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Perceived stress as a mediator between social support and posttraumatic growth among Chinese American breast cancer survivors

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Abstract

Background—Studies have shown that social support is positively associated with posttraumatic growth (PTG) among Caucasian cancer survivors. Whether the same relationship holds among Asian American cancer survivors and through what mechanism social support may influence PTG is unclear.

Objective—This study examined the association between social support and PTG among Chinese American breast cancer survivors, and proposed perceived stress as a mediator.

Methods—Chinese American breast cancer survivors ($n=118$) were recruited from Southern California. Participants' social support, perceived stress and PTG were measured in a questionnaire package.

Results—Social support was associated with lower perceived stress ($r = -0.34, p < .001$) and higher PTG ($r = 0.44, p < .001$). Perceived stress was negatively associated with PTG ($r = -0.36, p < .001$). Results from Structural Equation Modeling supported the mediation model, with satisfactory model fit indices ($\chi^2(37) = 65.55$, CFI = 0.98, IFI = 0.98, ILI = 0.97, RMSEA = 0.08). Both the indirect effect from social support to PTG via perceived stress ($\beta = 0.07, p < .05$) and the direct effect from social support and PTG ($\beta = 0.40, p < .001$) were statistically significant, suggesting a partial mediation effect of perceived stress between social support and PTG.

Conclusions—The positive association between social support and Chinese American breast cancer survivors' PTG was supported. Our findings also suggested that social support may facilitate PTG through reduction of perceived stress.

Implications for practice—Interventions that help to enhance Chinese American breast cancer survivors' social support may also facilitate their PTG.

Keywords

breast cancer; posttraumatic growth; social support; perceived stress; Chinese American

A cancer diagnosis has been shown to be a traumatic event which brings tremendous stress. Unique to acute traumatic events that have clear points of onset and termination, stressors from cancer are complex, ongoing, and difficult to single out (e.g., ongoing threats, fear of recurrence, worries about future).¹ Therefore, examining how people adapt to cancer-related stressors is important. In addition to psychological distress, studies have suggested that people may report positive changes after cancer diagnosis and treatments. Tedeschi and Calhoun defined the experience of positive changes occurring as a result of struggles with highly stressful events as posttraumatic growth (PTG).² Such positive changes can be broadly categorized into three aspects: including changes in self-perception, interpersonal relationships, and life philosophy. There are also discussions about the differentiation between PTG as an outcome and PTG as a positive illusionary coping strategy (which may not reflect positive changes in all aspects),^{1, 3} however, a few meta-analyses have found that PTG and other coping variables (for example, coping resources and strategies) are correlated but distinct concepts.^{4, 5} Previously, PTG has been reported among cancer survivors in the United States, European countries, and Asian countries.⁶⁻⁸ The potential benefits of PTG in cancer patients' mental health has also been found in a meta-analysis.⁹ According to Jim and Jacobsen's model,¹⁰ the degree to which people with cancer report PTG depends on a number of factors, including individual (e.g., demographic characteristics), socio-environmental coping resources (e.g., social support), and event-related (e.g., medical characteristics) factors.

Social support as a facilitating factor of PTG

Social support from important others is one of the interpersonal resources helpful in coping with stressors. Theoretical models have suggested that social support can function as an antecedent of personal growth by facilitating successful adaptation to life crises (e.g., more favorable appraisal, more effective coping strategies).¹⁰ Tedeschi and Calhoun have also postulated that supportive others can foster PTG by providing different perspectives for interpreting negative events, which could then be integrated into changes in people's schema (i.e., cognitive perceptions about the world).²

Empirical studies showed that social support was positively associated with PTG among different groups of cancer survivors, including cancer patients in Italy,⁷ young adult cancer survivors in Canada,¹¹ and breast cancer survivors in Turkey.¹² Among married breast cancer survivors in the United States,⁶ marital support was also shown to be associated with higher PTG. A meta-analysis of 103 studies and found that social support was associated with higher PTG among trauma-exposed individuals, with a small-to-medium effect size ($r = 0.26$).⁴ However, this meta-analysis did not attempt to address if the association between social support and PTG may vary among people from different ethnic groups. Whether the beneficial roles of social support apply to different ethnic groups may still need to be further examined. Some researchers have proposed that the concept of PTG appears valid cross-

culturally,¹³ but the strength of the associations between PTG and its predictors may differ among people due to their broader societal and cultural contexts.¹⁴ The role of social support in PTG among Chinese American breast cancer survivors, the largest Asian American group in the United States, was therefore examined in this study.

PTG and social support in the context of Chinese cancer survivors

Although the concept of PTG is originated from the Western literature, PTG is also relevant to the Chinese culture. The term ‘crisis 危機’ consists of two Chinese characters: ‘threat’ (危 *wei*) and ‘opportunity’ (機 *ji*). Some scholars suggest that people in South and East Asia (including Chinese) generally believe that human sufferings are inevitable. Traumatic events are also commonly interpreted as the opportunities to ‘grow through pain’, open up new horizons, take a new perspective in life, and strengthen perseverance among Chinese.¹⁵ Empirical studies have supported that the phenomenon of PTG is apparent among Chinese cancer survivors and its associations with psychological processes. For example, a qualitative study in Hong Kong indicated that Chinese breast cancer survivors reported some positive changes after cancer, including better social relationships, refocusing on priorities in the present and short-term, and a new appreciation of everyday life.¹⁶ Other studies have found that resources from individual characteristics (e.g., optimism) and cognitive processes (e.g., explanatory style, attention bias, and cancer-related rumination) were associated with PTG among Chinese cancer survivors.^{8, 15, 17} However, the role of resources from the social networks (e.g., social support) in Chinese cancer survivors’ PTG has yet to be clarified.

Asians and Asian Americans seem to have different social support dynamics than other ethnic groups. It has been found that Asian and Asian American college students had a lower willingness to seek social support when dealing with stressful events.¹⁸ In social interactions, Asians are encouraged to anticipate other people’s needs so that those who are in need do not have to directly verbalize their concerns and appear demanding¹⁹. Asians’ and Asian Americans’ concerns about the negative social consequences (e.g., burdening others, losing face) may also reduce their tendency to seek social support from others. These cultural preferences also apply to Chinese American breast cancer survivors²⁰. However, a lower tendency to seek social support does not mean that there are no needs for social support and no benefits from receiving social support in this population. Chinese American breast cancer survivors perceive a lack of social support, rarely discuss psychological distress with family, friends, or through health professionals, and are distant away from social networks in home countries.²¹ Previously, received social support has also been found to be associated with better quality of life among Chinese American breast cancer survivors²². These findings indicate that even Chinese American breast cancer survivors tend not to actively seek support, they may still benefit from receiving social support. Given the scarcity of studies, this study aimed to examine the role of received social support in Chinese American breast cancer survivors’ PTG.

Potential mechanism linking between social support and PTG

Given the potential beneficial role of social support suggested by theoretical models, one of the unanswered questions is the mechanism that social support may affect PTG. We

proposed that perceived stress may be a potential mediator between social support and PTG. Some researchers postulate that social support may intervene between a threatening event and a stress response by attenuating the stress appraisal.^{23, 24} It indicates that social support may help to redefine the perception about the potential harm of a situation and to prevent a situation from being appraised as highly stressful. These processes could facilitate better health outcomes. Previous studies also support the link between social support and perceived stress. For example, social support was negatively associated with perceived stress among young adult cancer survivors in Canada.¹¹ Wright also showed that social support network size and satisfaction were associated with lower perceived stress among online support group users.²⁵

The Stress and Coping model postulates that people's coping resources are associated with how people appraise the stressfulness of the situations. Such appraisals can in turn affect health outcomes including PTG.²⁶ This study attempted to explore the role of perceived stress (i.e., an appraised stress) in explaining the association between social support and PTG. The link between perceived stress and PTG was also examined in the literature. For example, Arpawong and colleagues found that perceived stress was associated with lower PTG among high school adolescents.²⁷ The same inverse relationship between perceived stress and PTG was also found among young adult cancer survivors in Canada¹¹ and breast cancer survivors in the United States.²⁸ Diaz, Aldridge-Gerry, and Spiegel found that a more negative diurnal cortisol slope (a greater decline in cortisol from morning to evening) was associated with higher PTG among women with metastatic breast cancer.²⁹ Based on these studies, we expected that perceived stress could be a mediator explaining the relationship between social support and PTG. We would like to test this mediation model among Chinese American breast cancer survivors.

Purpose of the study and hypotheses

This study aimed to examine the association between social support and PTG among Chinese American breast cancer survivors, and the mediating role of perceived stress between social support and PTG. Based on theoretical models and existing Western studies^{4, 5, 14}, we hypothesized that social support would be associated with higher PTG among Chinese American breast cancer survivors. We also hypothesized that perceived stress would mediate between social support and PTG, such that social support would be associated with lower perceived stress, which in turn would be associated with higher PTG.

Methods

Eligibility criteria

Inclusion criteria of this study included: (1) being a Chinese-speaking breast cancer survivor living in the United States; (2) being within 5 years after breast cancer diagnosis; and (3) having a first breast cancer diagnosis of stages 0-III. We chose the 5-year timeframe because it is one of the most important time points in cancer survivorship. The 5-year survival since diagnosis has been used to define long-term cancer survivorship, and situations of cancer survivors are more likely to be stable (i.e., cancer is neither growing nor spreading) after the

5-year period.³⁰ Understanding the PTG experience prior to long-term cancer survivorship may be helpful for earlier interventions to improve cancer survivors' well-being.

Recruitment and participants

The study was announced at cultural events, educational conferences, peer support groups, and community newsletters in Southern California. Breast cancer survivors were told that the objective of the study was to understand their adjustment to cancer. Those who indicated interests in the study were contacted by community research staff to determine their eligibility. Eligible individuals were invited to participate in the study. Among 148 eligible survivors, 118 agreed to participate, yielding an 80% response rate. Reasons for non-participation included being too busy, finding the study uninteresting, and health reasons. The study material was administered in Chinese. This study was granted approval from the relevant Institutional Review Board.

The participants had a mean age of 54.7 years (SD = 8.61) and an average of 18.8 years (SD = 9.39) being in the United States. Regarding cancer- and treatment-related variables, 24.1% were diagnosed less than one year from the time of enrollment in the study, 37.5% were within 1–2 years since their diagnosis, and 38.4% were within 2–5 years since their diagnosis. For the stage at diagnosis, 15.4% of the participants had Stage III disease, 41.9% had Stage II, 29.9% had Stage I, and 12.8% had Stage 0. Lastly, 94.1% had surgery due to breast cancer. Almost all participants have completed surgery or treatments; only 4.2% were currently receiving/undergoing treatments (Table 1).

Measures

The survey was administered in Chinese. The Chinese versions of two scales (the Posttraumatic Growth Inventory and the Perceived Stress Scale) were available^{31, 32}. However, due to scarcity of studies, these scales were yet to be validated among Chinese American breast cancer survivors. To ensure these scales were comprehensible for Chinese Americans, we slightly modified the items for language.

Post-traumatic growth—The Posttraumatic Growth Inventory (PTGI) was used to measure participants' current level of posttraumatic growth since their breast cancer diagnosis.³³ It includes 5 subscales (relating to others, new possibilities, appreciation of life, spiritual change, and personal strength). On a 6-point scale (*0 as I did not experience this change, 5 as I experienced this change to a very great degree*), participants were asked to rate the positive changes as a result of their traumatic events. A sample item is "I have a greater sense of closeness with others". Higher mean scores of the items in the total scale and the subscales indicate higher levels of PTG. The PTGI was reliable and valid among Chinese American breast cancer survivors.³⁴ In this study, the Cronbach's alphas for the whole scale and the five subscales were respectively 0.96, 0.93 (relating to others, 7 items), 0.85 (new possibilities, 5 items), 0.68 (appreciation of life, 3 items), 0.88 (spiritual change, 2 items), and 0.84 (personal strength, 4 items).

Social support—The Medical Outcomes Study Social Support Survey was used to measure participants' level of social support in five dimensions (including informational,

emotional, affectionate, tangible, and positive social interactions).³⁵ The scale was translated from English to Chinese and back-translated by two bilingual psychology researchers. The forward-translated and back-translated versions of the scales were compared and discussed. Modifications were made to produce the finalized versions which reflected the intended meanings of the items in the original English version. On a 5-point Likert scale (1 as *none of the time*, 5 as *all of the time*), participants were asked to rate how often they could receive social support from their family and friends. A sample item is “Someone whose advice you really want”. Higher mean scores of the items in the total scale and the subscales indicate higher levels of social support. This scale was reliable and valid among breast cancer survivors in Hong Kong.³⁶ In this study, the Cronbach’s alphas for the whole scale and the five subscales were respectively 0.97, 0.94 (informational, 6 items), .78 (emotional, 2 items), 0.88 (affectionate, 3 items), 0.88 (tangible, 4 items), and 0.89 (positive social interactions, 3 items).

Perceived stress—The 4-item Perceived Stress Scale (PSS) was used to measure participants’ perception of stress³². On a 4-point Likert scale (0 as *never*, 1 as *almost never*, 2 as *sometimes*, 3 as *fairly often*, 4 as *very often*), participants were asked to rate the degree to which they perceive their situations as stressful during the past month. A sample item is “How often have you felt that you were unable to control the important things in your life?”. A higher mean score indicates a higher level of perceived stress. The scale was reliable and valid among Chinese cardiac patients in Hong Kong.³⁷ The Cronbach’s alpha for this sample was 0.82.

Socio-demographic variables—Socio-demographic information such as age, marital status, education, and income were measured.

Cancer- and treatment-related variables—Information about participants’ breast cancer diagnosis (including cancer stage, time since diagnosis) and treatments undergone were measured.

Analytic plan

Descriptive statistics including means, standard deviations, and distribution statistics were computed for major variables. A Pearson correlation analysis was conducted to examine the associations among variables. These analyses were conducted by SPSS 21.0. Structural equation modeling (SEM) was used to evaluate the fitness of the hypothesized model in explaining the associations among social support, perceived stress, and PTG. Before conducting SEM, we estimated the goodness-of-fit of the measurement models by confirmatory factor analysis (CFA). The SEM and CFA were conducted using AMOS 21.0 (IBM). Missing values were analyzed using Expectation Maximization (EM) algorithm in SPSS. We found only 0% – 3.4% of missing data across all the variables of interest in this paper, and the pattern of missing values were random ($p > .05$ in EM missing value analysis). We therefore imputed the missing values using the mean-replacement method.

With the fact that social support and PTG are multidimensional constructs, we created latent variables of social support and PTG by using their subscales as indicators. Therefore, five

indicators were used to represent both the measurement models of social support (including informational, emotional, affectionate, tangible, and positive social interactions) and PTG (including relating to others, new possibilities, appreciation of life, spiritual change, and personal strength). As perceived stress was unidimensional, we did not create a latent construct for analysis. Due to the fact that each latent variable was composed of indicators from within the same measure, error covariances were allowed. Error covariances were added according to the modification indices that significantly improve the measurement model fit.³⁸

The hypothesized mediation model was evaluated through examination of model fit and standardized path coefficients.³⁸ In the structural model, PTG was used as the dependent variable. In the hypothesized model, mediation was tested through an analysis of direct and indirect effects, or path coefficients, among the latent and observed variables. To ensure the stability of the path coefficient estimates, the analysis for mediation model was also supplemented with 2000 bootstrap replications. Significance of indirect effect was examined by the 95% bias-corrected confidence intervals (CI) after bootstrapping. Confidence intervals were computed through the 2000 estimates of the indirect effect bootstrap samples. The highest and lowest 2.5% of the indirect effect estimates determined the confidence intervals. An indirect effect was considered statistically significant if the 95% CI did not include zero³⁹.

Model goodness-of-fit was evaluated using several indices recommended by researchers. Favorable fit indices include a chi-square value with a non-significant p-value or a chi-square to degrees of freedom (χ^2/df) ratio smaller than 2,⁴⁰ a Root Mean Square Error of Approximation (RMSEA) with values ≤ 0.08 ,⁴¹ a Comparative Fit index (CFI) and a Tucker–Lewis Index (TLI) with values >0.95 .⁴²

Results

Descriptive statistics and correlations among major variables

Descriptive statistics of major variables were computed. The skewness and kurtosis statistics did not indicate problems of non-normality among the major variables (Table 2). As hypothesized, social support was associated with lower perceived stress ($r = -0.34$, $p < .001$) and higher PTG ($r = 0.44$, $p < .001$). Perceived stress was negatively associated with PTG ($r = -0.36$, $p < .001$) (Table 2). We did not find significant associations ($ps > .05$) between PTG and background variables, including age ($r = -0.11$), household income ($r_s = 0.05$), education ($r_s = 0.06$), marital status ($r_s = 0.05$), time since diagnosis ($r_s = -0.10$), cancer stage ($r_s = -0.00$), and treatments undergone ($r_s = -0.14$ for radiation, $r_s = -0.15$ for taking medication, and $r_s = 0.05$ for chemotherapy) (data not tabulated). These variables were not included in the hypothesized mediation model.

Evaluating the latent variable measurement models: Confirmatory factor analysis

Two measurement models for latent variables were constructed and tested with CFA. With the inclusion of two error covariances (Figure), the measurement model for social support had a satisfactory fit ($\chi^2 (3) = 4.183$, $p = .242$, CFI = .998; TLI = .994; RMSEA = .058). With

the inclusion of three error covariances (Figure), the measurement model for PTG had a satisfactory fit ($\chi^2(2) = 0.640, p = .726, CFI = 1.000; TLI = 1.014; RMSEA = .000$). For the latent variables, all indicators had significant factor loadings with values greater than .70, showing that the indicators were sufficiently associated with the latent variable. These results indicated that measurement models were appropriate for further testing the proposed structural equation model.

Evaluating the mediational model: Structural equation modeling

With perceived stress as the mediator, the hypothesized model (Figure) showed a satisfactory fit in predicting PTG ($\chi^2(37) = 65.55, p = .003, \chi^2/df = 1.77; CFI = 0.98, IFI = 0.98, ILI = 0.97, RMSEA = 0.08$). The standardized path coefficients supported the negative association between social support and perceived stress ($\beta = -0.35, p < .001$), and the negative association between perceived stress and PTG ($\beta = -0.20, p < .05$). The direct effect from social support and PTG was also significant ($\beta = 0.40, p < .001$). The mediation model explained 26% of variance in PTG. These results suggested that Chinese American breast cancer survivors with a higher level of social support were more likely to report a lower level of perceived stress and a higher level of PTG. Those having a lower level of perceived stress were also more likely to report a higher level of PTG.

Results from bootstrapping supported the presence of a partial mediation effect, as both the indirect effect from social support to PTG via perceived stress ($\beta = 0.07, p = .034; 95\% CI = 0.01, 0.18$) and the direct effect from social support and PTG ($\beta = 0.40, p = .001; 95\% CI = 0.22, 0.57$) were greater than zero in the 95% biased-corrected confidence intervals. Therefore, a partial mediation effect of perceived stress between social support and PTG was supported. These results suggested that social support was associated with lower perceived stress, which in turn associated with higher PTG.

Discussion

This study was one of the early attempts in examining the role of social support in facilitating PTG and exploring perceived stress as a mediator between social support and PTG among Chinese American breast cancer survivors. Our findings implied that social support might facilitate PTG through reducing people's stress appraisals. Previously, a study found that perceived stress partially mediated the effects of social support on health-related quality of life among men treated for localized prostate cancer.⁴³ It further supports the mechanism that perceived stress may mediate between social support and well-being among cancer survivors.

Social support and PTG

In line with Western studies (e.g., a meta-analysis⁴), this study supported the beneficial role of social support in Chinese American cancer survivors' PTG. It implies that the importance of social support in facilitating PTG is also applicable to Chinese Americans. Even cultural norms may make Chinese Americans reluctant to seek social support when dealing with stressful events, the role of social support is still important to facilitate PTG among Chinese American breast cancer survivors. One question that emerges in PTG research and in our

own work is the possibility that some PTGI items (e.g., the “Relating to Others” subscale) may overlap with concepts such as social support. Based on our data, we did find a slightly higher correlation between the “Relating to Others” subscale of the PTGI and social support, compared to other PTGI subscales. The correlation coefficients between social support subscales and PTGI subscales did not exceed $r=0.50$ (ranging from 0.17 to 0.48), suggesting that the PTGI subscales did not have a substantial overlapping with social support subscales. We also agreed that the slightly higher correlation may be attributed to the fact that the “Relating to Others” subscale assesses the interpersonal environment of the participants; researchers should be aware of this when interpreting the current and existing findings regarding PTG and social support. However, one major difference between PTG and social support is that PTG focuses on the perceived changes in multiple aspects of people’s lives after the traumatic event, instead of just the current level of coping resources. When we did an ad-hoc analysis for the association between social support and the composite of PTG without the “Relating to Others” subscale, we only saw a very minor and non-significant change in the association compared to that when using the full PTGI. It suggested that the influence of the potential item content overlapping in the association was minimal.

As social support and PTG are multidimensional constructs, it is also meaningful for future studies to explore how different sources (e.g., from family, friends, and other cancer survivors) and types (e.g., implicit versus explicit) of social support relate to specific aspects of PTG among cancer survivors in multiple ethnic groups. For example, You and Lu suggest that the association between social support from family members is more predictive of QoL among Chinese cancer survivors, compared to support provided by other sources.²² Other research also suggest that Chinese or Asian people are more likely to benefit from implicit social support (i.e., emotional comfort people can obtain from social networks without disclosing or discussing their problems or stressors) than explicit social support (i.e., people’s specific recruitment and use of social networks to elicit support).¹⁹ Exploring the linkages of these social support variables and PTG can provide a clearer picture about the culturally-salient and culturally-universal associations between social support and PTG.

Perceived stress and PTG

We also found that perceived stress was negatively associated with PTG among Chinese American breast cancer survivors, suggesting that having a higher level of perceived stress was related to having a lower level of PTG. In line with our findings, a recent randomized controlled trial (RCT) found that a mindfulness-based stress reduction program was effective in reducing perceived stress and increasing PTG among breast cancer survivors in China.⁴⁴ Reduction of perceived stress and increase in positive states of mind are important for promoting cancer adaptations among Chinese. Qualitative studies have suggested that Chinese cancer survivors tend believe that maintaining positive states of mind can help to deal with fear of recurrence and promote cancer recovery,⁴⁵ which may include PTG as one of the potential outcomes. Moreover, our findings are also consistent with a meta-analysis indicating that global distress tends to be related to less benefit finding when the sample was composed of 25% or more non-White minority participants.⁴⁶ However, the meta-analysis also showed that the opposite pattern (i.e., global stress was associated with more benefit finding) was more apparent among studies having samples with less than 25% of non-White

minorities. Given that cultural contexts may shape people's reactions to stressful events and attributions to the events (e.g., the appraisal of stressfulness and resources to cope with the stressors),¹³ whether the relationship between perceived stress and PTG is potentially moderated by ethnicity/culture still needs further examinations.

Social support and PTG-facilitating processes

Our findings suggest that social support may facilitate PTG through the reduction of perceived stress. It provides an indirect evidence supporting that social support could function to alleviate people's perceived stress (or stress appraisal) in facilitating PTG.^{23, 24} However, a lack of full mediation in our findings may imply that other mediators are at play for linking social support and PTG. According to the affective-cognitive processing model,⁴⁷ the conscious processing of trauma-related information and emotional states is important in facilitating PTG. Previous studies have suggested that social support was associated with other affective, behavioral, and cognitive processes (e.g., emotional processing, physical activity, meaning-making, etc.).^{11, 48} These processes were also found to be positively associated with PTG.^{28, 48} Future research could examine the relationships between social support and these processes, and how these processes may facilitate PTG among breast cancer survivors.

Limitations

This study was subject to several limitations. First, we analyzed the data based on a cross-sectional survey. The relationships tested were at best correlational, but not causal. We also acknowledged that this study failed to address whether the trajectory for social support, perceived stress, and PTG vary across people at different times since cancer diagnosis. We recommend future studies to examine the trajectory of these variables and how changes in social support and perceived stress are associated with changes in PTG using longitudinal designs. Moreover, it has been suggested that PTG is likely to co-exist with posttraumatic stress symptoms as these stressors and stress responses may trigger a change in pre-existing schema.¹ It would be important for future research to disentangle the interrelationships among posttraumatic stress symptoms, perceived stress, and PTG among breast cancer survivors using longitudinal designs. Second, we recommend that future studies examine our proposed mediation model with the use of relevant biological or physiological indicators of perceived stress (e.g., salivary cortisol) to further validate our findings. Future studies may explore the linkage between physiological indicators of stress and PTG. Third, given the scarcity of studies specifically for Chinese American breast cancer survivors, the scales we used were yet to be validated in this population. One of the PTGI subscales (appreciation of life) reported a Cronbach's alpha of 0.68, slightly lower than the conventional standard of 0.70. However, all the other scales and subscales showed satisfactory psychometric properties in our sample. Future studies can further validate the scales and replicate our findings in a larger and more representative sample of Chinese American breast cancer survivors. Fourth, this mediation model only explained a moderate proportion of variance in PTG, suggesting that there should be other variables contributing to PTG. It has been suggested that other variables (e.g., cognitive and emotional coping strategies, centrality of the traumatic event to identity) are associated with PTG.^{28, 48} It is unclear if social support is associated with any of these variables. More research is warranted. Furthermore, this study

recruited a non-random sample of Chinese American breast cancer survivors in Southern California. Non-random sampling and self-selection bias in participation might limit the generalizability of the findings.

Future directions

Despite these limitations, this study contributed to examine the role of social support in facilitating PTG among Chinese American breast cancer survivors. Researchers should explore the possibility of enhancing PTG among (Chinese) breast cancer survivors through social support interventions. Social support interventions are found to be useful in improving patients' adaptation to cancer in multiple aspects. For example, Andersen and colleagues found a group-based intervention that emphasized social cohesion was effective in reducing emotional distress among cancer patients in the United States⁴⁹. Lu and colleagues also showed that the provision of social support in a peer-mentoring intervention was effective in reducing depressive and anxiety symptoms among Chinese American breast cancer survivors.³⁴ To extend from these studies and link up with our findings, it would be important to examine if such types of interventions could help to reduce perceived stress and enhance PTG among Chinese American breast cancer survivors.

Moreover, a recent meta-analysis evaluated the effects of 12 RCTs of psychosocial interventions for trauma-exposed populations on people's PTG and found that those interventions modestly increased people's PTG.⁵⁰ Some of those include social support and stress reduction techniques as part of the interventions, which further suggests the potential importance of increasing social support and stress reduction in facilitating people's PTG. As exploring the mediators between intervention and outcomes is increasingly important for interventions, this study contributed to the literature by unfolding one of the potential mechanisms linking between social support and PTG, which may indirectly explain the intervention effects of some existing studies.

Conclusion

The beneficial role of social support in Chinese American cancer survivors' PTG was supported. Our findings also suggested that social support may facilitate PTG through the reduction of perceived stress. Future studies should investigate the specific associations between specific types of social support and PTG, validate the proposed mediation model with longitudinal designs, and explore other potential mediators between social support and PTG. We believe that social support interventions (e.g., provision of social support through information and peer sharing) could also be helpful in promoting PTG.

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Figure.

Partial Mediation Model for the Relationships among Social Support, Perceived Stress, and Posttraumatic Growth.

Standardized path coefficients were presented. All structural path coefficients were statistically significant (* $p < .05$, ** $p < .01$, *** $p < .001$).

Table 1

Sample Characteristics (n=118)

	Frequency (%) / Mean (SD)
<i><u>Demographic variables</u></i>	
Age	54.7 (8.61)
Marital status	
Married	85 (72.0%)
Single/Separated/Divorced/ Widowed	33 (28.0%)
Education level	
Below high school	15 (12.7%)
High school	39 (33.1%)
Some college	32 (27.1%)
College or above	32 (27.1%)
Annual household income (in USD)	
<\$15000	38 (32.2%)
\$15000–\$45000	28 (23.7%)
\$45000–\$75000	21 (17.8%)
>\$75000	19 (16.1%)
Refused to answer	12 (10.2%)
Years in the US	18.8 (9.39)
<i><u>Cancer- and treatment-related variables</u></i>	
Time since diagnosis (n = 112)	
Less than 1 year	27 (24.1%)
Between 1–2 years	42 (37.5%)
Between 2–5 years	43 (38.4%)
Stage of diagnosis (n = 117)	
Stage 0	15 (12.8%)
Stage I	35 (29.9%)
Stage II	49 (41.9%)
Stage III	18 (15.4%)
Treatments undergone ^a	
Surgery	111 (94.1%)
Chemotherapy	76 (64.4%)
Radiation	44 (37.3%)
Medication (Tamoxifen, Arimidex, Femara, Zoladex) or hormone Herceptin)	75 (63.6%)

^aNote: Participants might select more than one type of treatments if applicable, so the total percentage did not add up to 100%.

Table 2

Descriptive Statistics and Correlations among Major Variables

	(1)	(2)	Mean(SD)	Skewness	Kurtosis	α
1. Social support	–		3.38 (0.92)	–0.02	–0.75	.97
2. Perceived stress	–0.34 ^a	–	1.58 (0.85)	0.33	0.06	.82
3. Posttraumatic growth	0.44 ^a	–0.36 ^a	3.17 (1.12)	–0.89	0.43	.96

^a $p < .01$.