

# Reducing Body Image–Related Distress in Women With Breast Cancer Using a Structured Online Writing Exercise: Results From the My Changed Body Randomized Controlled Trial

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## A B S T R A C T

### Purpose

Breast cancer treatment adverse effects result in one in three survivors experiencing body image–related distress (BID) that negatively impacts on a woman's ability to recover after cancer and into survivorship. My Changed Body (MyCB) is a Web-based psychological intervention to alleviate BID and improve body appreciation in survivors of breast cancer (BCSs) through a single-session, self-compassion focused writing activity. This randomized controlled trial evaluated the impact of MyCB on BID and body appreciation in BCSs. The moderating effect of lymphedema status (affected or unaffected) and appearance investment (self-importance placed on personal appearance) and the mediating effect of self-compassion were evaluated.

### Patients and Methods

Women (disease-free stage I to III BCSs who had experienced at least one negative event related to bodily changes after breast cancer) were randomly assigned to MyCB (n = 149) or an expressive writing control arm (n = 155). Primary outcomes were reduction in BID and improvement in body appreciation 1 week after intervention. Secondary outcomes included psychological distress (depression and anxiety) and self-compassion. Follow-up assessments occurred 1 week, 1 month, and 3 months after writing.

### Results

Compliance with the MyCB intervention was 88%, and attrition was 9.2%. Intent-to-treat linear mixed models indicated that participants who received MyCB reported significantly less BID ( $P = .035$ ) and greater body appreciation ( $P = .004$ ) and self-compassion ( $P < .001$ ) than expressive writing participants. Intervention effects on BID were moderated by lymphedema status ( $P = .007$ ) and appearance investment ( $P = .042$ ). Self-compassion mediated effects on both primary outcomes. Therapeutic effects were maintained at 1 month (BID and body appreciation) and 3 months (body appreciation) after intervention. Significant reductions in psychological distress (1-month depression,  $P = .001$ ; 1-week and 1-month anxiety,  $P = .007$ ) were evident for MyCB participants with lymphedema.


### Conclusion

This study supports the efficacy of MyCB for reducing BID and enhancing body appreciation among BCSs.

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## ASSOCIATED CONTENT

 Appendix  
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 Data Supplement  
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## INTRODUCTION

A key clinical goal in breast cancer is to support the increasing numbers of women diagnosed with breast cancer to facilitate long-term adjustment into survivorship.<sup>1</sup> Breast cancer treatments produce adverse effects with visible (eg, breast

loss, hair loss) and nonvisible (eg, hot flushes, nausea) bodily impacts. Unsurprisingly, > 50% of survivors of breast cancer (BCSs) experience body image–related concerns about their body appearance and function.<sup>1-5</sup> Adjustment to bodily changes is a complex challenge because treatment is physically and emotionally demanding.<sup>6,7</sup> Chronic distress related to bodily changes is

experienced by one in three women with breast cancer, hampering resumption of normal life after cancer<sup>7-10</sup>; in addition, some women experience fear of and shame about their altered bodies.<sup>11,12</sup> Body image–related distress (BID) is associated with significant burden characterized by increased psychopathology (depression and anxiety) and impairments in work, social, and relationship functioning.<sup>13,14</sup> BCSs who develop lymphedema, a treatment adverse effect characterized by visible arm and/or chest swelling, typically experience greater distress than unaffected BCSs.<sup>15,16</sup> Similarly, BCSs who have a high level of appearance investment (ie, place high importance on physical appearance for their self-identity) typically experience higher BID than individuals less focused on physical appearance.<sup>17</sup> Women express unmet needs regarding coping with the impact of bodily changes, yet these concerns are not typically addressed by health professionals.<sup>18</sup> Many BCSs prefer these issues to be addressed privately (eg, Web sites), rather than face to face,<sup>5</sup> as a result of embarrassment and psychological discomfort in discussing these matters.<sup>19</sup> If left untreated, body image difficulties may further contribute to psychological distress and diminished quality of life<sup>8</sup>; hence, it is important to address this problem.

To address these concerns, we developed the Web-based My Changed Body (MyCB) psychological intervention, a structured writing exercise designed to promote self-compassionate attitudes (ie, self-kindness),<sup>20</sup> which in turn should facilitate adjustment in women regarding their postcancer bodily changes. Self-compassion is linked with diminished psychological distress,<sup>21,22</sup> increased quality of life,<sup>23</sup> and ability to cope with and accept negative experiences,<sup>24</sup> including body image difficulties.<sup>25</sup> MyCB is based on therapeutic expressive writing (EW) adapted for oncology populations whereby individuals describe their deepest thoughts and emotions<sup>26-34</sup> with specific prompts focused on self-compassion<sup>20,24,35</sup> that may help women perceive the breast cancer experience in a caring and supportive way.<sup>36</sup> As a low-cost alternative to group-administered programs, brief self-administered self-compassion writing interventions are time efficient, minimizing participant burden.<sup>29,37-39</sup> The Web-based MyCB may provide a viable way to support the growing population of BCSs, most of whom are Internet users.<sup>40,41</sup> Our prior research has demonstrated the user acceptability<sup>42</sup> and feasibility<sup>43</sup> of MyCB.

The primary aim of this randomized controlled trial (RCT) was to assess whether usual care (UC) plus MyCB can promote adjustment to bodily changes in BCSs. Because EW is a well-accepted therapeutic approach in oncology populations,<sup>44</sup> we assessed whether MyCB + UC provides superior benefits compared with EW + UC. MyCB was framed within the Cash body image<sup>45</sup> and transactional process<sup>46</sup> models that conceptualize adjustment as reflecting positive and negative outcomes; hence, we assessed negative (BID)<sup>47</sup> and positive (body appreciation)<sup>48</sup> aspects of body image and adjustment. We hypothesized that MyCB + UC would be superior to EW + UC in reducing BID and improving body appreciation and tested whether the effect of MyCB on body image was mediated by self-compassion. Secondary aims were to assess whether MyCB + UC would lead to diminished psychological distress (depression and anxiety) and enhanced self-compassion compared with EW + UC. We also explored whether the effects of MyCB would differ for BCSs with lymphedema or BCSs with a high level of appearance investment (moderating effects).

## PATIENTS AND METHODS

### Participants

Members of nationwide breast cancer consumer organizations (Breast Cancer Network of Australia and Breast Cancer Care Western Australia), university or teaching hospitals (Westmead Hospital and Macquarie University Hospital), and two Sydney lymphedema clinics participated (from May to October 2015; Fig 1). Adult female BCSs were eligible if they were previously diagnosed with stage I to III breast cancer and/or ductal carcinoma in situ and were disease free; had completed active breast cancer treatment; had experienced at least one negative event related to bodily changes after breast cancer that made the woman feel bad about herself (ie, something involving a feeling of failure, humiliation, or rejection); and could undertake an online writing activity in English. Approximately 500 women meeting eligibility criteria were invited to participate. Of these, 304 women consented (60.8% uptake rate) and completed baseline assessment (Table 1). Two hundred and six women (68%) had a diagnosis of breast cancer alone, and 98 (32%) had a diagnosis of breast cancer with related lymphedema. Of the 304 consenting participants, 283 (93.1%) completed the 1-week assessment, 272 (89.5%) completed the 1-month assessment, and 279 (91.8% retention; 9.2% attrition) completed the 3-month assessment.

### Procedures

Women were invited to participate in the online study via e-mail advertisements, which contained a link to the study Web site and consent form, through the consumer organizations and clinic staff. A link to access follow-up questionnaires was e-mailed at each time point. Follow-up notifications were sent until participants requested to drop out of the study. Consequently, more participants responded at the 3-month than the 1-month follow-up.

We conducted an RCT to evaluate the efficacy of MyCB to reduce BID and enhance body appreciation among BCSs. A two-group, randomized controlled design with intervention (MyCB + UC) and active control (EW + UC) conditions was used. Participants were randomly assigned after completing baseline assessments using the Qualtrics (Seattle, WA) randomizer function to either MyCB + UC or EW + UC. Clinicians and participants were blind to condition allocation. Study assessments were undertaken online at baseline and 1 week, 1 month, and 3 months after baseline (Fig 1). Ethics approval was granted by the Macquarie University Human Research Ethics Committee (Reference No. 5201401083; Australian New Zealand Clinical Trials Registry No. ACTRN12615001381572).

### Intervention and Control Conditions

**Intervention: MyCB + UC.** The MyCB + UC group undertook a single 30-minute online writing activity<sup>42,43</sup> that used a modified EW prompt<sup>49,50</sup> as the initial writing starting point. First, participants were instructed to think about a distressing event related to their body after breast cancer and to write freely to introduce the event. Next, they continued writing about their body image after cancer treatment guided by five self-compassionate prompts, commencing with a narrow focus on negative aspects of the self, then gradually moving to a broad self-compassionate perspective (ie, other women's perspective), and concluding with a narrow focus on the personal situation (total of six writing parts).<sup>42</sup> Each prompt used a separate text box to assist participants in structuring their writing. The brief writing intervention is designed to enhance user acceptability and reduce time burden, similar to single-session EW with oncology patients<sup>29</sup> and prompted self-compassion-based writing interventions.<sup>51</sup>

**Control: EW + UC.** The active control group undertook a single 30-minute online writing activity that commenced with the same initial modified EW prompt<sup>49,50</sup> as the intervention group but without any self-compassionate–focused writing prompts. This unstructured writing was in a six-part format (comparable to the intervention group), with participants

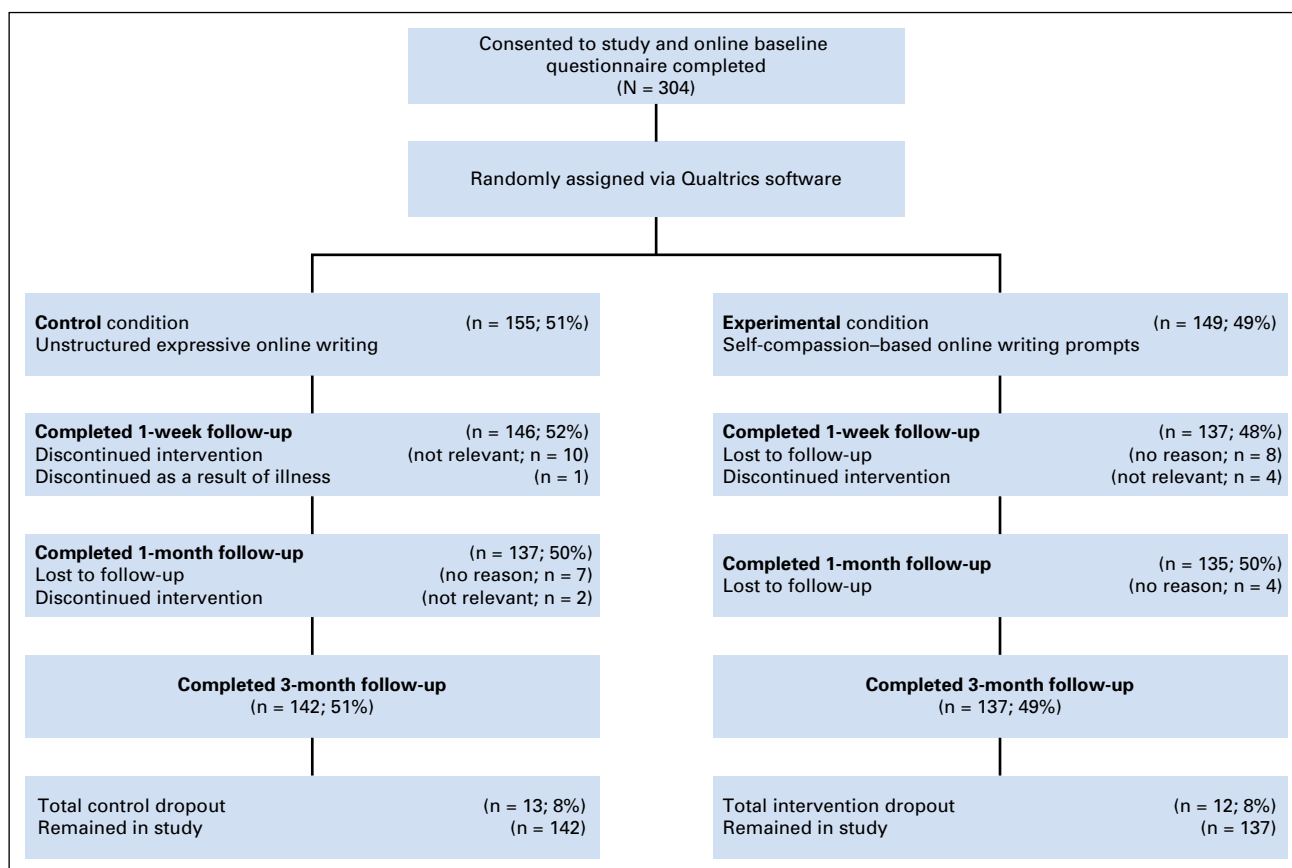


Fig 1. CONSORT diagram.

instructed to continue writing with general instructions (“Please describe the event further”) and without the use of specific prompts until all writing parts were completed. This EW control is a strength because it accounts for time devoted to writing and exposure to the stressor of the negative body image event. No restrictions were made for either group regarding access to clinic-based or other psychosocial care or use of other Internet-based self-help supportive resources.

**Outcomes**

The primary outcome of BID was assessed using the reliable 10-item Body Image Scale (score range, 0 to 30)<sup>47</sup> validated for use with oncology populations. Total scores  $\geq 10$  indicate BID.<sup>52</sup> The Body Image Scale demonstrated good internal consistency (Cronbach’s  $\alpha = .95$ ). Positive aspects of body image were assessed using the 13-item Body Appreciation Scale,<sup>48</sup> a reliable and validated measure (mean score range, 1 to 5). Higher mean scores indicate greater body appreciation. The Body Appreciation Scale demonstrated good internal consistency (Cronbach’s  $\alpha = .94$ ).

Secondary outcomes also reflected positive (ie, self-compassion) and negative (ie, depression and anxiety) aspects of adjustment. Self-compassion was measured using the 12-item, validated Self-Compassion Scale–Short Form (score range, 1 to 5;  $\alpha = .88$ ).<sup>53</sup> Psychological distress was measured using the depression and anxiety subscales of the 21-item Depression, Anxiety, and Stress Scales (score range, 0 to 21;  $\alpha$  for depression = .89;  $\alpha$  for anxiety = .78).<sup>54</sup> Appearance investment (moderator) was measured using the 20-item Appearance Schemas Inventory–Revised (score range, 1 to 5;  $\alpha = .85$ ).<sup>55</sup>

Demographic and medical information was documented, including age, marital status, country of birth, education level, employment status, diagnosis, time since diagnosis, adjuvant treatment received, and lymphedema status.

**Statistical Methods**

Analyses were conducted in SPSS (version 24; SPSS, Chicago, IL).<sup>56</sup> Baseline demographic and medical characteristics were compared across conditions via *t* tests and  $\chi^2$  tests. Potential covariates were assessed for inclusion in all mixed-model analyses if they met the criterion of significant reduction of error variance for each dependent variable<sup>57</sup>; adjusted means are reported thereafter. Main analyses were based on a group (two conditions) by time (four assessments: baseline, 1 week, 1 month, and 3 months) randomized design within an intent-to-treat framework. Maximum-likelihood linear mixed models were used to test group, time, and group-time interaction effects for all dependent variables. Maximum-likelihood estimation, which assumes that data are missing at random,<sup>58</sup> is an accurate method of dealing with missing data.<sup>59</sup> Secondary analyses using maximum-likelihood linear mixed models assessed the three-way interactions (moderator-group-time) for the moderating effects of lymphedema diagnosis and appearance investment on the primary and secondary outcomes. The moderating effect of age and time since diagnosis was also tested. The mediating effect of self-compassion on primary outcomes at 1 and 3 months was analyzed using the Hayes bootstrapping PROCESS approach.<sup>60</sup> Sample size calculations in GPower version 3.1<sup>61</sup> revealed that 244 participants (122 participants per group) were required to detect a moderate effect size in all linear mixed-model analyses with power held at 0.80 and a critical  $\alpha = .05$ . Given an anticipated dropout of 20%, we aimed to recruit 305 participants.

**Clinically Significant Change**

Clinically significant change was assessed between groups with  $\chi^2$  analyses of the percentage of BCSs whose BID scores changed (from baseline to 1 week, 1 month, and 3 months after writing) from  $\geq 10$  to  $< 10$ . Differences of proportions were compared via z-tests at each time point only when the overall  $\chi^2$  test was significant. Prior research informed by extensive clinical

**Table 1.** Participant Characteristics

Characteristic	MyCB + UC (n = 149)		EW + UC (n = 155)		P
	No. of BCS	%	No. of BCS	%	
Age, years					
Mean	57.50		57.23		.811
SD	8.98		9.97		
Marital					.331
Single	34	23	28	18	
Married	115	77	127	82	
Country of birth					.912
Australia	119	80	123	79	
Other	30	20	32	21	
Education					.478
Less than high school	38	26	42	27	
Finished high school	23	16	15	10	
Some tertiary	36	25	40	26	
Tertiary or more	49	34	57	37	
Occupation status					.688
Unemployed	76	51	75	49	
Employed	73	49	79	51	
Breast cancer diagnosis					.412
Early breast cancer	83	63	73	53	
Advanced breast cancer	7	5	13	9	
DCIS	41	31	52	38	
Time since diagnosis, years					.022
Mean	6.72		5.20		
SD	6.47		4.61		
Breast cancer treatment					.164
Surgery	11	7	8	5	
Surgery and RT	18	12	28	18	
Surgery and chemotherapy	11	7	10	7	
Surgery, RT, and chemotherapy	61	41	75	49	
RT and chemotherapy	0	0	1	1	
Surgery with reconstruction	10	7	4	3	
Surgery with reconstruction and RT	7	5	2	1	
Surgery with reconstruction and chemotherapy	13	9	10	7	
Surgery with reconstruction, RT, and chemotherapy	18	12	14	9	
Hormone treatment					.353
No	38	26	46	30	
Yes	110	74	108	70	
Targeted (trastuzumab)					.874
No	126	86	127	84	
Yes	21	14	25	16	
Lymphedema diagnosis					.629
No	99	66	107	69	
Yes	50	34	48	31	
Lymphedema stage					.761
0 (subclinical)	9	18	6	13	
1 (mild)	22	44	19	40	
2 (moderate)	18	36	20	43	
3 (severe)	1	2	2	4	
Appearance investment					.608
Mean	3.21		3.18		
SD	0.55		0.63		

Abbreviations: BCS, survivors of breast cancer; DCIS, ductal carcinoma in situ; EW, expressive writing; MyCB, My Changed Body; RT, radiotherapy; SD, standard deviation; UC, usual care.

interviews used scores of 10 to discriminate individuals experiencing no or little BID from those with greater distress.<sup>52,62</sup> Between-group comparisons were also conducted of the percentage of BCSs whose BID remained the same or worsened and those whose BID scores remained < 10 at follow-up.

## RESULTS

At baseline, the two groups did not differ on any demographic and medical characteristics, except for time since breast cancer

diagnosis, in which participants in the MyCB + UC intervention had significantly higher times since diagnosis ( $t = -4.66$ ,  $P < .001$ ; Table 1). There were no baseline differences in primary and secondary outcomes (Table 2). There were also no differences between participants with no missing data at 1-month follow-up (the time point with the greatest dropouts) and participants not providing data at this point (all  $\chi^2 < 0.96$ , all  $P > .327$ ). Attrition rates did not differ between the groups at any time point (all  $\chi^2 < 0.27$ , all  $P > .103$ ).

**Table 2.** Effect of Treatment on Primary and Secondary Outcomes

Outcome	MyCB + UC			EW + UC			P	d
	Mean Score	SD	95% CI	Mean Score	SD	95% CI		
<b>Body image distress*</b>								
Baseline	11.50	9.05	10.98 to 12.92	12.06	9.31	10.56 to 13.56	.560	0.06
1 week	9.28	8.84	7.85 to 10.71	10.87	8.98	9.36 to 12.37	.099	0.18
1 month	8.49	8.64	7.06 to 9.92	10.69	8.95	9.17 to 12.22	.023	0.25
3 months	8.01	8.72	6.58 to 9.44	9.49	8.99	7.98 to 11.00	.126	0.17
<b>Body appreciation scale†</b>								
Baseline	3.38	0.86	3.24 to 3.51	3.27	0.82	3.14 to 3.40	.256	0.13
1 week	3.53	0.85	3.39 to 3.66	3.30	0.78	3.17 to 3.43	.016	0.28
1 month	3.55	0.83	3.41 to 3.69	3.26	0.78	3.12 to 3.39	.002	0.36
3 months	3.56	0.84	3.42 to 3.70	3.28	0.78	3.15 to 3.41	.003	0.35
<b>Depression‡</b>								
Baseline	4.97	5.07	4.18 to 5.77	4.87	4.96	4.08 to 5.67	.843	0.02
1 week	4.25	4.98	3.45 to 5.06	4.64	4.78	3.84 to 5.44	.443	0.08
1 month	4.28	4.88	3.48 to 5.09	4.90	4.78	4.10 to 5.71	.222	0.13
3 months	3.79	4.92	2.98 to 4.59	4.20	4.80	3.39 to 5.00	.417	0.08
<b>Anxiety§</b>								
Baseline	3.82	3.85	3.22 to 4.43	3.69	3.75	3.09 to 4.30	.730	0.03
1 week	2.94	3.78	2.33 to 3.56	3.53	3.62	2.93 to 4.14	.127	0.16
1 month	2.89	3.72	2.28 to 3.50	3.39	3.64	2.78 to 4.00	.197	0.14
3 months	2.64	3.74	2.03 to 3.25	2.88	3.63	2.27 to 3.49	.530	0.07
<b>Self-compassion  </b>								
Baseline	3.23	0.67	3.12 to 3.35	3.09	0.75	2.98 to 3.20	.218	0.20
1 week	3.44	0.64	3.33 to 3.56	3.13	0.72	3.04 to 3.24	< .001	0.46
1 month	3.46	0.64	3.34 to 3.57	3.17	0.71	2.96 to 3.18	< .001	0.43
3 months	3.38	0.64	3.26 to 3.49	3.22	0.71	3.10 to 3.33	.210	0.24

Abbreviations: EW, expressive writing; MyCB, My Changed Body; SD, standard deviation; UC, usual care.

\*Controlling for chemotherapy status, radiotherapy status, and age.

†Controlling for hormone replacement therapy status, age, and education.

‡Controlling for marital status and hormone replacement therapy.

§Controlling for marital status, hormone replacement therapy status, and education.

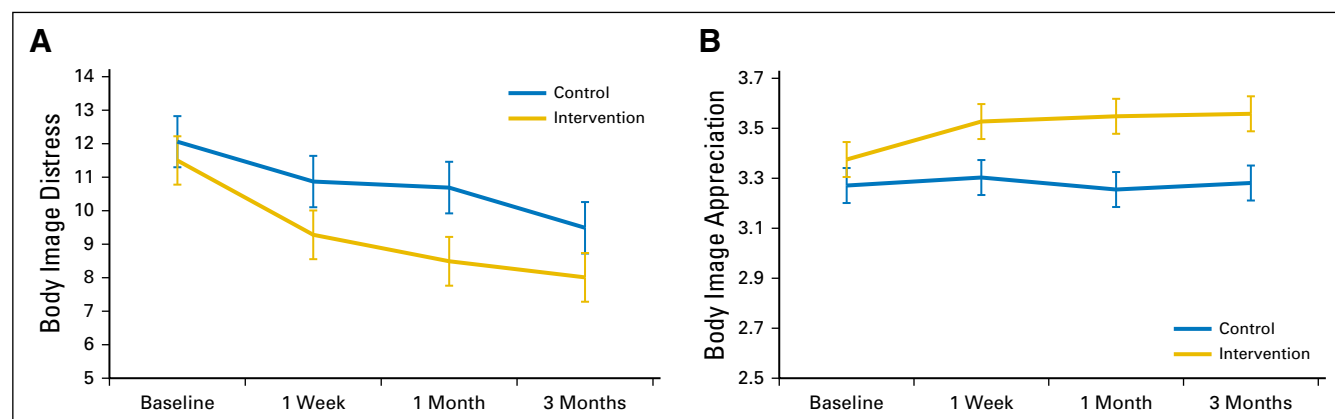
||Controlling for age and education.

**Statistical Effect: Group Comparisons**

Significant group-time interactions (Table 2, Fig 2, and Appendix Table A1, online only) were obtained for the primary outcomes of BID at 1 month (overall  $F = 2.89, P = .035$ ; 1 month  $P = .023, d = 0.25$ ) and body appreciation at all follow-up points (overall  $F = 4.39, P = .004$ ; 1 week  $P = .016, d = 0.28$ ; 1 month  $P = .002, d = 0.36$ ; 3 months  $P = .003, d = 0.35$ ). For BID, but not body appreciation ( $F = 2.47, P > .050$ ), there was a significant lymphedema status–group–time effect ( $F = 4.04, P = .007$ ; Table 3 and Fig 3) and appearance investment–group–time effect ( $F = 2.74, P = .042$ ; Table 4 and Fig 3). For the secondary outcomes (Table 2),

a significant group-time interaction was evident for self-compassion ( $F = 6.17, P < .001$ ). The group-time interactions for depression ( $F = 1.33, P = .263$ ) and anxiety ( $F = 2.21, P = .086$ ) were not significant, but there was a significant lymphedema status–group–time effect for all secondary outcomes (depression,  $F = 5.47, P = .001$ ; anxiety,  $F = 4.04, P = .007$ ; and self-compassion,  $F = 8.72, P < .001$ ; Table 3 and Fig 3). Appearance investment did not moderate any secondary outcome. No outcomes were moderated by the effects of age or time since diagnosis.

As predicted, controlling for baseline self-compassion, tests of mediation indicated significant indirect effects; that is, the effect of



**Fig 2.** Changes in (A) body image distress and (B) body appreciation over time by interventional allocation. Vertical bars represent 1 SE above and below the mean.

**Table 3.** The Effect of Lymphedema Status on Primary and Secondary Outcomes

Outcome	Breast Cancer Only				Breast Cancer + Lymphedema					
	MyCB + UC		EW + UC		MyCB + UC		EW + UC		P	d
	Mean (SD)	95% CI	Mean (SD)	95% CI	Mean (SD)	95% CI	Mean (SD)	95% CI		
Body image distress*										
Baseline	10.83 (8.42)	9.15 to 12.50	11.64 (8.85)	9.91 to 13.36	12.74 (8.51)	10.30 to 15.18	13.04 (8.85)	10.53 to 15.56	.495	0.09
1 week	9.69 (8.20)	8.01 to 11.37	10.24 (8.86)	8.52 to 11.97	8.64 (8.41)	6.17 to 11.10	12.28 (8.55)	9.75 to 14.82	.664	0.06
1 month	8.63 (8.06)	6.94 to 10.32	9.93 (8.61)	8.20 to 11.67	8.35 (8.56)	5.89 to 10.80	12.30 (8.55)	9.77 to 14.84	.276	0.16
3 months	8.83 (8.10)	7.14 to 10.52	9.42 (8.70)	7.69 to 11.15	6.76 (8.63)	4.31 to 9.21	9.76 (8.55)	7.22 to 12.29	.621	0.07
Body appreciation scale†										
Baseline	3.57 (0.82)	3.41 to 3.74	3.48 (0.80)	3.32 to 3.63	3.07 (0.73)	2.86 to 3.28	2.88 (0.75)	2.67 to 3.10	.381	0.11
1 week	3.62 (0.81)	3.46 to 3.79	3.49 (0.80)	3.34 to 3.65	3.38 (0.70)	3.17 to 3.60	2.94 (0.74)	2.73 to 3.16	.225	0.16
1 month	3.64 (0.80)	3.47 to 3.81	3.44 (0.77)	3.29 to 3.60	3.41 (0.72)	3.20 to 3.63	2.90 (0.74)	2.69 to 3.11	.074	0.25
3 months	3.61 (0.80)	3.45 to 3.78	3.43 (0.78)	3.27 to 3.58	3.48 (0.75)	3.27 to 3.69	3.00 (0.73)	2.79 to 3.23	.093	0.23
Depression‡										
Baseline	4.32 (4.69)	3.38 to 5.25	4.54 (4.75)	3.62 to 5.47	6.19 (4.32)	4.94 to 7.44	5.58 (4.56)	4.29 to 6.86	.708	0.05
1 week	4.42 (4.59)	3.48 to 5.36	4.49 (4.77)	3.56 to 5.42	3.89 (4.26)	2.61 to 5.16	4.94 (4.48)	3.64 to 6.24	.907	0.01
1 month	4.49 (4.52)	3.55 to 5.44	4.37 (4.64)	3.44 to 5.31	3.88 (4.33)	2.61 to 5.15	6.03 (4.48)	4.73 to 7.34	.841	0.03
3 months	4.03 (4.55)	3.08 to 4.98	4.23 (4.69)	3.29 to 5.16	3.34 (4.35)	2.08 to 4.60	4.12 (4.48)	2.82 to 5.42	.747	0.04
Anxiety§										
Baseline	3.10 (3.54)	2.40 to 3.80	3.09 (3.56)	2.39 to 3.78	5.16 (3.24)	4.22 to 6.10	4.98 (3.42)	4.02 to 5.94	.997	0.00
1 week	2.96 (3.20)	2.25 to 3.67	3.01 (3.58)	2.31 to 3.70	2.84 (3.48)	1.88 to 3.80	4.66 (3.37)	3.68 to 5.63	.917	0.01
1 month	2.84 (3.25)	2.12 to 3.56	2.85 (3.48)	2.14 to 3.55	2.96 (3.51)	2.01 to 3.91	4.54 (3.37)	3.57 to 5.52	.981	0.00
3 months	2.68 (3.28)	1.86 to 3.30	2.67 (3.52)	1.97 to 3.37	2.72 (3.45)	1.77 to 3.67	3.32 (3.37)	2.34 to 4.29	.848	0.03
Self-compassion										
Baseline	3.40 (0.69)	3.26 to 3.54	3.23 (0.69)	3.10 to 3.37	2.94 (0.63)	2.76 to 3.13	2.79 (0.67)	2.60 to 2.98	.224	0.25
1 week	3.43 (0.69)	3.29 to 3.57	3.28 (0.69)	3.14 to 3.41	3.46 (0.62)	3.28 to 3.65	2.82 (0.66)	2.63 to 3.01	.117	0.22
1 month	3.43 (0.68)	3.28 to 3.57	3.23 (0.67)	3.09 to 3.36	3.50 (0.63)	3.32 to 3.69	2.75 (0.66)	2.56 to 2.94	.058	0.30
3 months	3.42 (0.69)	3.28 to 3.56	3.29 (0.67)	3.15 to 3.42	3.30 (0.64)	3.11 to 3.48	3.06 (0.66)	2.87 to 3.26	.226	0.19

NOTE: Significant moderation effects are represented by differing patterns of significance across the levels of the moderator.

Abbreviations: EW, expressive writing; MyCB, My Changed Body; SD, standard deviation; UC, usual care.

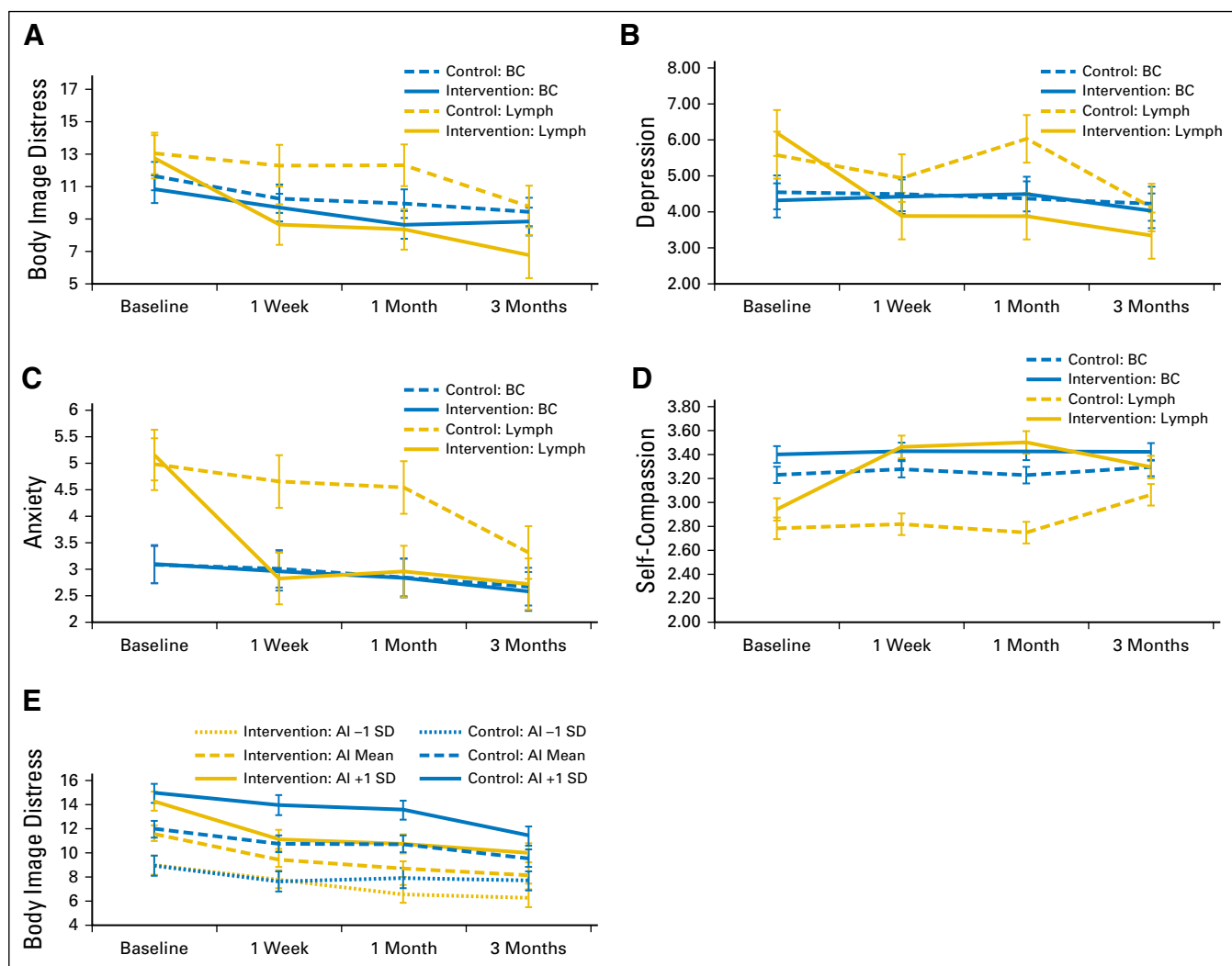
\*Controlling for chemotherapy status, radiotherapy status, and age.

†Controlling for hormone replacement therapy status, age, and education.

‡Controlling for marital status and hormone replacement therapy.

§Controlling for marital status, hormone replacement therapy status, and education.

||Controlling for age and education.



**Fig 3.** Effect of moderators on study outcomes. (A) The effect of treatment on body image distress moderated by lymphedema status. (B) The effect of treatment on depression moderated by lymphedema status. (C) The effect of treatment on anxiety moderated by lymphedema status. (D) The effect of treatment on self-compassion moderated by lymphedema status. (E) The effect of treatment on body image distress moderated by appearance investment. BC, breast cancer only; Lymph, lymphedema and breast cancer; SD, standard deviation.

MyCB at 1 month and 3 months on BID and body appreciation was mediated by self-compassion at 1 week (Table 5).

**Clinically Significant Change**

Overall  $\chi^2$  analyses were significant at 1 week and 1 month but not 3 months (1 week  $\chi^2 = 6.27, P = .044$ ; 1 month  $\chi^2 = 11.33, P = .003$ ; 3 months  $\chi^2 = 5.24, P = .073$ ). Follow-up z-tests indicate that significantly more MyCB + UC participants than EW + UC participants experienced improvements at 1 week (15% v 6%, respectively;  $z = -2.56, P = .005$ ) and 1 month (22.2% v 8%, respectively;  $z = -2.97, P = .002$ ). No significant differences were evident in the proportion of participants in the MyCB + UC and EW + UC groups who experienced deterioration or no improvement from baseline to 1 week (42% v 46%, respectively;  $z = 0.90, P = .82$ ) and 1 month (34.8% v 46%, respectively;  $z = 1.53, P = .94$ ). Similarly, no significant differences were evident in the proportion of participants in the MyCB + UC and EW + UC groups experiencing stable subclinical levels of BID from baseline

to 1 week (43% v 48%, respectively;  $z = 0.97, P = .83$ ) and 1 month (43% v 46%, respectively;  $z = 0.45, P = .68$ ).

A total of 88% of participants allocated to the MyCB intervention were compliant, undertaking all six parts of the writing intervention. Of those who did not complete all prescribed writing, 5% completed five of six parts, and the remaining 7% completed four or fewer of the six parts. Compliance with all six parts of writing in the control condition (81%) was similar to the MyCB intervention; of those who were noncompliant, all completed only the first writing part (one of six parts).

**DISCUSSION**

The aim of this study was to assess the efficacy of a brief Web-based self-compassion focused therapeutic writing intervention for BID in BCSs. We found that BCSs undertaking MyCB therapeutic writing demonstrated lower BID and greater body appreciation

**Table 4.** The Effect of Appearance Investment on Primary and Secondary Outcomes

Outcome	Appearance Investment (-1 SD)				Appearance Investment (mean)				Appearance Investment (+1 SD)									
	MyCB + UC		EW + UC		MyCB + UC		EW + UC		MyCB + UC		EW + UC							
	Mean (SD)	95% CI	Mean (SD)	95% CI	Mean (SD)	95% CI	Mean (SD)	95% CI	Mean (SD)	95% CI	Mean (SD)	95% CI						
<b>Body image distress*</b>																		
Baseline	9.00 (8.84)	7.52 to 10.48	8.99 (9.96)	7.35 to 10.62	9.90	0.00	11.65 (7.69)	10.36 to 12.95	12.00 (8.36)	10.63 to 13.36	.693	0.04	14.3 (8.86)	12.78 to 15.83	15.01 (9.36)	13.43 to 16.58	.498	0.08
1 week	7.83 (7.78)	6.33 to 9.32	7.64 (8.39)	6.12 to 9.27	.889	0.02	9.48 (9.31)	8.18 to 10.78	10.82 (9.60)	9.44 to 12.19	.129	0.14	11.13 (9.06)	9.57 to 12.69	13.99 (10.10)	12.42 to 15.56	.006	0.30
1 month	6.60 (6.56)	5.10 to 8.10	7.93 (10.01)	6.31 to 9.55	.211	0.14	8.70 (8.94)	7.39 to 10.00	10.76 (9.89)	9.38 to 12.14	.019	0.22	10.79 (7.76)	9.23 to 12.36	13.59 (8.42)	12.00 to 15.19	.008	0.35
3 months	6.28 (8.76)	4.78 to 7.77	7.70 (9.65)	6.10 to 9.31	.175	0.15	8.17 (7.77)	6.86 to 9.47	9.58 (8.40)	8.21 to 10.96	.108	0.17	10.06 (9.22)	8.51 to 11.61	11.46 (9.68)	9.87 to 13.04	.182	0.15
<b>Body appreciation</b>																		
Baseline	3.61 (0.89)	3.46 to 3.76	3.39 (0.96)	3.23 to 3.55	.041	0.24	3.36 (0.77)	3.23 to 3.49	3.26 (0.77)	3.13 to 3.38	.238	0.13	3.11 (0.94)	2.96 to 3.27	3.13 (0.91)	2.98 to 3.28	.904	0.02
1 week	3.61 (0.90)	3.46 to 3.77	3.40 (0.98)	3.34 to 3.56	.067	0.22	3.52 (0.77)	3.39 to 3.65	3.29 (0.77)	3.17 to 3.42	.009	0.30	3.43 (0.96)	3.28 to 3.59	3.17 (0.91)	3.02 to 3.32	.014	0.28
1 month	3.67 (0.91)	3.52 to 3.82	3.36 (0.94)	3.20 to 3.51	.003	0.34	3.54 (0.07)	3.40 to 3.67	3.24 (0.77)	3.11 to 3.36	.001	0.54	3.40 (0.96)	3.24 to 3.56	3.12 (0.92)	2.97 to 3.27	.011	0.30
3 months	3.68 (0.91)	3.53 to 3.83	3.41 (0.94)	3.26 to 3.56	.011	0.29	3.55 (0.77)	3.42 to 3.68	3.28 (0.77)	3.15 to 3.40	.002	0.35	3.42 (0.95)	3.26 to 3.58	3.14 (0.92)	2.99 to 3.29	.009	0.30
<b>Depression†</b>																		
Baseline	0.63 (29.73)	1.33 to 11.32	5.98 (31.56)	0.82 to 11.15	.775	0.17	8.70 (29.50)	3.76 to 13.65	8.38 (30.84)	3.34 to 13.43	.738	0.01	11.08 (31.08)	5.99 to 16.17	10.79 (31.44)	5.63 to 15.94	.808	0.01
1 week	5.18 (29.85)	0.17 to 10.19	5.43 (31.56)	0.26 to 10.59	.840	0.01	7.35 (29.50)	2.40 to 12.31	7.93 (30.84)	2.88 to 12.98	.551	0.02	9.53 (31.08)	4.43 to 14.63	10.43 (31.44)	5.28 to 15.59	.459	0.03
1 month	5.10 (29.85)	0.09 to 10.12	6.14 (31.56)	0.97 to 11.30	.389	0.03	7.40 (29.50)	2.44 to 12.35	8.55 (30.84)	3.50 to 13.60	.236	0.04	9.69 (31.08)	4.60 to 14.79	10.96 (31.56)	5.79 to 16.13	.304	0.04
3 months	4.31 (29.85)	0.00 to 9.31	5.78 (31.44)	0.62 to 10.94	.228	0.05	6.32 (29.50)	1.37 to 11.27	7.12 (30.84)	2.07 to 12.17	.411	0.03	8.34 (31.08)	3.25 to 13.42	8.46 (31.56)	3.29 to 13.62	.922	0.00
<b>Anxiety‡</b>																		
Baseline	5.53 (8.24)	4.15 to 6.91	4.90 (8.87)	3.45 to 6.35	.502	0.07	7.68 (6.81)	6.53 to 8.82	7.19 (7.00)	6.05 to 8.34	.506	0.07	9.82 (8.46)	8.44 to 11.20	9.48 (8.68)	8.06 to 10.90	.720	0.04
1 week	4.54 (8.30)	3.12 to 5.95	4.78 (8.84)	3.34 to 6.23	.793	0.03	5.90 (6.92)	4.74 to 7.07	6.94 (7.02)	5.79 to 8.09	.168	0.15	7.27 (8.72)	5.85 to 8.70	9.1 (8.69)	7.67 to 10.52	.056	0.21
1 month	4.08 (8.50)	2.66 to 5.51	5.02 (8.86)	3.57 to 6.47	.323	0.11	5.78 (6.95)	4.61 to 6.95	6.74 (7.08)	5.58 to 7.90	.194	0.14	7.48 (8.65)	6.06 to 8.89	8.46 (8.87)	7.01 to 9.91	.306	0.11
3 months	3.80 (8.47)	2.38 to 5.22	4.26 (8.80)	2.82 to 5.69	.632	0.05	5.21 (6.92)	4.05 to 6.37	5.68 (7.07)	4.53 to 6.84	.521	0.07	6.62 (8.51)	5.23 to 8.01	7.11 (8.82)	5.67 to 8.56	.604	0.06
<b>Self-compassion  </b>																		
Baseline	3.50 (0.77)	3.37 to 3.63	3.42 (0.86)	3.28 to 3.56	.404	0.10	3.23 (0.61)	3.12 to 3.33	3.11 (0.61)	3.01 to 3.21	.108	0.20	2.95 (0.82)	2.82 to 3.08	2.76 (0.80)	2.66 to 2.93	.106	0.23
1 week	3.60 (0.78)	3.47 to 3.73	3.42 (0.85)	3.27 to 3.55	.054	0.22	3.43 (0.62)	3.32 to 3.53	3.15 (0.62)	3.04 to 3.25	<	.001	3.25 (0.85)	3.11 to 3.39	2.88 (0.80)	2.75 to 3.01	<	.001
1 month	3.64 (0.80)	3.51 to 3.77	3.30 (0.88)	3.16 to 3.44	.001	0.41	3.44 (0.62)	3.34 to 3.55	3.08 (0.62)	2.98 to 3.18	<	.001	3.25 (0.85)	3.11 to 3.39	2.86 (0.84)	2.72 to 3.00	<	.001
3 months	3.58 (0.80)	3.44 to 3.71	3.40 (0.84)	3.26 to 3.53	.066	0.22	3.37 (0.62)	3.26 to 3.47	3.22 (0.62)	3.12 to 3.33	.053	0.24	3.16 (0.84)	3.02 to 3.30	3.05 (0.83)	2.91 to 3.18	.261	0.13

NOTE. Significant moderation effects are represented by differing patterns of significance across the levels of the moderator.

Abbreviations: EW, expressive writing; MyCB, My Changed Body; SD, standard deviation; UC, usual care.

\*Controlling for chemotherapy status, radiotherapy status, and age.

†Controlling for hormone replacement therapy status, age, and education.

‡Controlling for marital status and hormone replacement therapy.

§Controlling for marital status, hormone replacement therapy status, and education.

||Controlling for age and education.



**Table 5.** Mediation Effect of Self-Compassion on Primary Outcomes

DV	Effect of IV on M		Effect of M on DV		Direct Effect		Indirect Effect			
	$\beta$	<i>P</i>	$\beta$	<i>P</i>	$\beta$	<i>P</i>	Boot $\beta$	SE	CI Lower	CI Upper
1 month										
Body image disturbance ( $R^2 = 0.42$ )										
Self-compassion, M			-6.48	< .001			-1.51	0.64	-2.79	-0.28
Condition, IV	0.23	.013			-0.26	.758				
Chemotherapy	-0.03	.812	0.53	.012						
Radiotherapy	-0.10	.377	-3.90	.047						
Age	0.01	.021	-0.26	< .001						
Body appreciation ( $R^2 = 0.59$ )										
Self-compassion, M			0.76	< .001			0.21	0.07	0.08	0.36
Condition, IV	0.27	.003			0.07	.027				
Hormone therapy	-0.01	.929	0.21	.006						
Age	0.01	.015	0.02	< .001						
Education	0.03	.427	0.03	.256						
3 months										
Body image disturbance ( $R^2 = 0.36$ )										
Self-compassion, M			-5.60	< .001			-1.44	0.06	-2.65	-0.44
Condition, IV	0.26	.006			0.08	.929				
Chemotherapy	-0.01	.943	0.08	.015						
Radiotherapy	-0.11	.308	0.24	.004						
Age	0.01	.029	-2.92	< .001						
Body appreciation ( $R^2 = 0.52$ )										
Self-compassion, M			0.67	< .001			0.02	0.07	0.09	0.36
Condition, IV	0.32	< .001			0.09	.217				
Hormone therapy	-0.01	.910	0.20	.015						
Age	0.01	.059	0.02	< .001						
Education	0.09	.014	0.08	.010						

Abbreviations: DV, dependent variable; IV, independent variable; M, mediator.

compared with BCSs undertaking unstructured EW; this effect was sustained at all follow-up assessments for body appreciation. For BID, the beneficial effect was strongest at the 1-month follow-up and was particularly impactful for BCSs who place high importance on their appearance and for those women with secondary lymphedema, which are subgroups of BCSs known to experience the greatest body image concerns after treatment.<sup>17,63</sup> After MyCB writing, BCSs with lymphedema also experienced the greatest improvements in depression, anxiety, and self-compassion; reductions in depression and anxiety are important because they are associated with poorer quality of life in BCSs.<sup>64</sup> As an indicator of clinical significance, a greater proportion of MyCB participants experienced reductions in BID compared with EW participants.

Consistent with prediction, the mediation analyses confirmed the mechanism of action that the MyCB effects on BID and body appreciation at 1 and 3 months of follow-up were through post-writing self-compassion, which had improved significantly after the MyCB writing exercise. These are the first prospective data, to our knowledge, to confirm the mediating role of self-compassion in relation to BID, and as such, these data are a key addition to the theory underlying self-compassion.<sup>42</sup>

Overall, these findings indicate that the MyCB writing intervention demonstrated statistically and clinically meaningful benefits compared with unstructured, self-directed EW<sup>65</sup> for addressing BID. Importantly, the MyCB benefits were achieved independently, without clinician or other in-person support. These findings add to the emerging evidence that self-compassion interventions may be beneficial for addressing body image concerns<sup>25</sup> and in enhancing BCS adjustment.<sup>66-68</sup> Recruiting from

online communities and clinics ensured the greatest generalizability of these findings. The minimal participant contact of the research team, online nature of recruitment, and accessible, self-guided independent nature of the MyCB intervention support the ecologic validity of this therapeutic approach and highlight the potential for implementation through online BCS networks. As a Web-based intervention, MyCB helps overcome current clinician-patient barriers to address BID,<sup>18</sup> allowing BCSs to access the intervention in privacy. The comparatively high retention rate in this study (91.8%)<sup>69-72</sup> and high compliance to MyCB provide additional support for user acceptability, as previously demonstrated.<sup>42</sup> A further strength is the use of the EW control, which accounted for time spent writing and exposure to the stressor of the negative body image event.

These findings should also be considered in light of a number of limitations. The single-session MyCB intervention does not allow conclusions to be drawn regarding the optimal number of administrations of the writing for maximum benefit. Moreover, clinically meaningful reductions in BID should be sustained over a longer period (eg, a minimum of 6 months); hence, further research is needed to determine the longer term effects of MyCB. Participants self-enrolled if they had at least one negative body image-related experience, but we did not specifically screen for BID at study entry, resulting in a range of BID levels within the sample studied. Our findings suggest that BCSs with higher distress benefitted more from MyCB; hence, future studies should target these women. Despite quantitative evidence that MyCB writing increased self-compassion, in this study the participants' writing was not linked with their quantitative data to ensure anonymity,

precluding the ability to control for word count or time spent writing. Further investigations with documentation of the timing and content of writing for the MyCB intervention are needed for understanding potential dose-response relationships.

Recruitment into this study via e-mail messaging of breast cancer and lymphedema consumer organizations closely mimicked real-life situations but may have excluded BCSs who do not subscribe to such organizations or attend lymphedema clinics, and the nature of the intervention excludes the small percentage of BCSs without Internet access. Prior work has demonstrated potential benefits of a paper-based writing approach,<sup>43</sup> and this could potentially be offered in future MyCB use.

To our knowledge, this is the first RCT to specifically address BID in BCSs with a therapeutic self-compassion focused writing approach. The analyses demonstrated both statistically and clinically meaningful reductions in BID, particularly for women with breast cancer-related lymphedema and women who characteristically place high importance on physical appearance. The Web-based, self-administered MyCB intervention is low cost and requires minimal user time commitment. Future research is needed to replicate these findings beyond 3 months and to determine whether booster writing sessions may provide additional benefits. Additional investigations are also needed to ascertain the impact of MyCB on other aspects of psychosocial functioning impacted by BID including overall quality of life and social, work, and

relationship functioning.<sup>13,14</sup> These findings, along with the prior user acceptability studies, demonstrate the potential for MyCB to be a key evidence-based supportive resource to enhance BCS adjustment.

#### AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

Disclosures provided by the authors are available with this article at [jco.org](http://jco.org).

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**AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST**

**Reducing Body Image–Related Distress in Women With Breast Cancer Using a Structured Online Writing Exercise: Results From the My Changed Body Randomized Controlled Trial**

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**Appendix**

**Table A1.** Covariate Effects From Maximum-Likelihood Linear Mixed Model Analyses

Variable	$\beta$	SE	95% CI	<i>t</i>	<i>P</i>
<b>Body image distress</b>					
Chemotherapy	-3.43	1.02	-5.45 to -1.42	-3.36	.001
Radiotherapy	1.94	1.05	-0.13 to 4.01	1.85	.006
Age	-0.24	0.05	-0.34 to -0.15	-5.08	< .001
<b>Body appreciation</b>					
Hormone therapy	-0.26	0.10	-0.45 to -0.07	-2.67	.008
Age	0.02	0.01	0.01 to 0.03	4.89	< .001
Education	0.07	0.03	0.01 to 0.13	2.33	.020
<b>Self-compassion</b>					
Age	0.01	0.01	0.00 to 0.02	2.80	.006
Education	0.07	0.02	0.02 to 0.11	2.83	.005
<b>Depression</b>					
Marital status	1.55	0.55	0.45 to 2.64	2.79	.006
Hormone therapy	0.99	0.50	0.01 to 1.98	1.98	.048
<b>Anxiety</b>					
Marital status	0.91	0.41	0.10 to 1.72	2.21	.028
Hormone therapy	0.84	0.38	0.09 to 1.58	2.21	.028
Education	-0.37	0.12	-0.60 to -0.13	-3.11	.002

NOTE. Chemotherapy reference category was received chemotherapy. Radiotherapy reference category was received radiotherapy. Hormone therapy reference category was received hormone therapy. Marital status reference category was married or partnered.