand of stress. Coping mechanisms are an integral part of the cancer survivorship pathway and have been shown to affect many aspects of a patient's health. Passive coping mechanisms such as avoidance have been shown to increase risk of anxiety and depression and are strongly related to negative health behaviours that affect diet, exercise, sleep and stress levels [4]. Similarly, maladaptive coping mechanisms such as denial, self-blame and venting have been positively related to physical and psychological distress levels [5]. In contrast, positive coping mechanisms such as positive reappraisal have been shown to be associated positively with patient's well-being [6]. Coping styles in breast cancer survivors have shown to be affected by many factors such as age at diagnosis, social support and ethnicity [7, 8, 9]. In particular, immediate breast reconstruction at the time of mastectomy with preservation of the breast form has been shown to be a positive influence on breast cancer patients [10]. This appears to affect both physical and emotional recovery [11], quality of life (QOL) [12] and psychosocial functioning [13].

There are currently no studies, however, to show whether immediate breast reconstruction at time of mastectomy compared to mastectomy alone changes coping mechanisms for breast cancer patients. The primary aim of this study, therefore, was to conduct a prospective cohort study to see how women who have had immediate breast reconstruction at time of mastectomy cope with breast cancer, compared to those who have mastectomy alone. The secondary aim was to see if there was a significant difference in coping styles due to breast reconstruction surgery.

Methods

Ethics

This cohort study had the full approval of the National Research Ethic Committee Wales REC4 Reference #14/WA/1174.

Inclusion criteria

The inclusion criteria for this study was all women who had had mastectomy with an immediate breast reconstruction in Shropshire between 2003 and 2014 for either ductal carcinoma in situ (DCIS) or invasive breast cancer which was node negative (invited group 1). The principle exclusion criteria were: men, node positive cancer and prophylactic mastectomy with breast reconstruction. Node positive cancer patients were excluded as there is evidence which shows that they have very different coping mechanisms because the cancer has spread and there is possibility of no cure.

Study design

Each index patient from invited group 1 was matched for year of diagnosis, adjuvant therapy and age to one woman who had mastectomy alone for DCIS or breast cancer which was node negative (invited group 2). If there was not a similar patient to match to, the nearest equivalent patient in age or adjuvant therapy was used. Patients were identified using either British Association Surgical Oncology (BASO) or the Somerset Cancer Database.

A standardised questionnaire, the Brief Cope Scale [14], was sent to the two cohorts. This is an abbreviated version of the original Cope Inventory which was developed to reduce the time burden of the original protocol and also omitted scales that were found not to be important among breast cancer patients. It is a 28 point item and is rated by a four-point Likert scale ranging from "I haven't been doing this at all" (score one) to "I have been doing this a lot" (score four). The Brief Cope Scale covers 14 dimensions, with each dimension having two items.

The questionnaire was anonymised and sent out with a detailed information sheet explaining the nature of the study. Participants, by returning the questionnaire, were implicitly consenting to be involved in the study. Patients identified by BASO system for inclusion in the study are termed invited groups 1&2 for reconstruction and mastectomy respectively. Participants who responded are termed cohorts 1 &2 for reconstruction and mastectomy respectively. Cohort demographics were assessed for comparability using Chi-squared analysis. Mean scores for each different coping style were calculated for each cohort and were compared using independent T-test analysis. Using a power calculation, the aim was to achieve a 56% response rate which would achieve a confidence level of 95% with a margin error of 5.5%.

Results

Questionnaires were sent to a total of 234 patients: 117 in mastectomy and immediate reconstruction cohort (invited group 1), and 117 in mastectomy alone cohort (invited group 2).

Demographics and clinical characteristics of study population

The invited group's demographics are summarised in Table 1. The mean age of the reconstruction group was 50, with a range of 29 to 70. The mean age of the mastectomy group was 52, with a range of 32 to 70. Invited groups were matched for both age and year of diagnosis. The reconstruction group had significantly more patients with DCIS 47% (P= 0.0006) and good prognostic tumours 7% (P=0.009), compared to mastectomy group 25% and 1% respectively. The mastectomy group had significantly more patients that had adjuvant therapy 73% compared to mastectomy group 50% (P= 0.0002).

Response rate and demographics of responders

The response rate of the study was 58% (136 patients, with 77 responses from the reconstruction cohort 66% (Cohort 1) and 59 from the mastectomy cohort (Cohort 2) 51%). This response rate was of sufficient power to achieve expected confidence level of 95% with a margin error of 5.5%.

Demographics of responders are summarised in Table 2. The mean age of the reconstruction cohort was 52.4, with range 28-77, and the mean age of the mastectomy cohort was 53.3, with range 31 to 75. The majority of patients for both cohorts were White British or British/English.

Two thirds (i.e. 66%) of responders in the reconstruction cohort were supported (i.e. married or had a partner) and 72% of those in the mastectomy cohort were supported. The two cohorts of responders were similar in age, ethnicity and social support.

Coping mechanisms

The mean scores for each coping mechanism for the reconstruction cohort and the mastectomy alone cohort are presented in Table 3. For each of the fourteen coping dimensions there were two items "I haven't been doing this at all" (score one) to "I have been doing this a lot" (score four), with range of scores from 2-8 for each coping style. Common coping mechanisms for the reconstruction cohort were acceptance, active coping and use of emotional support. Common coping mechanisms for the mastectomy cohort were acceptance, use of emotional support and positive reframing. Significantly more patients from the reconstruction cohort coped by active coping (T value 1.66 at P value 0.04). Significantly less patients coped by active venting in the reconstruction cohort compared to the mastectomy cohort; (T value 1.71 at P value 0.04). These results suggest that breast reconstruction has a positive effect on coping styles of breast cancer patients, allowing higher levels of active coping and lower levels of venting.

Several factors, including age and social support, have been associated with differences in coping styles [4, 7, 8]. We were interested, therefore, to determine whether there are differences in coping styles between the mastectomy alone and the reconstruction cohort that relate to these two factors. When the data were analysed according to whether patients were supported or not, we found that significantly more patients in the supported group who had breast reconstruction coped by active coping compared to the mastectomy cohort (T value = 2.28 P = 0.01).

To assess whether age is related to any differences in coping styles, each cohort was split into two groups: a younger group (aged less than 49 years old) and an older group (aged more than 49 years old) (Table 4 and 5). Significantly more patients in the younger age group from the mastectomy cohort used either behavioural disengagement or emotional support as coping mechanisms (T value 1.86 at P value 0.03 and T value 1.97 at P value 0.02, respectively), compared to the younger age group from the reconstruction cohort. Both of these coping styles are thought to represent types of maladaptive psycho-social adjustment [4, 5]. In the older age groups, significantly more patients in the reconstruction cohort used active coping than the mastectomy cohort (T value 1.88 at P value 0.03).

Discussion

Both mastectomy and breast reconstruction have been shown to have individual effects on every aspect of a breast cancer survivors psychosocial adjustment from QOL to the ability of a patient to return to normal life [10, 11, 12, 13]. For the first time this study presents evidence to suggest that coping styles may be similarly affected.

Common coping styles

This study has shown that common coping mechanisms for both the immediate reconstruction cohort and the mastectomy alone cohort were acceptance and the use of emotional support. Similarly, a meta-analysis of 11,948 breast cancer patients found that acceptance (i.e. facing the reality even if it does not fit one's expectations or desires, and the willingness to deal with this reality) was used as a primary coping mechanism and was associated with higher well-being and health [15].

Use of emotional support as a primary coping mechanism (i.e. talking to friends to discuss emotions and seeking moral support) also correlates with findings in the literature [16, 17]. This coping mechanism has been shown to be associated with better health status, and lower psychological distress [18].The other common coping mechanism within the mastectomy cohort was positive reframing. This coping style works to manage distressed emotions rather than dealing with the immediate stressor. Positive reframing has been shown to promote higher well-being and health [15].

The effect of breast reconstruction on coping mechanisms

Within our study we found that a larger number of patients who had undergone immediate breast reconstruction coped by active coping (a positive coping style) and significantly less by venting (a negative coping style), compared to the mastectomy alone cohort. Venting, as an emotional coping strategy, results in focus on the distress that is being experienced and venting of feelings. Venting has been shown to be the greatest predictor of emotional distress [5] and has been shown to prevent adjustment to diagnosis with increased levels of anxiety and depression [19]. Active coping strategies involve an awareness of the stressor, followed by attempts to reduce any associated negative outcome, and have been shown to improve QOL and well-being in all types of cancer survivors including breast [20], ovarian [21] and prostate cancer [22]. It is also an important form of coping in other forms of reconstruction, such as for total nasal defects following radical tumour resection [23] and skin graft reconstruction for severe burns injury [24]. It is not unsurprising, therefore, that this is the predominant coping style within the reconstruction cohort, as breast reconstruction reduces the impact of the loss of breast form and associated effects on the patient's identity. This reinforces the importance of this study by highlighting how individual treatments can alter coping mechanisms of the patient.

Age differences and coping mechanisms

The results from this study indicate that common coping mechanisms in the younger responders from the mastectomy alone cohort are behavioural disengagement and the use of emotional support. It has been shown previously those patients who survive cancer at a younger age struggle more with their diagnosis due to the implications on life goals and subsequent roles in life [7].

Behavioural disengagement is a form of avoidance where the participant withdraws or does not engage in any actions in order to cope. Thus, young women who are diagnosed with breast cancer and need a mastectomy struggle to cope and do so by disengagement. This type of coping has been shown to be consistently associated with poor adjustment to cancer diagnosis [15].

The other common coping style of the younger mastectomy cohort was the use of emotional support. This is a common coping style in breast cancer survivors and has been shown to be predicted by uncertainty in illness [16, 17]. This finding would certainly fit with our study as there is a recognised increase in uncertainty for patients diagnosed at younger age with changing life goals and roles. In contrast, older patients in our study commonly coped by active coping. Older patients are thought more likely to anticipate the onset of chronic illness in their advancing years and they are more likely to have achieved life goals. Thus, as concluded by Costanzo (2009, p.147), "age appeared to confer resiliency; older survivors were more likely than younger adults to show psychosocial functioning".

Social support and coping mechanisms

Supported patients (e.g. those married or living with a partner) in the reconstruction cohort also coped more by active coping. Social support has been shown to be an important factor in determining coping styles. For example, emotional support in the form of husband/wife, partner, or friends has been shown to have the strongest relationship with positive coping styles such as active coping [8]. This is also supported by a study that showed that cancer survivors who have perceived high levels of social support tend to choose active coping strategies and have more positive changes in their health behaviours [4].

Potential limitations

It has been shown that scores on coping with cancer can vary over time [25]. A limitation of the current study, therefore, is that it included patients diagnosed over an eleven year period. Though patients were matched for year of diagnosis it is possible that they may have not responded to questions on how they coped at the time of diagnosis but how they are coping currently. In the future, it will be important to compare coping at more than one time interval point, to look at the stability of coping mechanisms over time.

Non-responder bias is another potential limitation in questionnaire cohort research. It may be, for example, that the non-responders were struggling to cope and felt unable or unwilling to respond, and so we may have missed an important finding. Due to the anonymity of responders, we cannot delineate the demographics of the non-responders, apart from acknowledging a higher non response rate in the mastectomy cohort than the reconstruction cohort, with 50% and 35% respectively.

In particular, we do not know the tumour type the responders have as this was not included within the questionnaire. However, as reasoned above, this research study was sufficiently powered and thus we can be confident that we have a representative response from each cohort.

In this research study there was significant variability between the two invited groups and tumour types (Table 1), in that more patients in the reconstruction cohort had DCIS than invasive breast cancer. One of the main reasons for this is that better prognosis tumours are less likely to need adjuvant therapy such as chemotherapy and these patients are more likely to be considered suitable for breast reconstruction. This is an expected difference as patients who have mastectomy for DCIS usually don't need adjuvant therapy such as radiotherapy and thus are very suitable candidates for reconstruction. Similarly, those less common tumours such as papillary and tubular which have better prognosis were more common in the reconstruction cohort. Subsequently, significantly more patients in the mastectomy cohort had ductal carcinoma and lobular carcinoma. Other published research shows similar variability between surgical groups [26, 27].

In our study the mastectomy cohort had significantly more patients who had chemotherapy and this is because patients and surgeons may choose to opt for mastectomy alone if adjuvant therapy will be required to make sure recovery for breast reconstruction does not delay this therapy. Indeed, not having neo-adjuvant treatment has been shown to be a predictor of immediate breast reconstruction [28].

Though chemotherapy has been shown to effect coping styles [29], there is growing evidence that this only occurs in a third of cancer survivors with many patients having cognitive deficits following surgery prior to starting any adjuvant therapy [30]. Thus, we have reason to explain the variability within our cohorts and in context with the evidence of the literature it may not necessarily represent a confounding factor to our results.

Future research

Though the work presented here has shed some light on coping mechanisms in breast cancer survivors, there is much scope for future work on this important research topic. To increase the generalisability of the results, a large multi-centre prospective cohort study of breast cancer patients with immediate reconstruction and mastectomy or mastectomy alone should be conducted to include representation from both urban and rural populations. By capturing a wider range of demographic data such as age, ethnicity, social support (marital status and social network), religion, socio-demographic characteristics: education level, family income, tumour type, and adjuvant therapy; chemotherapy, radiotherapy, Herceptin or hormone therapy, a more detailed analysis could be conducted to gain further insights into the complex issues that may influence coping mechanisms. It would also be important to look at whether reasons that might preclude breast reconstruction such as existing co-morbidities and if surgical outcome from reconstruction also have influence. In addition, quality of life measures, along with data from anxiety and depression scales could potentially highlight any neuropsychological deficits related to coping styles. The stability of coping mechanisms could be determined by longitudinal analysis of Brief Cope Scale data at (for example), time of diagnosis, twelve months and five years.

Conclusion

This study presents the first evidence to suggest that breast reconstruction alters coping mechanisms and styles in breast cancer patients. In particular, breast reconstruction appears to alter coping mechanisms in breast cancer survivors by allowing less venting coping style and more active coping. Older patients and those with social support cope with more positive coping styles such as active coping, while younger patients tended to struggle and cope with maladaptive styles such as behavioural disengagement. Understanding how breast surgery, in particular breast reconstruction, changes coping mechanisms will allow clinicians to understand cancer survivorship in breast cancer patients and helps to inform individualised care plans and needed support. Further research is needed on this important issue.

Conflicts of interest and project finance

There are no conflicts of interest to be declared. All the finance for this project was provided by the Chief Investigator. Keele University provided the insurance for this research project.

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Table

Table 1 Demographics of invited groups

	Reconstruction invited group	Mastectomy invited group	Statistic
Age	50.2 (range 29-66)	51.7 (range 32-70)	T value 1.39 P=0.08
Year of Diagnosis			
2003	5	5	
2004	3	3	
2005	4	4	
2006	4	4	
2007	4	4	
2008	3	3	
2009	13	13	
2010	13	13	
2011	21	21	
2012	14	14	
2013	16	18	
2014	17	15*	
Pathology			
DCIS	**55**	**30**	**χ^2=11.6 P= 0.0006**
Ductal cancer	**45**	**67**	**χ^2 =8.29 P=0.004**
Lobular cancer	**8**	**19**	**χ^2 =5.07 P=0.02**
Other	**9**	**1**	**χ^2 =6.69 P=0.009**
Adjuvant therapy			
None	**59**	**31**	**χ^2 =14.2 P= 0.0002**
Hormone therapy	30	30	χ^2 =0 P=1
Hormone therapy and radiotherapy	**4**	**13**	**χ^2 =5.14 P=0.02**
Chemotherapy and other adjuvant therapy	**24**	**43**	**χ^2 =7.55 P=0.006**
Total	**117**	**117**	

Significant results at P<0.05 ***Highlighted in purple***

***No suitable patients in 2014 to match so two extra patients from 2013 included**

**** Other (Adenocarcinoma, Medullary, Papillary, Tubular)**

Table 2 Demographics of responders

	Reconstruction cohort (Cohort 1)	Mastectomy cohort (Cohort 2)	Statistic
Age	52.4 (range 28-77)	53.3 (range 31-75)	T value 0.44 P =0.32
Ethnic group			
White British	55	46	
British/English	12	11	
Black Caribbean	2	0	
Chinese	1	0	
White European	1	0	
Not recorded	6	2	
Marital Status			
Unsupported	24	17	χ^2 =0.024 P0.877
Single	6	7	
Divorced	15	8	
Widowed	3	2	
Supported	51	42	
Married	45	36	
Partner	6	6	
Not recorded	2	0	
Total	**77**	**59**	

Table 3 Mean scores for coping styles of responders

Coping Style	Reconstruction cohort	Mastectomy cohort	Statistic
Self-distraction	4.83	4.81	T value 0.05 p=0.48
Active coping	**5.49**	**4.90**	**T value 1.88 P<0.04**
Denial	3.12	3.29	T value 0.57 p=0.25
Substance use	2.79	2.81	T value 0.09 P=0.46
Use of emotional support	5.21	5.26	T value 0.13 p=0.45
Use of instrumental support	4.16	4.33	T value 0.51 p=0.30
Behavioural disengagement	2.63	2.74	T value 0.53 P=0.30
Venting	**3.29**	**3.79**	**T value 1.71 p<0.04**
Positive reframing	4.96	5.00	T value 0.64 P=0.26
Planning	4.65	4.88	T value 0.97 p=0.16
Humor	4.56	4.93	T value 0.03 P=0.49
Acceptance	6.72	6.84	T value 0.03 P=0.49
Religion	3.01	3.00	T value 0.04 p=0.48
Self-blame	3.51	3.16	T value 1.16 P=0.12

Significant results at P<0.05 ***Highlighted in purple***

Table 4 Means scores for Coping styles in younger age group <49

Coping Style	Reconstruction cohort	Mastectomy cohort	Statistic
Self-distraction	5.17	5.81	T value 1.13 p=0.13
Active coping	5.39	5.38	T value 0.03 p=0.49
Denial	3.22	3.13	T value 0.19 p=0.43
Substance use	3.04	2.75	T value 0.58 p=0.28
Use of emotional support	**4.57**	**5.75**	**T value 1.97 p<0.02**
Use of instrumental support	3.91	4.75	T value 1.37 p=0.09
Behavioural disengagement	**2.52**	**3.38**	**T value 1.86 p<0.03**
Venting	3.65	4.19	T value 0.94 p=0.18
Positive reframing	5.35	5.19	T value 0.25 p=0.40
Planning	4.57	4.93	T value 0.68 p=0.25
Humor	4.91	5.06	T value 0.20 P=0.42
Acceptance	6.26	7.06	T value 1.48 P=0.07
Religion	2.74	3.13	T value 0.78 P=0.22
Self-blame	3.91	3.44	T value 0.73 P=0.23

Significant results at P<0.05 ***Highlighted in purple***

Table 5 Mean scores for Coping Styles in older age group 49 or older

Coping style	Reconstruction cohort	Mastectomy cohort	Statistic
Self-distraction	4.67	4.43	T value 0.60 P=0.27
Active coping	**5.54**	**4.71**	**T value 1.88 P<0.03**
Denial	3.08	3.36	T value 0.74 P=0.23
Substance use	2.67	2.83	T value 0.50 p=0.31
Use of emotional support	5.5	5.07	T value 1.02 P=0.16
Use of instrumental support	4.27	4.17	T value 0.27 P=0.40
Behavioural disengagement	2.67	2.5	T value 0.73 P=0.23
Venting	3.13	3.64	T value 1.51 P=0.07
Positive reframing	4.79	4.93	T value 0.32 P=0.37
Planning	4.69	4.86	T value 0.39 P=0.36
Humor	4.4	4.88	T value 1.07 P=0.14
Acceptance	6.92	6.76	T value 0.49 P=0.31
Religion	3.13	2.95	T value 0.51 P=0.30
Self-blame	3.33	3.05	T value 0.84 P=0.21

Significant results at P<0.05 ***Highlighted in purple***

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