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The role of depression and other psychological factors in work ability among breast cancer survivors in Australia

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Abstract

Objective: Identifying modifiable factors affecting work ability among cancer survivors is important. The primary aim of the present study was to examine the effects of depression and related psychological factors on work ability among breast cancer survivors in Australia.

Methods: In this cross-sectional electronic and postal survey, Australian breast cancer survivors were investigated. Work status and conditions before and after cancer treatment were analysed. Work ability was measured using the Work Limitation Questionnaire©-Short Form (WLQ-SF) with its four domains (time management, physical tasks, mental-interpersonal tasks, and output tasks). Three psychological factors were investigated: depression, fear of cancer recurrence, and demoralisation. Sociodemographic and clinical data were also collected. Multivariate regression analysis was used to identify the associations of psychological factors with WLQ-SF.

Results: Among eligible survivors, 310 (50%) responded to the survey and were analysed. Nearly one third reported their work conditions had changed after cancer treatment. The depressed group reported limited work ability in 35%–44% of the four domains of WLQ-SF, while the non-depressed group reported limited work ability in only 8%–13%. At-work productivity loss was approximately fourfold higher in the depressed group than in the non-depressed group. In multivariate analysis, at-work productivity loss was associated with depression, demoralisation, and past history of anxiety.

Conclusions: After breast cancer treatment, work conditions changed toward lower wages and working hours. Depression, demoralisation, and past history of anxiety were associated with lower work ability. Further evaluations of work rehabilitation in breast cancer survivors are warranted.

KEYWORDS
breast cancer, demoralisation, depression, oncology, psycho-oncology, rehabilitation, return to work, work ability

1 | BACKGROUND

In 2020, Australia anticipates 20,000 new cases of breast cancer, which is the most common cancer in women worldwide.[1] Breast cancer accounts for 24% of the cancer burden in women.[2] Approximately 40% of breast cancers are detected in women ≤65 years of age.[3] Fortunately, the 5-year survival rate has steadily improved; 91% of breast cancer patients are now expected to achieve ≥5-year survival.[1]

However, survivors still report physical and psychosocial symptoms that affect their quality of life, cause disability, and can compromise rehabilitation.[4] In a meta-analysis, the risk of unemployment was 1.37-fold higher for cancer survivors than for healthy controls, and was particularly high among women with breast, gastrointestinal, and reproductive cancers.[5] Among women with breast cancer, 43%–93% were in work 1 year later, with the percentage varying across countries.[6]

Return to work (RTW) patterns after cancer diagnosis were diverse. Some people continued working, whereas others took time off work and returned later. Among the people who continued working after their cancer diagnosis, some worked in the same way as before, while others changed their work patterns, for example decreased the hours worked.[7] Because many previous studies investigated RTW by working status at a specific time point, all three of these described patterns were often included in the reported RTW status.

Factors facilitating RTW are younger age, single status, higher level of education, and higher income.[8] However, advanced-stage cancer, fatigue, pain, chemotherapy, extensive surgery, radiotherapy, and hormonal-therapy impede RTW.[8] The general financial situation and work factors, such as support from colleagues, are also important for RTW.[9] In terms of job characteristics, a late return to work was associated with physical constraints in the previous job rather than any specific industry or occupation.[10] Also, high demand at work was negatively associated with RTW.[11] Psychological factors affecting RTW in breast cancer patients have been less studied than sociodemographic and clinical factors. However, life satisfaction, coping resources, social support, and frustrations are factors all reportedly associated with RTW.[6]

Work ability has been defined as the self-reported capability of workers to perform their work,[12] and it is an essential factor for the RTW of cancer patients, independent of age and clinical factors.[5] Among breast cancer survivors, work ability was slightly lower than that found in cancer-free populations.[13,14] During the course of illness, breast cancer patients' work ability was most impaired during cancer treatment but improved after treatment. However, it did not return to the pre-diagnostic level.[12] Among potential factors associated with work ability, age, education, income, level of social support, year of diagnosis, co-morbidity, chemotherapy, fatigue, anxiety, and depression have been inconsistently associated.[12–14]

However, there were some limitations in previous studies. Firstly, their focus was usually on clinical status, physical health, or the work environment rather than psychological factors.[6] The identification of psychological factors, such as depression, is important because they are modifiable in many cases. Secondly, in many studies, RTW was investigated using qualitative methods. Qualitative research is very useful for in-depth analysis of the complex issue of RTW among cancer patients; however, the quantitative approach has the advantage of objectivity and direct comparisons can be made between groups. Third, the most frequent outcome measure was whether the subjects' work limitations were determined by interviews or questionnaire surveys. There have been few such investigations, and most studies measured that outcome by the number of hours worked or a single visual analogue scale. Those methods lead to a lack of detail regarding the degree of impairment.[12,13,15] Finally, RTW and work ability vary widely by country due to differences in culture, health insurance systems, and disability pensions.[6] Among cancer survivors in Australia, there have been few reports on RTW, and even fewer on work ability.

The primary aim of the present study was to examine the effects of depression and related psychological factors on work ability among breast cancer survivors in Australia using validated questionnaires. In addition, changes in the work situation and conditions before and after cancer treatment were surveyed.

2 | METHODS

2.1 | Study design and recruitment

This cross-sectional study of breast cancer survivors used an electronic and postal survey. Eligible survivors were identified in the breast cancer database of Cabrini Health, a large private hospital based in Melbourne, Australia. The inclusion criteria were as follows: aged 18 years or older; breast cancer survivors who had completed active treatment (i.e., surgery, chemotherapy, radiotherapy, or HER2-targeted therapies, except hormone therapy); listed in the breast cancer database of Cabrini Health and operated on by a Cabrini surgeon; ability to give written informed consent; and willingness to participate in and comply with the study. Exclusion criteria were not having an e-mail or postal address; no longer living in Australia; stage 4 breast cancer; and receiving breast cancer surgery outside of Cabrini.

The questionnaires were in electronic (Survey Monkey®) or postal form, as stated above. Online completion or return of the postal questionnaire was considered to indicate consent. The study was approved by the Cabrini Human Research Ethics Committee and Research Governance Office, Study ID 13-09-12-19. This study was conducted in accordance with the principles of the Declaration of Helsinki.

2.2 | Measures

2.2.1 | Return to work status and work ability

Regarding work status, the participants reported their current and pre-cancer treatment work/activity status by selecting from among

employed full time, part time, home duties, retired, unemployed, and "others".

The changes in work conditions were assessed via self-reported items that were used in a previous study.[16] The participants were asked whether they continued all of their previous work activities after cancer treatment. For the participants who answered that they had changed their work, they were asked to specify the changes, in terms of working hours, payment, range of tasks, or employer.

Work ability after cancer treatment was assessed using the validated Work Limitation Questionnaire©-Short Form (WLQ-SF) scale of Lerner and colleagues.[17–19] WLQ-SF contact information and permission to use: Mapi Research Trust, Lyon, France, https://eprovide.mapi-trust.org. All Rights Reserved. This scale is composed of eight items investigating four domains: time management, physical tasks, mental-interpersonal tasks, and output tasks. The items assess the difficulty caused by physical or emotional health across the four domains. This scale has been widely used and is both reliable and well-validated for physically ill patients. Scores in each domain range from 0 (*none of the time*) to 100 (*all the time*), where the questions pertain to limitations in the performance of tasks in the past 2 weeks. The weighted sum of scores for the four domains is used to calculate at-work productivity loss, relative to a healthy sample (range: 0–24.9).[17]

2.3 | Socio-demographic and clinical characteristics

Medical and sociodemographic data were obtained from the breast cancer database of Cabrini Health (sex, age, time since first diagnosis, pathologic report on hormonal receptor status, clinical stage, surgery type, breast reconstruction, axillary clearance due to lymph node involvement, radiotherapy, chemotherapy, HER-2 targeted therapy, and selective oestrogen receptor modulators), or via the survey questionnaires completed by participants themselves (marital status, educational level, country of birth, and working situation/condition before and after treatment). History of mental illness was assessed using a multiple response question, allowing the selection of none, depression, anxiety, alcohol dependence, and drug dependence. The last choice was "any other psychiatric condition"; respondents were asked to specify it.

2.4 | Depression and other psychological parameters

Depression was diagnosed using the Patient Health Questionnaire-9 (PHQ-9), which is a reliable and valid instrument consisting of nine items and based on the criteria of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. A score $\geq$10 is suggested as the cut-off for major depression.[20] In the present study, participants were divided into non-depressed and depressed groups based on this cut-off value.

Fear of cancer recurrence (FCR) was assessed using five items developed by Kornblith and colleagues, all rated on a 5-point Likert scale ranging from "strongly agree" to "strongly disagree".[21] The five items consisted of unpredictability, fear of relapse, interfering with enjoying life, afraid of getting worse, and beliefs about a cure. The score for the FCR ranges from 0–100.

Demoralisation was measured using the Demoralisation Scale-short form (DS-6),[22] which consists of six items rated on a 3-point Likert scale; total scores range from 0 to 12. The scale includes three items on disheartenment, one on dysphoria, and two on loss of meaning and purpose. The DS-6 is a well-validated questionnaire measuring loss of morale and poor coping; a higher score represents greater demoralisation.

2.5 | Statistical analysis

Descriptive data analyses were initially performed. Missing values for dependent variables were not imputed; the answer option 'not applicable' was used in these cases and treated as systemic missing. For nominal independent variables, missing values were addressed using modal imputation, while expectation-maximisation imputation was used for continuous variables. Participants with missing data exceeding 5%, except systemic missing, were excluded from the analysis. Summary statistics are presented as mean $\pm$ standard deviation. For frequencies, 95% confidence intervals (CIs) were calculated. Work limitations in the four domains of the WLQ-SF were analysed according to depression status using the independent *t*-test. To determine the factors associated with work productivity loss, Pearson's correlation, independent *t*-tests, and analysis of variance were used as appropriate. Independent variables significantly associated with the at-work productivity loss in univariate analysis ($p < 0.05$) were simultaneously entered into a multivariate linear regression analysis model. The associations of independent variables with the four WLQ-SF domains were also analysed using multivariate linear regression. Bonferroni correction was performed to account for multiple testing (adjusted p-value < 0.01). Statistical analyses were conducted using SPSS 26.0 software (SPSS Inc.).

3 | RESULTS

3.1 | Survey response rate

The survey was distributed to 624 eligible breast cancer survivors via Survey Monkey® or post; 323 (52%) survivors completed and returned the survey. Among the 323 participants, 13 were excluded from the analysis because they had more than 5% missing data. Thus, 310 (50%) participants were included in the final analysis.

3.2 | Characteristics of the participants

The psychosocial and clinical characteristics of the participants are described in Tables 1 and 2. Briefly, 309 (99.7%) participants were

TABLE 1 Sociodemographic and psychological characteristics of the participants (n = 310)

Variables	Descriptive	95% CI
Socio-demographic variables		
Sex, female, *n* (%)	309 (99.7)	1.27 to 1.41
Age, mean (SD), years	61.8 (11.5)	60.48 to 63.05
Marital status, *n* (%)	-	1.67 to 1.77
Single/widowed/divorced/separated/partnered but not living together	88 (29.4)	-
Married/partnered and living together	222 (71.6)	-
Education, *n* (%)	-	3.12 to 3.23
Secondary school not completed	25 (8.1)	-
Year 12 or equivalent	56 (18.1)	-
TAFE or college certificate or diploma	52 (16.8)	-
University degree	176 (56.8)	-
Currently studying	1 (0.3)	-
Country of birth, *n* (%)	-	1.27 to 1.41
Australia	235 (75.8)	-
Other English-speaking country	46 (14.8)	-
Non-English-speaking county	29 (9.4)	-
Work status before cancer treatment[a]	-	2.22 to 2.52
Employed full time	104 (33.7)	-
Employed part time	88 (28.5)	-
Home duties	38 (12.3)	-
Retired	71 (23.0)	-
Unemployed	1 (0.3)	-
Others	7 (2.3)	-
Current work status[a]	-	0.08 to 2.63
Employed full time	76 (24.6)	-
Employed part time	92 (29.8)	-
Home duties	42 (13.6)	-
Retired	88 (28.5)	-
Unemployed	2 (0.6)	-
Others	9 (2.9)	-
Psychological variables		
Past history of mental illness (multiple responses), *n* (%)		
Depression	56 (18.1)	0.14 to 0.22
Anxiety	48 (15.5)	0.11 to 0.19
Others[b]	7 (2.3)	0.00 to 0.04
Depression diagnosis (PHQ-9≥ 10)[c], *n* (%)	42 (13.5)	1.10 to 1.18
Fear of cancer recurrence[d], mean (SD), score	36.7 (16.7)	34.81 to 38.55
Demoralisation Scale-6[e], mean (SD), score	2.0 (2.5)	1.75 to 2.30

Abbreviations: CI, confidence interval; PHQ-9, patient health Questionnaire-9; SD, standard deviation; TAFE, technical and further education.

[a]The variable has one missing case (n = 309).

[b]Others: Anorexia nervosa, dementia, drug dependence, post-traumatic stress disorder, post-traumatic stress disorder combined bipolar disorder, prolonged grief disorder, and restless legs syndrome.

[c]A score ≥10 is suggested as the cut-off for major depression.

[d]Ranges from 0 to 100; a higher score represents greater fear of recurrence.

[e]Ranges from 0 to 12; a higher score represents greater demoralisation.

TABLE 2 Clinical characteristics of the participants (n = 310)

Variables	Descriptive	95% CI
Time since cancer diagnosis, mean (SD), months	27.5 (11.2)	26.23 to 28.74
Pathologic report, *n* (%)		
Oestrogen receptor, positive	268 (86.5)	1.82 to 1.90
Progesterone receptor, positive	244 (78.7)	1.74 to 1.84
Her-2 IHC 3+ or IHC2+&FISH+	45 (14.5)	1.11 to 1.19
TNM clinical stage, *n* (%)	-	2.40 to 2.56
0	13 (4.2)	-
1	157 (50.6)	-
2	119 (38.4)	-
3	21 (6.8)	-
Surgery type, *n* (%)	-	1.65 to 1.75
Mastectomy	93 (30.0)	-
WLE, BCS, quadrantectomy	217 (70.0)	-
Breast reconstruction, yes, *n* (%)	51 (16.5)	1.12 to 1.20
Bilateral oophorectomy, yes, *n* (%)	19 (6.1)	1.03 to 1.09
Sentinel lymph nodes, positive, *n* (%)	93 (30.0)	1.25 to 1.35
Axillary clearance, yes, *n* (%)	62 (20.0)	1.15 to 1.25
Radiotherapy, yes, *n* (%)	236 (76.1)	1.71 to 1.81
Neo-adjuvant chemotherapy, yes, *n* (%)	48 (15.5)	1.11 to 1.19
Adjuvant chemotherapy, yes, *n* (%)	80 (25.8)	1.21 to 1.31
HER2-targeted therapy, yes, *n* (%)	41 (13.2)	1.09 to 1.17
Hormone therapy, yes, *n* (%)	256 (82.6)	1.79 to 1.87

Abbreviations: BCS, breast-conserving surgery; CI, confidence interval; FISH, in situ hybridisation; IHC, immunohistochemistry; SD, standard deviation; WLE, wide local excision.

female and the mean age was 61.8 ± 11.5 (Median [IQR]: 60.8 [51.9–71.2]) years. The mean time since cancer diagnosis was 27.5 ± 11.2 months. Most of the participants were stage 1 or 2 (89.0%). Depression was diagnosed in 42 (13.5%) of survivors using the PHQ-9. The mean FCR score was 36.7 ± 16.7 (range: 0–100) and the mean DS-6 score was 2.0 ± 2.5 (range: 0–12).

3.3 | Changes in work status and conditions

Regarding changes in the work situation and conditions before and after cancer treatment, 309 and 310 participants answered, respectively. Compared with the work situation before cancer treatment, the most common work status was full-time, followed by part-time. However, after cancer treatment, most of the participants indicated that they worked part-time or were retired (Figure S1). Among the 104 (33.7%) survivors who had full-time jobs before cancer treatment, 69 (66.3%) remained in full-time jobs, 21 (29.2%) changed to part-time jobs, and 14 (13.4%) indicated that they were not in paid employment (2 home duties, 9 retired, 2 unemployed, and 1 others-volunteer) after cancer treatment.

The work conditions changed in 89 (28.7%) of the 310 participants; 57 (64.0%) worked fewer hours and 34 (38.2%) received less income after cancer treatment than before. The range of work tasks and employer changed in 42 (47.2%) and 22 (24.7%) of the 89 responders, respectively, after cancer treatment (Table S1).

3.4 | Work limitation after cancer treatment

Among the 310 participants, 232 (74.8%) answered all questions; among the other 78 participants, 8 (2.6%) had missing answers and 70 (22.6%) had 'not applicable' answers in at least one domain.

The WLQ-SF data are summarised in Table 3. The mean WLQ-SF work limitation scores were 14.6 ± 21.0 for time management, 18.0 ± 25.3 for physical tasks, 12.0 ± 16.4 for mental-interpersonal tasks, and 14.7 ± 20.1 for output tasks. The mean at-work productivity loss score was 3.9 ± 4.5, and 77 (33.2%) survivors had an at-work productivity loss score of 0, indicating no loss of productivity.

In total, 35%–44% and 8%–13% of the depressed and non-depressed groups, respectively, reported work limitations across

TABLE 3 Mean WLQ-SF scores by depression status

WLQ-SF, mean (SD)					
	Total	Depression group		T-test[a]	
		Non-depressed	Depressed		
	(n = 232)	(n = 197)	(n = 35)	t	p
Four domains (range 0–100)[b]					
Time management	14.6 (21.0)	9.84 (16.0)	41.43 (25.5)	−7.08	<0.001*
Physical tasks	18.0 (25.3)	13.32 (21.2)	44.29 (30.2)	−5.81	<0.001*
Mental-interpersonal tasks	12.0 (16.4)	7.80 (11.0)	35.71 (21.3)	−7.59	<0.001*
Output tasks	14.7 (20.1)	10.60 (15.9)	37.50 (25.7)	−5.99	<0.001*
At-work productivity loss (range 0 to 24.9)[c]	3.9 (4.5)	2.73 (3.3)	10.3 (4.7)	−9.14	<0.001*

Note: *Bonferroni-corrected $p < 0.01$.

Abbreviations: SD, standard deviation; WLQ-SF, work limitation questionnaire-short form.

[a]*p* by independent *t*-test.

[b]Work limitation ranged from 0 (*none of the time*) to 100 (*all the time*).

[c]The calculated score by the weighted sum of scores for the four domains relative to a healthy sample. Higher score means more loss of productivity.

TABLE 4 Multivariate linear regression analysis of factors associated with the WLQ-SF at-work productivity loss score (n = 232)

	B	β	95% CI for B	p
Depression diagnosis, yes	4.39	0.35	2.85 to 5.93	<0.001*
Fear of cancer recurrence, score	0.03	0.09	−0.00 to 0.05	0.081
Demoralisation Scale-6, score	0.46	0.27	0.24 to 0.69	<0.001*
Past history of depression, yes	0.74	0.07	−0.44 to 1.92	0.219
Past history of anxiety, yes	1.74	0.15	0.48 to 2.99	0.007*
Secondary school not completed	0.27	0.02	−1.38 to 1.92	0.747
Year 12 or equivalent	−0.53	−0.04	−1.86 to 0.80	0.434
TAFE or college certificate or diploma	0.63	0.05	−0.58 to 1.84	0.307
Neo-adjuvant chemotherapy, yes	0.98	0.08	−0.16 to 2.12	0.092

Note: Adjusted *R*-squared = 0.481; $p > F = 0.000$; *Bonferroni-corrected $p < 0.01$; Excluded variable: Education-University degree.

Abbreviations: CI, confidence interval; TAFE, technical and further education; WLQ-SF, work limitation questionnaire-short form.

each of the four WLQ-SF domains. At-work productivity loss was approximately 4-fold higher in the depressed than in non-depressed group ($p < 0.001$, Table 3).

3.5 | Factors associated with at-work productivity loss

In univariate analysis, educational level, past history of depression or anxiety, neo-adjuvant chemotherapy, FCR score, DS-6 score, and current depression diagnosis were significantly associated with at-work productivity loss ($p < 0.05$). In multivariate linear analysis (Table 4), depression diagnosis, DS-6 score, and past history of anxiety were significantly associated with at-work productivity loss. Depression diagnosis and past history of anxiety were associated with at-work productivity loss (scores of 4.39 [$p < 0.001$] and 1.74 points [$p = 0.007$], respectively). Every 1-point increase in the DS-6 increased the at-work productivity loss score by 0.46 points. The overall model explained 48% of the variance in at-work productivity loss.

3.6 | Factors associated with scores in the four WLQ-SF domains

Depression was associated with limitations in all four WLQ-SF domains (Table S2). Higher DS-6 scores were associated with difficulty in mental-interpersonal tasks and output tasks, but showed modest association with time management. Past history of anxiety was only associated with mental-interpersonal tasks and output tasks. FCR, education level, and neo-adjuvant chemotherapy showed associations with some WLQ-SF domains, but the significance was decreased after Bonferroni correction.

4 | DISCUSSION

Our principal finding was that work conditions changed for nearly one third of breast cancer survivors after treatment, involving less income and fewer working hours. The rates of part-time employment and retirement increased correspondingly. Depressed survivors had approximately 4-fold higher limitation scores with respect to their work performance than survivors without depression. Higher at-work productivity losses were associated with a current depressive diagnosis, high demoralisation scores, and a past history of anxiety disorder. To the best of our knowledge, this is the first report to focus on the effects of psychological parameters (depression, fear of cancer recurrence, and demoralisation) on work ability among breast cancer survivors in Australia.

The RTW rate differs across countries.[6] In Australia, there have been few studies on RTW. In one longitudinal survey conducted between 1996 and 2013 among women with breast cancer in Australia, only 48% of full-time workers returned to full-time work; the other 52% returned to part-time work or did not return to paid work 3 years after diagnosis.[23] Although direct comparison of this prior and the current study is difficult, approximately 66% of the survivors in our survey who had full-time work remained in full-time employment after being treated for cancer. Differences in study design, sample characteristics, work environment, and policy could have affected the results.

Changes in the work situation were observed in the present study: full-time employment before cancer treatment was the most common work status, followed by part-time and retired. However, after cancer treatment, part-time became the most common work status. Furthermore, the proportion of retired people compared with those in full-time work increased after cancer treatment. These changes were reflected in fewer working hours and less income. A transition from full-to part-time work has been consistently reported by breast cancer survivors.[23,24]

The mean WLQ-SF scores in our cohort were lower than those in previous reports. The scores in all four domains (range: 12.0–18.0) were lower in the present study than for survivors of various types of cancer (range: 14.2–26.3),[25] and for those with depression (range: 19.5–36.4)[26] and other chronic conditions (range: 27.9–44.8),[27] but were higher than in healthy controls in previous studies (range: 7.8–9.8).[26] Furthermore, approximately one-third of our participants had an at-work productivity loss score of 0 (i.e.,, no limitations), providing quite encouraging results.

However, our participants with depression reported 3–4-fold higher work limitations in all four WLQ-SF domains than the non-depressed participants. Overall productivity loss was also 4-fold higher in the depressed group than in the non-depressed group. Understandably, depression negatively affected mental-interpersonal tasks, but also physical tasks, time management, and output tasks. Depression has been reported to reduce work ability,[26] including among breast cancer survivors.[13,28]

Regarding other psychological factors, demoralisation and a past history of anxiety were significantly associated with overall productivity loss among breast cancer survivors. Results regarding the association of anxiety with work limitations were equivocal in previous studies.[13,29] There have not been prior studies reporting on the association of demoralisation and FCR with work limitations in the literature.

Although depression was associated with work limitations in all four WLQ-SF domains, demoralisation and past history of anxiety were not significantly associated with time management and physical task performance. Demoralisation refers to a dispirited state of mind wherein low morale can lead to loss of meaning, hope, and purpose; it is correlated with but involves different phenomena to depression.[30]

4.1 | Clinical implications

The present study had several strengths and clinical implications. We used a validated scale (the WLQ-SF) to measure work ability across four domains, and calculated at-work productivity loss. The data are very instructive for understanding the work-related outcome of breast cancer survivors in Australia specifically. In addition to clinicians always being interested in how survivors are managing at work, our results regarding psychological factors, such as depression and demoralisation, have clinical implications because such factors are often modifiable. Screening for depression and demoralisation can be recommended for breast cancer survivors. In future trials, strategies for managing depression and demoralisation could be investigated as a potential way to enhance the work performance of breast cancer survivors.

4.2 | Study limitations

Several limitations should also be considered when interpreting the present results. Firstly, the cross-sectional design did not allow conclusions to be drawn regarding causal relationships. Secondly, other factors that may mediate the association of the WLQ-SF score with work ability, such as comorbidities, fatigue, and work factors, were not investigated.[9,14,31] However, the R^2 value in the multivariate regression model of the present study was 0.48, which is close to a medium-sized effect (≥0.5) found in behavioural science.[32] Third, the relatively advanced age of the subjects could have affected the RTW and work productivity loss data, albeit noting that the mean age was younger than the cut-off for pensioner status in Australia (66 years). Also, the proportion of older people in employment has been increasing since the turn of the century.[33] Fourth, the participants were all recruited from a private hospital, which may limit the generalisability of the findings. A multicentre study including public hospitals is needed. Fifth, only 50% of the participants from eligible survivors completed and were analysed in this study, resulting in a selection bias. Finally, the information about work status and conditions was very limited. Various types of work and occupations were not investigated in this study, and it was unclear whether respondents were in the same job when they moved between a part-time and full-

time job. Despite these limitations, our results could provide a foundation for subsequent studies on RTW and work ability among breast cancer survivors in Australia. Longitudinal studies recruiting participants from various states in Australia would be desirable.

5 | CONCLUSION

In conclusion, after breast cancer treatment, some respondents had less income and fewer working hours. The survivors with depression had 4-fold higher at-work productivity loss scores than those without depression. In addition, demoralisation and a past history of anxiety were associated with lower work ability. Further evaluations of RTW in breast cancer survivors are warranted.

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CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

ETHICAL STATEMENT

The study was approved by the Cabrini Human Research Ethics Committee and Research Governance Office, Study ID 13-09-12-19. This study was conducted in accordance with the principles of the Declaration of Helsinki.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available.

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REFERENCES

1. Cancer Australia. *Breast Cancer in Australia Statistics*. Cited 2020 Oct 16. Available from: https://www.canceraustralia.gov.au/affected-cancer/cancer-types/breastcancer/statistics
2. Cancer Australia. *Report to the Nation - Breast Cancer 2012, Cancer Australia*. Surry Hills, NSW; 2012. Cited 2020 Oct 16. Available from: https://www.canceraustralia.gov.au/publications-and-resources/cancer-australia-publications/report-nation-breast-cancer-2012
3. Cancer Australia. *5-year Relative Survival*. Cited 2020 Oct 16. Available from: https://ncci.canceraustralia.gov.au/outcomes/relative-survival-rate/5-year-relative-survival
4. Wu HS, Harden JK. Symptom burden and quality of life in survivorship: a review of the literature. *Canc Nurs*. 2015;38:E29-E54.
5. de Boer AG, Verbeek JH, Spelten ER, et al. Work ability and return-to-work in cancer patients. *Br J Canc*. 2008;98:1342-1347.
6. Islam T, Dahlui M, Majid HA, et al. Factors associated with return to work of breast cancer survivors: a systematic review. *BMC Publ Health*. 2014;14(Suppl 3):S8.
7. Main DS, Nowels CT, Cavender TA, Etschmaier M, Steiner JF. A qualitative study of work and work return in cancer survivors. *Psycho Oncol*. 2005;14:992-1004.
8. Cocchiara RA, Sciarra I, D'Egidio V, et al. Returning to work after breast cancer: a systematic review of reviews. *Work*. 2018;61:463-476.
9. Chow SL, Ting AS, Su TT. Development of conceptual framework to understand factors associated with return to work among cancer survivors: a systematic review. *Iran J Public Health*. 2014;43:391-405.
10. Fantoni SQ, Peugniez C, Duhamel A, Skrzypczak J, Frimat P, Leroyer A. Factors related to return to work by women with breast cancer in northern France. *J Occup Rehabil*. 2010;20:49-58.
11. Johnsson A, Fornander T, Rutqvist LE, Vaez M, Alexanderson K, Olsson M. Predictors of return to work ten months after primary breast cancer surgery. *Acta Oncol*. 2009;48:93-98.
12. Cheung K, Ching SYS, Chan A, Cheung D, Cheung SYP. The impact of personal-, disease- and work-related factors on work ability of women with breast cancer living in the community: a cross-sectional survey study. *Support Care Canc*. 2017;25:3495-3504.
13. Carlsen K, Jensen AJ, Rugulies R, et al. Self-reported work ability in long-term breast cancer survivors. A population-based questionnaire study in Denmark. *Acta Oncol*. 2013;52:423-429.
14. Lindbohm ML, Taskila T, Kuosma E, et al. Work ability of survivors of breast, prostate, and testicular cancer in Nordic countries: a NOCWO study. *J Cancer Surviv*. 2012;6:72-81.
15. Tamminga SJ, Coenen P, Paalman C, et al. Factors associated with an adverse work outcome in breast cancer survivors 5-10 years after diagnosis: a cross-sectional study. *J Cancer Surviv*. 2019;13:108-116.
16. Heuser C, Halbach S, Kowalski C, Enders A, Pfaff H, Ernstmann N. Sociodemographic and disease-related determinants of return to work among women with breast cancer: a German longitudinal cohort study. *BMC Health Serv Res*. 2018;18:1000.
17. Lerner D, Reed JI, Massarotti E, Wester LM, Burke TA. The Work Limitations Questionnaire's validity and reliability among patients with osteoarthritis. *J Clin Epidemiol*. 2002;55:197-208.
18. *Work limitations questionnaire, © 1998*, The health institute, Tufts Medical center f/k/a new England Medical center hospitals, Inc.; Debra Lerner, Ph.D.; Benjamin Amick III, Ph.D.; and GlaxoWellcome, Inc. All Rights Reserved.
19. Walker TJ, Tullar JM, Diamond PM, Kohl HW, 3rd, Amick BC, 3rd. Validity and reliability of the 8-item work limitations questionnaire. *J Occup Rehabil*. 2017;27:576-583.
20. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16:606-613.
21. Greenberg DB, Kornblith AB, Herndon JE, et al. Quality of life for adult leukemia survivors treated on clinical trials of Cancer and Leukemia Group B during the period 1971-1988: predictors for later psychologic distress. *Cancer*. 1997;80:1936-1944.
22. Belvederi Murri M, Zerbinati L, Ounalli H, et al. Assessing demoralization in medically ill patients: factor structure of the Italian version of the demoralization scale and development of short

versions with the item response theory framework. *J Psychosom Res*. 2020;128:109889.
23. Lewis J, Mackenzie L, Black D. Workforce participation of Australian women with breast cancer. *Psycho Oncol*. 2020;29:1156-1164.
24. Hamood R, Hamood H, Merhasin I, Keinan-Boker L. Work transitions in breast cancer survivors and effects on quality of life. *J Occup Rehabil*. 2019;29:336-349.
25. Tamminga SJ, Verbeek JH, Frings-Dresen MH, De Boer AG. Measurement properties of the Work Limitations Questionnaire were sufficient among cancer survivors. *Qual Life Res*. 2014;23:515-525.
26. Lerner D, Adler DA, Rogers WH, et al. Work performance of employees with depression: the impact of work stressors. *Am J Health Promot*. 2010;24:205-213.
27. Verhoef JA, Miedema HS, Bramsen I, Roebroeck ME. Using the work limitations questionnaire in patients with a chronic condition in The Netherlands. *J Occup Environ Med*. 2012;54:1293-1299.
28. Dahl AA, Fosså SD, Lie HC, et al. Employment status and work ability in long-term young adult cancer survivors. *J Adolesc Young Adult Oncol*. 2019;8:304-311.
29. Cheng ASK, Lau LOC, Ma YNH, Ngai RH, Fong SSL. Impact of cognitive and psychological symptoms on work productivity and quality of life among breast cancer survivors in Hong Kong. *Hong Kong J Occup Ther*. 2016;28:15-23.
30. Robinson S, Kissane DW, Brooker J, Burney S. A systematic review of the demoralization syndrome in individuals with progressive disease and cancer: a decade of research. *J Pain Symptom Manag*. 2015;49:595-610.
31. Munir F, Yarker J, McDermott H. Employment and the common cancers: correlates of work ability during or following cancer treatment. *Occup Med (Lond)*. 2009;59:381-389.
32. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Associates; 1988.
33. Compton E, Brady H, Hetherington D, et al. *Blueprint for an Ageing Australia*. Sydney, Australia: Per Capita; 2014. Cited 2021 Feb 22. Available from: https://percapita.org.au/wp-content/uploads/2018/05/Blueprint-for-Ageing-FINAL.pdf

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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