The unexpected impact of expressive writing on posttraumatic stress and growth in Chinese American breast cancer survivors

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Abstract
Objective: The present study examined the impact of expressive writing on reducing posttraumatic stress disorder symptoms (PTSS) and facilitating posttraumatic growth (PTG) in Chinese American breast cancer survivors.

Method: Ninety-six women who had completed primary treatments for breast cancer were randomly assigned to a cancer experience facts condition, an emotional disclosure condition, or a self-regulation condition and wrote on three occasions over 3 weeks. Participants completed outcome assessments at baseline and 1, 3, and 6 months after the last writing session.

Results: Surprisingly, results indicated that there was generally a small increase in PTSS (ESsg = .16) and a small decrease in PTG (ESsg = −.16) from baseline to the 6-month follow-up. Effect size comparisons and latent growth curve models also indicated that the cancer facts condition was generally associated with superior outcomes for both PTSS and PTG.

Conclusions: These findings speak to the importance of examining whether interventions are equally efficacious in different cultures.

Keywords: Asian Americans, cancer, expressive writing, PTSD, posttraumatic growth

1 | INTRODUCTION

Cancer represents a significant public health issue in the United States. The American Cancer Society estimates that more than 15.5 million Americans are living with a history of cancer, and projected approximately 1.7 million new cases and 600,000 cancer deaths to occur in 2017 (Cancer Facts and Figures; American Cancer Society, 2017). Fortunately,
treatments for cancer are improving; and the number of cancer survivors is expected to increase to 20.3 million in the next 10 years. As more patients recover, the need for treatment for psychological problems associated with the disease will become more pressing. In addition to its impact on physical health, cancer is associated with serious mental health problems including significant psychological distress, anxiety, and depression (Carlson & Bultz, 2003; Kreberger et al., 2014; Spencer, Nilsson, Wright, Pirl, & Priprz, 2010). Life-threatening illnesses such as cancer can be experienced as traumatic events. Cancer survivors often report symptoms of post-traumatic stress, and in a minority meet full for posttraumatic stress disorder (PTSD; Jim & Jacobsen, 2008; Kangas, Henry, & Bryant, 2002). However, evidence suggests that cancer survivors commonly report posttraumatic growth (PTG) as well (Jim & Jacobsen, 2008; Koutrouli, Anagnostopoulos, & Potamianos, 2012).

Asian Americans may experience unique challenges when confronted with cancer. Cancer is the most common cause of death for Asian Americans (Heron, 2016). Obstacles such as limited fluency and financial difficulties may lead to dissatisfaction with treatment decisions (Katie Lee & Knobf, 2015). Asian Americans also face cultural stigma surrounding cancer (Ashing-Giwa et al., 2004; Lee et al., 2013; Lu, You, Man, Loh, & Young, 2014). Social support is generally related to better quality of life for cancer patients, including emotional and functional well-being (Parker, Baile, de Moor, & Cohen, 2003; So et al., 2013). However, Asian Americans are less likely to seek social support for their problems and seeking social support can provoke stress responses (Chang, 2015; Kim, Sherman, & Taylor, 2008; Taylor et al., 2004). This tendency may be due to social concerns such as losing face, burdening others, or disrupting group harmony (Chang, 2015; Kim, Sherman, Ko, & Taylor, 2006). A study by You and Lu (2014) found that Asian breast cancer survivors tended to conceal their cancer from those around them and avoid interpersonal interactions. Lepore's (2001) social cognitive processing theory proposes that those with an unsupportive social networks may experience disruptions in the cognitive processing and integration of traumatic events. Thus, difficulties due to unsupportive interpersonal interactions may contribute to negative outcomes for cancer survivors. Cancer-related communication strain among family members has been related to negative mental health outcomes such as greater depression and reduced vitality (Paek & Lim, 2016). Social constraints have also been associated with greater physical symptoms in Asian American breast cancer survivors (Wong & Lu, 2016).

One intervention that may be particularly relevant to Asian cancer survivors is expressive writing. Expressive writing involves disclosing one's deepest thoughts and feelings surrounding a traumatic event (Pennebaker & Chung, 2007). A typical expressive writing paradigm asks individuals to write on three to five occasions for approximately 20–30 min on an emotionally salient topic. Although most expressive writing paradigms include a similar structure and focus, there is variability in the specific instructions and requirements involved in expressive writing interventions. Expressive writing has been shown to promote better physical health, general functioning, physiological outcomes, and psychological outcomes, including enhanced well-being as well as reductions in distress, depression, and anxiety (Frattaroli, 2006; Frisina, Borod, & Lepore, 2004; Kállay, 2015; Smyth, 1998).

Expressive writing also appears to benefit those who have experienced traumatic events. For example, participants who were assigned to a benefit finding condition in which they wrote about positive aspects of trauma were found to have fewer health center appointments than controls (King & Miner, 2000). In addition, written exposure therapy, which involves writing a detailed account of a past traumatic experience while emphasizing the emotional impact and meaning attached to the traumatic event, has been demonstrated to be a promising intervention for PTSD due to motor vehicle accidents (Sloan, Marx, Bovin, Feinstein, & Gallagher, 2012), and an online expressive writing intervention in which individuals write about what they perceive as their deepest thoughts and feelings stemming from a trauma has been found to improve symptoms of PTSD in veterans transitioning into civilian life (Sayer et al., 2015). Meta-analytic reviews have found that, in addition to generally having positive effects on psychological and physical outcomes (Frattaroli, 2006), expressive writing interventions that target writing about traumatic events can have positive effects on a variety of health outcomes (Mogk, Otte, Reinhold-Hurley, & Kröner-Herwig, 2006).

Evidence also suggests that expressive writing interventions confer benefits for those who have been affected by cancer. These benefits include reductions in depression, elevations in positive mood, better quality of life, alleviation of distress due to social constraints, improved sleep quality, and increased vigor (de Moor et al., 2002;
Jensen-Johansen et al., 2013; Zakowski, Ramati, Morton, Johnson, & Flanigan, 2004). For example, Stanton and colleagues (2002) conducted a randomized, controlled trial in which breast cancer survivors were randomized to write about their deepest thoughts and feelings about their cancer, the positive consequences of their cancer experience, or facts about their cancer experience. Emotional disclosure was associated with a decrease in physical symptoms, and both benefit-finding and emotional disclosure were associated with fewer medical appointments. A subsequent trial, however, found no differences between writing conditions on health outcomes among women with metastatic breast cancer who were randomized to either expressively write about emotions related to cancer or to write about cancer facts (Low, Stanton, Bower, & Gyllenhammer, 2010), but there was some evidence that factors such as social support may moderate the effects of writing interventions. Evidence to date regarding the benefits of expressive writing among breast cancer survivors appears to generally support the use of expressive writing, but there may be moderators of efficacy such as emotional support (Low et al., 2010), population characteristics or ethnicity, or other intrapersonal and interpersonal factors (de Moor et al., 2002, Merz, Fox, & Malcarne, 2014).

Few studies have examined expressive writing paradigms within Asian American populations, and evidence suggests that they may respond differently than non-Hispanic Whites. Expressive writing may be a culturally sensitive intervention for Asian American cancer survivors because it allows them to engage in intrapersonal emotional disclosure without experiencing stigma, shame, and judgment or disrupting their relationships with those in their social circle. Lu and Stanton (2010) created a self-regulation moderator model of expressive writing in which individuals are asked to write about emotions related to a stressful experience as well as to reflect on the impact of the stressful experience on their life and tested it among Caucasian and Asian undergraduates. Their model proposed that the effects of expressive writing are moderated by individual differences, and emotional disclosure is most beneficial when it involves cognitive reappraisal of traumatic events. When emotional disclosure and cognitive reappraisal occur together, these processes contribute to more effective self-regulation and thus greater health benefits. The self-regulation condition was indeed found to be the most beneficial to mental and physical health, and Asian Americans benefitted more from this form of expressive writing compared with the non-Hispanic Caucasians.

Lu, Zheng, Young, Kagawa-Singer, and Loh (2012) subsequently developed a community-based expressive writing intervention specifically for Chinese-speaking Asian American breast cancer survivors. Survivors engaged in self-regulation expressive writing, discussing their deepest feelings and thoughts about cancer, strategies for coping with cancer, and positive thoughts and feelings about their experience with cancer. The intervention proved to be culturally sensitive and promoted robust increases in quality of life, as well as reductions in fatigue, posttraumatic stress, and intrusive thoughts. This work was followed by a clinical trial in which self-regulation expressive writing was compared to an emotional disclosure only condition and a control group in which patients wrote only about objective facts of their cancer experience (Lu et al., 2017). A surprising pattern of results emerged, with participants in the cancer facts condition showing the greatest increases in emotional wellbeing, and the self-regulation condition prompting greater increases in emotional well-being than the emotional disclosure condition. The surprising results regarding the impact of the cancer facts condition underscores the importance of not assuming that interventions will be equally efficacious on treatment outcomes across different cultural or ethnic groups. The current study reports analyses regarding secondary outcomes of that trial.

1.1 The present study

The current study aims to extend prior work and determine whether expressive writing is effective in reducing symptoms of PTSD and facilitating PTG in Asian American breast cancer survivors. In line with the previous results regarding the benefits of expressive writing for cancer survivors (e.g., Stanton et al., 2002), our hypotheses were that expressive writing would be more beneficial for both posttraumatic stress disorder symptoms (PTSS) and PTG in the emotional disclosure or the self-regulation groups compared with the cancer facts group. These hypotheses were explored using data from a previously published trial examining the impact of expressive writing on quality of life in Chinese American breast cancer survivors (Lu et al., 2017.)
METHODS

2.1 Participants

Participants were 96 Asian women who were recruited from the Houston, Los Angeles, and New York metropolitan areas. The age of participants ranged from 37 to 77 years old (M = 54.54, SD = 7.91), and all participants in this sample were foreign born, with the majority reporting that they were born in China (62.5%) or Taiwan (20.8%). 86.3% of participants had been diagnosed with breast cancer at stage I to III, with a mean time since diagnosis of 19.24 months (SD = 10.93). The majority of participants were married (71.9%) and had completed a college education (51.6%). The inclusion criteria for the study were (1) a previous diagnosis of stages 0 to III breast cancer, (2) recently (within the past 4 years) completed primary medical treatment for breast cancer (e.g., surgery, radiotherapy, chemotherapy), and (3) reported comfort writing and speaking Chinese (i.e., Mandarin, Cantonese).

2.2 Experimental design and conditions

See Lu et al. (2017) for details about the experimental design and rationale for the writing conditions. Participants were randomly assigned to one of three writing conditions: a cancer facts condition (n = 33) in which participants were asked to objectively write about their cancer diagnosis and treatment in a detailed manner, an emotional disclosure condition (n = 29) in which participants were asked to write about their deepest thoughts and feelings about their cancer experiences, or a self-regulation condition (n = 34) in which participants were asked to write about their deepest feelings and thoughts related to their cancer experience during week one, the coping strategies they used to deal with stressors caused by their cancer experience during week two, and positive thoughts and feelings regarding their cancer experience during week three. Participants were asked to write continuously for up to 30 min or until they completed one full page of writing on three occasions over a 3-week period. The majority of essays were judged to represent the assigned condition when independently evaluated by two raters who were blind to condition. Furthermore, examinations of the content of the essays using the LIWC2007 (Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007) program revealed differences in the anticipated directions between groups in the use of positive and negative emotions and cognitive processes such as insight and causation (see Lu et al., 2017 for more detail). Participants completed outcome assessments at baseline and at 1, 3, and 6 months after the last writing.

2.3 Measures

2.3.1 Posttraumatic growth

The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) was used to assess positive changes and reported benefits in the aftermath of cancer. The PTGI contains 21 items to which participants respond using a six-point Likert scale with response options ranging from not at all (0) to a very great degree (5). For the present study, the PTGI total score was used. The PTGI is one of the most widely used measures of perceived positive outcomes in the aftermath of trauma and has robust evidence of reliability and validity, including in Chinese samples (e.g., Ho, Chan, & Ho, 2004). In the present study, Cronbach’s alpha for the PTGI at all assessments ranged from .96 to .97.

2.3.2 Posttraumatic stress symptoms

The PTSD Symptom Scale – Self Report (PSS-SR; Foa, Riggs, Dancu, & Rothbaum, 1993) was used to assess posttraumatic stress symptoms in the aftermath of participants’ cancer experiences. The PSS-SR contains 17 items that reflecting the DSM-IV-TR symptoms of posttraumatic stress disorder. Participants respond on a four-point Likert scale with response options ranging from not at all (0) to almost always (3). For the present study, a total score was calculated. The PSS-SR is one of the most widely used measures of posttraumatic stress symptomatology and has robust evidence of reliability and validity, including in Chinese samples (e.g., Lu et al., 2012). In the present study, the Cronbach’s alphas of the PSS-SR at all assessments ranged from .92 to .94.
2.4 | Analysis

Data analyses were conducted using Mplus 7.2 (Muthén & Muthén, 1998–2015). Multiple imputation and robust maximum likelihood estimation procedures were used to handle missing data so that the full intent-to-treat sample could be included in all analyses. We began by calculating effect sizes with 95% confidence intervals to determine the magnitude of differences in PTG and PTSS within and between the three conditions at each time point. The standardized mean gain effect size (ESsg) was used to quantify changes across time in PTG and PTSS when collapsing across the three writing conditions. Cohen’s d effect sizes were then calculated for comparisons between conditions at each time point. Before examining the impact of condition on the longitudinal course of outcomes, we conducted a series of longitudinal measurement invariance models to demonstrate that any observed changes in PTG and PTSS truly reflected changes in the constructs across time, and were not simply an artifact of changes in the measurement of these constructs across time. The results of the longitudinal measurement invariance models supported strong invariance for both PTSS and PTG.

Latent growth curve (LGC) modeling was then used to examine the relative impact of the three writing conditions on the trajectories of change in PTG and PTSS from the baseline assessment to the final follow-up assessment. Two unconditional LGC were specified first to quantify intraindividual change in PTG and PTSS across treatment conditions. Two sets of conditional LGC were then specified with linear trajectories for each outcome with dummy codes representing treatment condition. We first examined models in which dummy codes were specified to represent the self-regulation and emotional disclosure conditions, with cancer facts as the reference condition. Additional models were then specified with self-regulation as the reference condition so that comparisons between all three conditions could be made. Identical models were specified for PTG and PTSS. Model fit in the LGC analyses was evaluated using commonly used model fit statistics and criteria: root mean-square error of approximation (RMSEA; Steiger & Lind, 1980) and the standardized root-mean-square residual (Joreskog & Sorbom, 1996) less than .08, and the Tucker–Lewis index (TLI; Tucker & Lewis, 1973) and the comparative fit index (CFI; Bentler, 1990) greater than .95. The effects of treatment condition in all LGC models was examined using both the unstandardized effects (with 95% CI), and the partially standardized effects (with 95% CI), which can be interpreted in a manner similar to the Cohen’s d effect size metric. Conclusions were primarily based on the effect size and confidence interval reports, but statistical significance of findings is also discussed.

3 | RESULTS

3.1 | Posttraumatic stress and growth

We began by examining the means of posttraumatic stress symptoms and PTG in the imputed data set when collapsing across writing conditions and the associations among posttraumatic stress symptoms and PTG (Table 1). The means for PTG were on the high end of the range of the means of what previous studies have found when examining PTG in breast cancer samples (Stanton, Bower, & Low, 2006). Based on recommended cutoffs, the average level of posttraumatic stress symptoms at the baseline assessment was consistent with a moderate level of PTSD symptomatology, with 61.5% of participants above the threshold for probable PTSD based on self-reported DSM-IV-TR criteria and 74.0% of participants above the threshold for probable PTSD based on a cutoff score of 15 (Foa et al., 1993). These findings suggest that PTSD may be a significant and potentially undertreated issue in Chinese cancer survivors.

In the whole sample, posttraumatic stress symptoms increased and PTG decreased from baseline to the final assessment when collapsing across conditions. The effect size magnitude of the increase in posttraumatic stress symptoms was small (ESsg = .16; 95% CI .01: .31), but statistically significant based on the confidence interval of the effect size. The pattern of means of PTG across time were also surprising, with PTG decreasing from baseline to the final assessment when collapsing across conditions. The effect size magnitude of the decrease in PTG was also small (ESsg = −.16; 95% CI −.03: −.28), but statistically significant based on the confidence interval of the effect size. The associations between posttraumatic stress symptoms and PTG across time were generally negative and small in magnitude.
### TABLE 1

<table>
<thead>
<tr>
<th></th>
<th>T1 PTG</th>
<th>T2 PTG</th>
<th>T3 PTG</th>
<th>T4 PTG</th>
<th>T1 PTG</th>
<th>T2 PTG</th>
<th>T3 PTG</th>
<th>T4 PTG</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 PTG</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>T2 PTG</td>
<td>.78</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>T3 PTG</td>
<td>.79</td>
<td>.78</td>
<td>1.00</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>T4 PTG</td>
<td>.81</td>
<td>.79</td>
<td>.86</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>T1 PTSS</td>
<td>−.08</td>
<td>−.06</td>
<td>.02</td>
<td>.02</td>
<td>.74</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2 PTSS</td>
<td>−.12</td>
<td>−.16</td>
<td>−.12</td>
<td>−.16</td>
<td>.71</td>
<td>.78</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>T3 PTSS</td>
<td>−.06</td>
<td>−.11</td>
<td>−.11</td>
<td>−.12</td>
<td>.71</td>
<td>.78</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>T4 PTSS</td>
<td>−.17</td>
<td>−.19</td>
<td>−.12</td>
<td>−.20</td>
<td>.72</td>
<td>.81</td>
<td>.85</td>
<td>1.00</td>
</tr>
<tr>
<td>M</td>
<td>65.09</td>
<td>62.73</td>
<td>62.07</td>
<td>61.02</td>
<td>14.83</td>
<td>15.13</td>
<td>15.16</td>
<td>16.58</td>
</tr>
<tr>
<td>SD</td>
<td>24.13</td>
<td>23.08</td>
<td>24.94</td>
<td>26.78</td>
<td>10.67</td>
<td>10.02</td>
<td>11.03</td>
<td>11.28</td>
</tr>
</tbody>
</table>

Note: PTG, posttraumatic growth as measured by the Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996); PTSS, posttraumatic stress symptoms as measured by the PTSD Symptom Scale – Self Report (Foa et al., 1993). The range of possible scores on the PTGI was 0–105, and 0–51 on the PSS-SR.

### FIGURE 1

Posttraumatic stress means across time by condition and overall based on imputed data

![Figure 1](image)

#### 3.2 Between-condition effect sizes

Next, we examined the means of posttraumatic stress symptoms (Figure 1) and PTG (Figure 2) across time within each of the three conditions and the between-condition effect sizes for both outcomes at each time point (Table 2). The magnitude of the differences between conditions was generally small for both posttraumatic stress symptoms and PTG, but there were slight variations in how the outcomes changed across time between conditions. In the cancer facts condition, posttraumatic stress symptoms and PTG both decreased slightly at time 2 and 3 before returning to approximately baseline levels at time 4. In contrast, posttraumatic stress symptoms gradually increased and PTG gradually decreased in both the self-regulation and emotional disclosure conditions. At the final assessment there were small and statistically nonsignificant effect size differences such that the cancer facts condition had lower levels of posttraumatic stress symptoms than the self-regulation condition ($d = −.33; 95% CI −.81: .16$) and emotional disclosure conditions ($d = −.31; 95% CI −.79: .17$), and the cancer facts ($d = .25; 95% CI −.23: .73$) and emotional disclosure ($d = −.23; 95% CI −.27: .72$) conditions had higher levels of PTG than the self-regulation condition.

#### 3.3 Trajectories of posttraumatic stress and growth

Unconditional growth curve models were then specified to examine trajectories of change in posttraumatic stress symptoms and PTG across the three conditions. The model fit was excellent for the unconditional LGC models for
both posttraumatic stress symptoms ($\chi^2 (df = 5) = 4.59, p > .05$, RMSEA = .02, TLI = 1.00, CFI = 1.00) and PTG ($\chi^2 (df = 5) = 8.71, p > .05$, RMSEA = .08, TLI = .98, CFI = .98). Consistent with the imputed means reported in Table 1, the mean of the slope parameter for PTG suggested a decline across time ($−1.28, SE = .641, p < .05$), whereas the mean of the slope parameter for posttraumatic stress symptoms suggested an increase across time ($+.62, SE = .32, p = .05$), although the slope for posttraumatic stress symptoms was not statistically significant.

### 3.4 Treatment effects on trajectories of change

The final analyses were a series of conditional LGC in which the effects of condition on trajectories of change in both outcomes were examined. The model fit was excellent for the conditional LGC models for both posttraumatic stress symptoms ($\chi^2 (df = 12) = 17.769, p > .05$, RMSEA = .06, TLI = .98, CFI = .98) and PTG ($\chi^2 (df = 12) = 18.26, p > .05$, RMSEA = .07, TLI = .97, CFI = .98). The unstandardized and standardized condition effects from these models are reported in Table 3. Although none of the condition effects were statistically significant based on the confidence intervals of the parameter estimates, the magnitude of the effect sizes for these comparisons suggested small to moderate differences between conditions in the outcome trajectories. Both the self-regulation ($d = .38$) and emotional disclosure conditions ($d = .72$) resulted in an increase in posttraumatic stress symptoms relative to the cancer facts condition, and the emotional disclosure condition ($d = .35$) resulted in an increase in posttraumatic stress symptoms relative to the self-regulation condition. Both the self-regulation ($d = −.67$) and emotional disclosure ($d = −.21$) conditions resulted in a decrease in PTG relative to the cancer facts condition, and the emotional disclosure ($d = .46$) resulted in a more positive trajectory in PTG relative to the self-regulation condition. Given the observed effects of the cancer facts condition on both outcomes, these results suggest that none of the three writing conditions resulted in a clinically significant improvement in either PTG or posttraumatic stress.

### 4 DISCUSSION

The present study examined the effects of expressive writing on posttraumatic stress symptoms and growth among Chinese American breast cancer survivors. The ability to restrain the expression of emotions to maintain social harmony is a cardinal value rooted in interdependence among Chinese individuals (Markus & Kitayama, 1991). Similarly, holding in one’s emotional distress to prevent burdening others is also viewed as a sign of social competence and maturity among this cultural group (Kagawa-Singer & Wellisch, 2003). Along this vein, we predicted that the intrapersonal disclosure afforded by expressive writing interventions would be an especially effective psychotherapeutic intervention for this population. Specifically, we hypothesized that Chinese American breast cancer survivors in the expressive writing conditions (i.e., emotional disclosure and self-regulation) would experience reductions in posttraumatic stress symptoms.
### TABLE 2  Imputed M/SD and between condition Cohen's $d$ effect size (95% CI) for PTSS/PTG

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Time</th>
<th>Cancer facts ($n = 33$)</th>
<th>Self-regulation ($n = 34$)</th>
<th>Emotional disclosure ($n = 29$)</th>
<th>Cancer facts versus self-regulation $d$ (95% CI)</th>
<th>Cancer facts versus emotional disclosure $d$ (95% CI)</th>
<th>Self-regulation versus emotional disclosure $d$ (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTG</td>
<td>T1</td>
<td>64.97/26.14</td>
<td>64.01/22.76</td>
<td>66.49/24.07</td>
<td>.04 (−.44 : .52)</td>
<td>−.06 (−.54 : .42)</td>
<td>−.10 (−.60 : .39)</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>61.00/27.42</td>
<td>62.64/20.35</td>
<td>64.82/21.03</td>
<td>−.07 (−.55 : .41)</td>
<td>−.15 (−.63 : .33)</td>
<td>−.10 (−.60 : .39)</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>61.51/27.79</td>
<td>58.79/24.79</td>
<td>66.55/21.47</td>
<td>.10 (−.38 : .58)</td>
<td>−.20 (−.68 : .28)</td>
<td>−.33 (−.83 : .17)</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>63.74/30.35</td>
<td>56.97/23.03</td>
<td>62.69/26.78</td>
<td>.25 (−.23 : .73)</td>
<td>.04 (−.44 : .51)</td>
<td>−.23 (−.72 : .27)</td>
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<tr>
<td>PTSS</td>
<td>T1</td>
<td>14.52/10.16</td>
<td>15.59/11.55</td>
<td>14.29/10.47</td>
<td>−.10 (−.58 : .38)</td>
<td>.02 (−.46 : .50)</td>
<td>.12 (−.38 : .61)</td>
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<tr>
<td></td>
<td>T2</td>
<td>13.48/8.86</td>
<td>17.68/10.86</td>
<td>14.02/9.92</td>
<td>−.42 (−.90 : .07)</td>
<td>−.06 (−.54 : .42)</td>
<td>.35 (−.15 : .85)</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>13.68/11.75</td>
<td>15.21/10.98</td>
<td>16.79/10.30</td>
<td>−.13 (−.61 : .35)</td>
<td>−.28 (−.76 : .21)</td>
<td>−.15 (−.64 : .35)</td>
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<tr>
<td></td>
<td>T4</td>
<td>14.24/10.13</td>
<td>17.99/12.41</td>
<td>17.58/11.02</td>
<td>−.33 (−.81 : .16)</td>
<td>−.31 (−.79 : .17)</td>
<td>.03 (−.46 : .53)</td>
</tr>
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</table>

**Note:** PTG, posttraumatic growth; PTSS, posttraumatic stress symptoms. Positive effect sizes indicate that the condition listed first was associated with higher levels of PTG/PTSS; negative effect sizes indicate that the condition listed first was associated with lower levels of PTG/PTS.
TABLE 3 Unstandardized and standardized treatment effects from conditional latent growth curve models

<table>
<thead>
<tr>
<th>Condition comparison</th>
<th>Outcome</th>
<th>Unstandardized</th>
<th>Standardized</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>b</td>
<td>95% CI</td>
<td>d</td>
</tr>
<tr>
<td>Cancer facts versus self-regulation PTG</td>
<td>PTG</td>
<td>-2.17</td>
<td>(-4.81 : .48)</td>
<td>-.67</td>
</tr>
<tr>
<td></td>
<td>PTSS</td>
<td>.67</td>
<td>(-6.6 : 1.99)</td>
<td>.38</td>
</tr>
<tr>
<td>Cancer facts versus emotional disclosure</td>
<td>PTG</td>
<td>- .66</td>
<td>(-4.04 : 2.71)</td>
<td>-.21</td>
</tr>
<tr>
<td></td>
<td>PTSS</td>
<td>1.26</td>
<td>(-1.17 : 2.69)</td>
<td>.72</td>
</tr>
<tr>
<td>Self-regulation versus emotional disclosure</td>
<td>PTG</td>
<td>1.52</td>
<td>(-1.66 : 4.70)</td>
<td>.46</td>
</tr>
<tr>
<td></td>
<td>PTSS</td>
<td>.59</td>
<td>(-.98 : 2.17)</td>
<td>.35</td>
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Note: The condition listed first was reference condition; PTG, posttraumatic growth; PTSS, posttraumatic stress symptoms

symptoms and increases in PTG over time compared with those in the cancer facts condition. However, this hypothesis was not supported.

Unexpectedly, the overall pattern of findings suggested that Chinese American breast cancer survivors did not experience a clinically significant improvement in either PTG or PTSS, and that the cancer facts condition resulted in superior outcomes for both PTG and PTSS relative to the emotional disclosure and self-regulation conditions. For the cancer facts condition, the difference in the trajectories of over time in PTG relative to the self-regulation condition ($d = .67$) and in PTSS relative to the emotional disclosure condition ($d = .72$) were moderate to large in magnitude. Chinese American breast cancer survivors in the cancer facts condition also reported lower levels of posttraumatic stress symptoms than the self-regulation and emotional disclosure conditions at the final assessment. Given the overall trend of a small but significant increase in posttraumatic stress symptoms and decrease in PTG over time, our results suggest that the cancer facts condition may have served as a buffer against poorer outcomes over time. These findings suggest the importance of developing culturally based interventions, considering population characteristics, and including ethnic minorities in empirically testing interventions well-validated among Caucasians.

In the cancer facts condition, Chinese American breast cancer survivors reflected over the details of their cancer experiences in a dispassionate and objective way, whereas individuals in the emotional disclosure and self-regulation condition reflected on negative emotional states. While we had initially thought that expressive writing conditions (i.e., self-disclosure & emotional disclosure) could provide a private outlet for Chinese breast cancer survivors to express their innermost feelings to make sense of their cancer experiences, the more explicit focus on emotions may have been culturally incongruent with their preferred coping styles. For example, it was found that women in the cancer fact condition in this trial used significantly more insight and causation words than those in the emotional disclosure condition (Lu et al., 2017). Alternatively, it may also be possible that the focus on negative emotions led to maladaptive ruminative processes that may have caused the worsened outcomes.

Dovetailing with this explanation, Mauss and Butler (2010) found that the value of emotional restraint has downstream consequences on physiology. They found that that Asians who held strong emotional control values exhibited a “challenge” (i.e., adaptive) pattern of cardiovascular responding that is indicative of less physiological effort during a laboratory-based anger-provocation task, whereas European Americans with strong emotional control values exhibited a “threat” (i.e., maladaptive) pattern of cardiovascular responding (Mauss & Butler, 2010). This suggests that diverting attention away from emotions (as opposed to recalling emotional states and expressing them) may be more culturally normative. That is, Chinese American breast cancer survivors in the emotional disclosure and self-regulation conditions may have experienced additional distress stemming from a focus on their negative emotions that was above and beyond the initial distress from their cancer experiences. In sum, the transformation of traumatic cancer experiences and pain into PTG might be attributed to different factors among Chinese breast cancer survivors.

The cancer facts condition may have unique therapeutic mechanisms for the Chinese American breast cancer survivor population. Using the Linguistic Inquiry and Word Count software (LIWC2007; Pennebaker, Chung, Ireland,
Gallagher et al., 2007), it was found that women in the cancer fact condition in this trial used significantly more insight and causation words than those in the emotional disclosure condition (Lu et al., 2017). By recalling details about their cancer experience in a calm and detached way, Chinese American breast cancer survivors may have experienced greater psychological distance (Ayduk & Kross, 2010) and enabled themselves to adopt broader perspectives to see the “big picture” of their cancer experiences. In addition, the cognitive processing facilitated by the cancer fact condition may have been culturally congruent with the holistic cognitive style more prevalent among East Asians. Holistic thoughts (Masuda & Nisbett, 2001; Nisbett, Peng, Choi, & Norenzayan, 2001) involve the preference for explaining and making sense of events by attending to relationships and situations (as opposed to personal dispositions). Thus, the focus on facts about their cancer experiences may have helped direct their attention toward the context surrounding their cancer, and away from their personal feelings. Whereas the cancer fact condition is typically conceptualized as a neutral control condition, this condition may be uniquely well-suited to facilitating cognitive processes among Chinese American breast cancer survivors.

Chinese American breast cancer survivors may benefit more from expressive writing instructions targeting cognitive processes such as insight-finding, but not emotional expression and disclosure. Supporting this explanation, Lu and Stanton (2010) found that Asian Americans benefited more from expressive writing compared with European Americans in the cognitive reappraisal condition, but Asian Americans instructed to write about their deepest feelings did not experience benefits (Knowles, Wearing, & Campos, 2011). Future expressive writing trials could potentially attempt to include a “pure” cognitive writing condition (as opposed to the blended cognitive and emotion focus of the self-regulation condition in the present study) to explore whether Chinese American breast cancer survivors benefit from a greater emphasis on cognitive processes.

Building on these cultural explanations, nativity status may also explain the unexpected findings. All of the women in the sample were foreign-born immigrants. Notably, Asian immigrants are more likely to reside in ethnic enclaves where they are protected from pressure to acculturate to mainstream American culture, and are more likely to experience a greater sense of community support from other Asian immigrants than are second-generation Asian Americans (Stafford, Becares, & Nazroo, 2010). Asian immigrants have also been described as hardy, where they have lower stress reactivity to stress-related illnesses, and view stressors as changeable and opportunities for growth (Funk, 1992; Kuo & Tsai, 1986). The cultural factors associated with their foreign-born status may have affected the effectiveness of traditional expressive writing interventions. We did not examine acculturation status as moderator of the efficacy of writing interventions, however, so this remains a topic for future research to examine empirically to determine how that may impact outcomes.

The notion that not all psychotherapeutic interventions are equally efficacious across cultural groups has been articulated for decades (Sue & Zane, 2006). However, a review of cultural competency in psychotherapeutic interventions noted that little is known about whether individuals from a given ethnic community would respond poorly to certain evidence-based approaches, and thus little consensus exists as to when to use cultural interventions (Sue, Zane, Hall, & Berger, 2009). Addressing this gap in the literature, our findings provide some evidence for the importance of culturally tailoring expressive writing interventions for Chinese American breast cancer survivors. In spite of the numerous expressive writing interventions reviewed in meta-analyses (e.g., Frattaroli, 2006), very few expressive writing intervention trials have been conducted with Asian Americans in general, and even fewer with Chinese American breast cancer survivors. Future replication and research is needed for this growing population in the United States (Gomez et al., 2010).

Although the present findings provide support for the importance of culturally tailoring psychotherapeutic interventions, methodological limitations should be highlighted. First, the sample size was relatively small and was a secondary analysis of previously published trial and the trial was therefore not designed or statistically powered to detect small effect sizes differences between conditions in PTG or PTSS. The power analysis originally conducted for this trial indicated that a sample size of 25 participants per group would be sufficient to provide 80% power to detect a medium effect size on the primary outcome of quality of life.

The sample size used in the present study also prevented us from examining whether the severity of the cancer diagnosis or the time since diagnosis/treatment may have moderated the impact of the interventions on either PTG or PTSS.
Indeed, the wide confidence intervals for the comparison of randomized conditions on outcomes suggest that important moderators of effects might exist (Tables 2 and 3). Understanding the extent to which cancer diagnosis, treatment history/status, and other factors moderate the longitudinal course of PTS, PTG, and other related outcomes will be an important area for future research.

Second, the previous examination of outcomes from this sample suggested that the cancer fact condition may have prompted some degree of cognitive processing and may therefore not be a true control condition (Lu et al., 2017). The inclusion of a no writing control condition or a more neutral control condition will help to clarify the treatment effects of the cancer facts writing condition. It is unclear what mechanisms caused the changes in PTG/PTSS in the whole sample and whether it would naturally occur and persist over time. Previous studies have found that the psychological functioning of breast cancer survivors deteriorated over a period of 4 years after diagnosis (Helgeson, Snyder, & Seltman, 2004). Given the high rate of probable PTSD in this sample and the chronic nature of PTSD, future longitudinal studies are needed to better characterize the trajectory of PTSD in this population. Third, the sample comprises mostly foreign-born Chinese American immigrants, and thus the generalizability of findings to US-born Chinese Americans requires further research. Relatedly, given the significant differences across different Asian American subgroups (e.g., Japanese Americans and Vietnamese Americans), generalizability to other Asian American subgroups also warrants attention. In general, future research designed to test the extent to which expressive writing interventions are effective for other diverse populations, including ethnic minorities, men and women, and various cancer types are needed, and conducting larger clinical trials in which outcomes can be directly compared across two or more cultures will be important.

Despite these limitations, the present study is one of the first to assess the efficacy of expressive writing interventions on PTG and PTSS among Chinese American breast cancer survivors. Contrary to expectations, the cancer facts condition was associated with better outcomes relative to the emotional disclosure and self-regulation condition. Moreover, the sample as a whole had small but significant increases in posttraumatic stress symptoms and decreases in PTG across the six months of follow-up assessments. Findings suggest that theories regarding benefits of traditional expressive writing paradigms may be culturally incongruent, and they shed new light on how we might best design culturally effective psychotherapeutic interventions for Chinese American breast cancer survivors.

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