

**The role of acculturation in the relationship between self-stigma and psychological distress
among Chinese American breast cancer survivors**

Krystal Warmoth¹, Celia C.Y. Wong², Lingjun Chen³, Shelby Ivy⁴ and Qian Lu^{3*}

1 University of Exeter Medical School, University of Exeter, Exeter, UK

2 The College at Brockport, State University of New York, Department of Psychology,
Brockport, New York

3 Department of Health Disparities Research, University of Texas MD Anderson Cancer Center,
Houston, Texas, USA

4 University of Texas at San Antonio, TX, USA

*Corresponding author: Qian Lu, M.D., Ph.D., Department of Health Disparities Research, the
University of Texas MD Anderson Cancer Center. Email: qlu@mdanderson.org

Abstract

Attitudes about breast cancer have improved in the USA, yet stigma is still present in some ethnic and immigrant populations and affecting survivors' experiences. Chinese American breast cancer survivors report negative beliefs and stigma to be a major stressor; this could result in mental health consequences. We hypothesized that greater self-stigma will be related to greater psychological distress (namely, depressive symptoms, and perceived stress). Furthermore, we expected that the association between self-stigma and psychological distress will be stronger among Chinese American breast cancer survivors who are less acculturated to the USA than those who are highly acculturated. One hundred and thirty-six Chinese American breast cancer survivors completed questionnaires that measured self-stigma, acculturation, depressive symptoms, perceived stress, and demographic information. Hierarchical linear regressions were conducted to examine the main effect of stigma on depressive symptoms and perceived stress, and the moderating effect of acculturation. As predicted, self-stigma was associated with greater depressive symptoms and perceived stress among Chinese American breast cancer survivors, especially those who are less acculturated. Self-stigma may play a part in psychological adjustment among Chinese American breast cancer survivors. Interventions that incorporate techniques to reduce self-stigma could be beneficial for Chinese American breast cancer survivors, especially for those who are less acculturated to American society.

Keywords: Asian Americans, breast cancer, perceived stress, depression, culture, adjustment

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Introduction

In recent years, breast cancer has become less stigmatized in American culture, with major events, companies and organizations advocating and merchandising awareness (Else-Quest & Jackson, 2014). The pink ribbon (the symbol of breast cancer awareness and prevention) is on everything from jewellery to hammers. An entire month (October) is dedicated to promoting screening and self-exams along with fund-raising. These actions have given way to the *pink ribbon culture* (Sulik, 2010), presenting breast cancer as a disease of innocence in the USA. With this change of perception, breast cancer gained widespread attention and reduced stigma; however, the depiction of women with breast cancer—as all-American, white, heterosexual, and middle- to upper-class—is not representative of every breast cancer survivor and their experience (Gibson, Lee, & Crabb, 2014).

Despite advances in treatment and more patients surviving and living longer, cancer still invokes fear of death around the world and, in certain cultures, stigmatizing beliefs, e.g. the survivors deserved to get cancer due to immoral behavior (Chittem & Butow, 2015; Karim, 2003). Specifically, breast cancer stigma is still prevalent in Chinese cultures (Wong-Kim, Sun, Merighi, & Chow, 2005), but how this relates to their survivorship experience and adjustment is understudied. Chinese Americans report unmet social and emotional needs and challenges during survivorship, including stigmatization and psychological distress (Ashing-Giwa et al., 2004; Warmoth, Cheung, You, Yeung, & Lu, 2017). Research on Chinese American breast cancer experience and survivorship is sparse. A better understanding is needed so that these needs and disparity can be addressed to improve the survivorship experience and adjustment of this understudied population.

Breast cancer stigma and its consequences

For Chinese American breast cancer survivors (CABCS), coping may draw on traditional cultural beliefs about life and illness and social support resources. Accordingly, survivorship adjustment and experience may differ from those of other breast cancer survivor population due to different understandings of the disease and beliefs and values in Chinese culture. In Chinese society, there is a personal responsibility and guilt attached to breast cancer and widespread cancer stigma (Wong-Kim et al., 2005). Cancer is thought to be caused by some immoral behavior conducted by the individual or an ancestor and is the result of karma or bad luck. In other words, the survivor may have done something to deserve getting breast cancer. Sadly, most of the literature on psychological adjustment and survivorship experiences are from people from Western cultures (and predominantly White), and it is uncertain how these negative beliefs and stigma relate to the experiences of survivors from non-Western cultures.

The major problem with stigma is that it can impact people's access to resources, social relationships, and coping behaviors and also be internalized by individuals and harm their health and wellbeing (Hatzenbuehler, Phelan, & Link, 2013). *Self-stigma* occurs when members of a devalued group (breast cancer survivors) become aware of the stereotype, prejudice, and discrimination targeted against them, and sequentially, endorse and internalize these feelings and beliefs (Corrigan & Watson, 2002). With the internalization of stigma, people with stigmatized identities often experience shame, guilt and diminished self-worth (Pearson et al., 2009). Cancer patients who attributed their disease to internal causes (due to their past immoral behavior or wrong-doings) reported greater self-blame, poorer self-esteem and higher depressed affect, anxiety and anger (Else-Quest, LoConte, Schiller, & Hyde, 2009). Negative cultural beliefs of breast cancer could similarly impact mental health and well-being, if they have been internalized. In fact, CABCS have reported negative body image and reduced self-esteem due to cultural

cancer-related beliefs (Warmoth et al., 2017), and feeling ashamed and stigmatized caused them distress (Ashing-Giwa et al., 2004; Warmoth et al., 2017; Wong-Kim et al., 2005). Most of the evidence is from qualitative research which found that stigma is a commonly reported and experienced stressor among Asian survivors that can influence their adjustment and mental health (Lam & Fielding, 2003; Warmoth et al., 2017; Wong-Kim et al., 2005). A recent quantitative study found that internalized stigma can harm the quality of life among CABCS by means of maladaptive cognitive processes (Wong et al., 2019). Drawing from previous evidence, this study predicted that there will be an association between self-stigma and psychological distress (depressive symptoms and perceived stress) in CABCS.

Along with positive versus negative beliefs towards breast cancer, another important difference between Western and many non-Western cultures relates to whether treating individual as the primary social unit. In collective cultures (i.e., Chinese culture), interrelatedness is emphasized between the individual and the group (especially, the family and ancestors). Therefore, stigma may be more detrimental to individual functioning and wellbeing in Chinese culture than in Western cultures as people who own the stigmatized identity are more concerned about the potential negative impact this identity may bring to their social relationships. For instance, previous evidence has shown that some CABCS believed that their breast cancer meant death (Lu, Yeung, You, & Dai, 2016), and this belief was linked to concerns about fulfilling familial responsibilities, resulting in less confidence, loss of identity, and increased stress (Warmoth et al., 2017). Moreover, if a survivor believed that she had done something to deserve getting breast cancer, it could be difficult for her to disclose and confide in family and friends and get social support (Wong-Kim et al., 2005). As social support from family and relationships are crucial to self-worth and coping with stress (Lim, 2014), self-stigmatization may be acutely

detrimental to the mental health of survivors from collectivist cultures by constraining themselves from seeking necessary social support.

The role of acculturation

To cope with breast cancer, a Chinese American immigrant may emerge both traditional and new cultural views or even adopt the dominant culture of the host society if those views are more positive. Traditional Chinese cultural beliefs may affect cancer survivors' mental health, but the degree of influence may depend on individuals' level of acculturation to the American culture. *Acculturation* is referred to the process of cultural change and adaptation that occurs which foreign-born individuals adopt the values, norms, attitudes, and behaviors of the mainstream culture (Yoon et al., 2013). There is some evidence that suggests acculturation leads to better mental health and resilience among Asian immigrants (Gupta, Leong, Valentine, & Canada, 2013; Yoon et al., 2013). Nonetheless, the relationship between acculturation and health is nuanced (Yoon et al., 2013). There is a need to further understand this relationship—particularly, how cultural health beliefs (breast cancer stigma) may relate to health outcomes in immigrant populations with differing levels of acculturations—to determine whether there are CABCS who are particularly vulnerable or in need of intervention.

Evidence suggests that recent immigrants and non-English monolingual individuals have more negative breast cancer beliefs and are less likely to seek screening, treatment and health care (Ashing-Giwa et al., 2004). Recent Chinese American immigrants may still hold negative beliefs about cancer as they have had less exposure to more positive beliefs in the USA. Furthermore, if they can only speak their native language, their social network may be less diversified, leaving their negative beliefs unchallenged. In a previous study, it was found that high-acculturated women held dual western or traditional Chinese beliefs and identities (Tsai,

Morisky, Kagawa-Singer, & Ashing-Giwa, 2011). Highly acculturated CABCS may adopt more American views of breast cancer and the pink ribbon culture, therefore potentially reducing the impact of stigma and its associated stress.

Besides adopting more positive views of breast cancer, highly acculturated CABCS may utilize more social support resources. Evidence has showed that Asian American breast cancer survivors tend to have smaller social networks and greater difficulty getting social support than Caucasian women (Kagawa-Singer, Wellisch, & Durvasula, 1997; Wellisch et al., 1999). This disparity in social support may be due to cultural differences in emotional expression and self-disclosure. CABCS tend not to disclose their diagnosis or feelings because of the burden that it may cause others, as well as stigma associated with breast cancer (Warmoth et al., 2017; Wong-Kim et al., 2005). However, highly acculturated CABCS was found to receive more overall functional social support that include emotional/informational, tangible and affectionate support, as well as more support from their partners (Tsai et al., 2011). Based on acculturation's effect on challenging negative beliefs regarding breast cancer and increasing social support, the association between self-stigma and psychological distress may be moderated by acculturation, with stigmatized CABCS who are less acculturated to the USA experiencing greater psychological distress than those who are highly acculturated.

The present study

Attitudes about breast cancer have improved in the USA, yet negative views remain in Chinese American communities (Warmoth et al., 2017; Wong-Kim, Sun, & DeMattos, 2003). These negative beliefs may have consequences for the mental health and adjustment of CABCS if they have internalized these negative views. Evidence from qualitative research proposes this relationship (Lam & Fielding, 2003; Wong-Kim et al., 2005); however, it has not been

empirically tested. This study examined the association between self-stigma and psychological distress (depressive symptoms and perceived stress). We hypothesize that greater self-stigma will be related to greater depressive symptoms (Hypothesis 1) and perceived stress (Hypothesis 2). Furthermore, in recognition of the role that acculturation can play in cancer beliefs and coping (Tsai et al., 2011), this study explored how the relationship between self-stigma and psychological distress may vary as a function of acculturation. We expect that the association between self-stigma and psychological distress will be stronger among CABCS who are less acculturated to the USA than those who are highly acculturated (Hypothesis 3).

Method

Participants

For an expressive writing intervention study (Lu et al., 2017), 136 CABCS were recruited, and their baseline data were analyzed. Their ages ranged from 37-77 years old ($M = 54.6$, $SD = 9.37$). Among them, 51.6% received college education or above, 71.9% were married, 86.3% were diagnosed with breast cancer and the mean time since diagnosis was 19.24 months ($SD = 10.93$ months).

Procedure

Potential participants were told that the study aimed to understand their experiences with breast cancer. Study inclusion criteria included being diagnosed with breast cancer within 5 years and self-identified to be comfortable speaking, reading, and writing in Chinese. Local Chinese American community organizations in Southern California advertised the study and announcements were also made at cultural events, educational conferences, peer support groups, and via community newsletters. Participants received questionnaire packages by mail, completed

the questionnaires at home, and returned them by mail. Participants received monetary compensation (20 USD) upon completion. Institutional Review Board approval was obtained before launching the study.

Measures

Participants self-reported their demographic (age, education, annual household income, and marital status) and medical characteristics (stage of breast cancer and time since cancer diagnosis). All the items on the self-stigma, acculturation, perceived stress, and depressive symptom measures are presented in Supplementary Material 1.

Self-Stigma

A 4-item measure was modified from the Chinese version of the Self-Stigma Scale-Short Form (Mak & Cheung, 2010) was used to measure self-stigma as a breast cancer survivor. Its original 9-item validated version is designed as a generalizable self-report instrument for stigma in minority groups. Items were chosen from the Self-Stigma Scale and modified to fit the context of breast cancer based on studies examining the psychosocial challenges of CABCS (Warmoth et al., 2017). The Cronbach's alpha was .93 in the current sample.

Acculturation

The Stephenson Multigroup Acculturation Scale (SMAS; Stephenson, 2000) used to measure individuals' levels of acculturation to the USA. The SMAS has been used among Asian Americans (Eap et al., 2008; Kim, Edwards, Sweeney, & Wetchler, 2012) and correlates with another Asian acculturation scale (Eap et al., 2008; Suinn, Ahuna, & Khoo, 1992). Cronbach's alpha was .80.

Depressive symptoms

The 10-item Center for Epidemiologic Studies Depression Scale (CES-D; Kohout, Berkman, Evans, & Cornoni-Huntley, 1993) was used to measure depressive symptoms. The CES-D is a reliable and valid measure of depressive symptoms in various populations, including Chinese American women (Li & Hicks, 2010). In the current sample, Cronbach's alpha was .92.

Perceived stress

The Perceived Stress Scale quantifies the psychological construct of perceived stress and captures the degree to which one perceives stressful situations relative to their coping abilities (PSS-10; Cole, 1999; Taylor, 2015). Four items were extracted from the self-report questionnaire and used in this study. The Perceived Stress Scale has been used in clinical settings (Cohen, Kamarck, & Mermelstein, 1983; Mitchell, Crane, & Kim, 2008) and exposes precursor stages of psychiatric disorders and individuals at risk for worsening conditions (Taylor, 2015). The instrument has been used in studies involving Chinese American women (Lau, Wong, Wang, Kwong, & Wang, 2014). Cronbach's alpha was .86 in the current study.

Data analytic plan

Correlation analyses were conducted among variables used in the theoretical model (self-stigma, acculturation, depressive symptoms, and perceived stress). Associations of dependent variables (depressive symptoms and perceived stress) with demographic and medical variables were also examined to identify potential covariate(s) to be controlled in the later analysis.

Before regression analyses were conducted, the interaction term between the predictor variable and the moderator variable was computed. To reduce multicollinearity, the predictor and moderator variables were centered (each score was subtracted by the sample mean) before computation of the interaction term. Regression analyses were then conducted to examine the moderating effect of acculturation in the associations of self-stigma with depressive symptoms

and perceived stress, based on the procedures recommended by Aiken, West, and Reno (1991). The independent variables (self-stigma and acculturation) were entered as the first step, and the interaction term was entered as the second step. If the interaction term was tested significant, the Johnson-Neyman (J-N) technique (Johnson & Fay, 1950; Preacher, Curran, & Bauer, 2006) and simple slope analysis would be used to better understand the nature of the interaction.

Results

Bivariate correlations among all of the examined variables in this study were examined. Results showed that self-stigma and acculturation were both significantly associated with depressive symptoms and perceived stress (Table 1). Pearson correlations and chi-squares tests were also conducted to examine the associations between depressive symptoms and perceived stress with demographic and medical variables. Except for family income (depressive symptoms: $r = -.28, p < .01$; perceived stress: $r = -.32, p < .01$), depressive symptoms and perceived stress were not significantly associated with any of the demographic or medical variables ($p > .20$). Only family income was used as a covariate in later analyses.

[Table 1 near here]

To test the hypothesized main effect and moderation effect, hierarchical linear regressions were conducted to examine the moderating effect of acculturation in the associations between self-stigma, depressive symptoms, and perceived stress (see Table 2)¹. Supporting Hypotheses 1 and 2, self-stigma was positively associated with depressive symptoms and perceived stress; supporting Hypothesis 3, a significant interaction effect between self-stigma

¹ Simple slope analyses of the moderating effect of stigma in the associations between acculturation, depressive symptoms, and perceived stress were also performed, and the findings are presented in the Supplementary Materials.

and acculturation was found in predicting depressive symptoms and perceived stress (see Table 2).

[Table 2 near here]

To better understand the nature of interaction, the J-N technique was used to explore the regions of significance (ROS) across all the moderator values. The ROS for the simple slope of the predictor (self-stigma) conditioned on the value of the moderator (acculturation) was estimated. Results showed that stigma was significantly associated with depressive symptoms when acculturation was lower than 1.94 (81.1% of the sample). However, this effect decreased as acculturation increased, and when acculturation was 1.94 or greater than 1.94, stigma was no longer associated with depressive symptoms (see Figure 1a). Similarly, stigma was significantly associated with perceived stress when acculturation was lower than 1.91 (81.1% of the sample). However, this effect decreased as acculturation increased, and when acculturation was 1.91 or greater than 1.91, stigma was no longer associated with perceived stress (see Figure 1b).

[Figure 1a and b near here]

Simple slope tests were conducted with the outcome variables (depressive symptoms and perceived stress) regressed on the predictor variables (self-stigma) at specific values of the moderator variable: high vs. low acculturation: 1.5 *SD* above vs. below the mean (Aiken et al., 1991). The conditional values of self-stigma were set in accordance with the ROS estimation result. The results of simple slope tests showed that self-stigma was positively associated with depressive symptoms ($\beta = .59, t = 4.93, p < .001$) and perceived stress ($\beta = .76, t = 5.20, p < .001$) among those with low levels of acculturation (see Figure 2a and 2b).

Self-stigma was not significantly associated with depressive symptoms ($\beta = .16, t = 1.28, p = .20$) and perceived stress ($\beta = .17, t = 1.09, p = .28$) among CABCS with high levels of

acculturation (see Figure 2a and 2b). According to both simple slope figure and ROS, the most risk subgroup of CABCS is those who are highly stigmatized and less acculturated. Additionally, acculturation may serve as a protector when it reaches a certain high level.

[Figure 2a and b near here]

Discussion

The study aims were to examine the association between self-stigma and psychological distress (depressive symptoms and perceived stress) among CABCS and investigate how the relationship may vary as a function of acculturation to the USA. The study found that self-stigma was positively related to negative psychological health, supporting our predictions. CABCS who had greater self-stigma about breast cancer experienced more depressive symptoms (Hypothesis 1) and perceived stress (Hypothesis 2)². The results also showed evidence of a moderating role of acculturation levels on the association between self-stigma and negative psychological health. Greater self-stigma was associated with more depressive symptoms and perceived stress among less acculturated CABCS (Hypothesis 3).

Qualitative studies indicate that stigma is a major stressor among Chinese survivors and CABCS (Warmoth et al., 2017; Wong-Kim et al., 2005). Breast cancer self-stigma has shown a negative association with quality of life of minorities (Graves et al., 2012; Wong et al., 2019). Yet, the relationship between self-stigma and psychological distress (depressive symptoms and perceived stress) had not been empirically tested. This study found quantitative evidence to support this relationship: CABCS who had greater self-stigma reported more depressive symptoms and perceived stress. Accordingly, stigma reduction may be beneficial in

² Mediation analyses were conducted to examine whether perceived stress mediates the effect of self-stigma on depressive symptoms. Findings are presented in the Supplementary Materials.

psychological adjustment among CABCS to reduce the likelihood of depression and perceived stress.

Culturally-sensitive breast cancer stigma reduction interventions need to be developed, and these interventions must address the concerns related to the stigma and shame of breast cancer. Programs that provide information that dispel the negative beliefs and myths about breast cancer could be beneficial as they may reduce fear and stigma. For example, a peer-mentoring and education intervention with CABCS found that reduced stigma was a possible mechanism for decreasing depressive symptoms (Lu, You, Man, Loh, & Young, 2014). Interventions could be delivered through individual or couple support programs and community-based programs with professionals familiar with Chinese cultural norms. Additional studies are needed to develop, evaluate, and implement such interventions.

The results also revealed some important differences between survivors who were highly acculturated to the USA compared to those who were not. Specifically, there were significant associations between self-stigma and psychological distress among those with low levels of acculturation, but the strength of associations was attenuated when acculturation increased. When acculturation meet the critical value, self-stigma was no longer associated with psychological stress. It is possible that survivors with low acculturation experience more negative outcomes because they endorse more traditional Asian cultural beliefs about cancer (e.g., cancer is deserved or terminal), influencing their coping and ability to positively adjust (Tsai et al., 2011) and thus, experiencing more psychological distress. In contrast, the survivors with high levels of acculturation may endorse the more positive view of breast cancer which is present in the US pink ribbon culture (Sulik, 2010). These individuals may also seek and receive more social support resources to cope, as has been previously found that highly acculturated

CABCS receive more social support from partners (Tsai et al., 2011). Acculturation may serve as a protector when it reaches a certain high level. Future research could examine the link between acculturation, health beliefs, coping resources and psychological distress in breast cancer adjustment among Chinese American immigrant women. Exploring this relationship may help develop a better understanding of how cultural and health beliefs are related to psychological distress in breast cancer survivors.

The findings indicate that most CABCS, due to their relatively less acculturated status to the USA, may be at a greater risk of the negative effects of self-stigma on mental health. Additionally, the most risk subgroup in the CABCS population is those who were highly stigmatized and less acculturated. Interventions that incorporate techniques to reduce stigma (Lu et al., 2014; Warmoth et al., 2019) may be more beneficial for CABCS who are less acculturated and should target those women. The findings suggest that future interventions for Chinese Americans survivors should consider the multiple cultural, social, and medical contextual forces affecting the unique experiences of this growing population. Attention to the modifiable risk factors through psychosocial interventions and the exploration of potential buffers against self-stigma of different racial and ethnic breast cancer survivors will be important areas of future research.

There are some study limitations that must be acknowledged. Firstly, the cross-sectional nature of data prevents us from drawing causal inferences. Although the proposed relationships were based on previous work and theory, the findings should be interpreted with caution. Future studies should aim to replicate these findings with longitudinal or experimental designs. Secondly, the moderating effect of acculturation was attributed to the cultural differences in appraisal of cancer and social support; however, these variables were not directly

assessed in this study. Further work could measure cancer beliefs and perceived social support to explore whether these differed in the highly and lowly acculturated groups. Thirdly, some measures used were modified from established measures. Before any analysis was conducted, we assessed the measure for validity and reliability; despite being considered acceptable, they have not been established beyond this in any way. Fourthly, the relationships found in this study may be specific to CABCS and not applicable to other populations. Further studies with samples of greater diversity in terms of culture, gender, age, and cancer types should be conducted to investigate these relationships.

Conclusions

Despite the rise of the pink ribbon culture (Sulik, 2010) and a reduction in breast cancer stigma in the USA, it is still present in some ethnic and immigrant populations. Among Chinese American breast cancer survivors, stigma is a major stressor with mental health consequences. CABCS with greater self-stigma experienced more negative psychological distress (depressive symptoms and perceived stress), especially those who are less acculturated to the USA. Stigma reduction may play an important role in the adjustment of CABCS, and interventions that aim to reduce stigma may be beneficial. Education is needed in some ethnic communities to combat the stigma and the negative beliefs about breast cancer so that survivors experience less negative psychological health and to improve the survivorship experience and adjustment of this understudied population.

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References

- Aiken, L. S., West, S. G., & Reno, R. R. (1991). *Multiple regression: Testing and interpreting interactions*: Sage.
- Ashing-Giwa, K. T., Padilla, G., Tejero, J., Kraemer, J., Wright, K., Coscarelli, A., . . . Hills, D. (2004). Understanding the breast cancer experience of women: a qualitative study of African American, Asian American, Latina and Caucasian cancer survivors. *Psycho-Oncology, 13*(6), 408-428. doi:10.1002/pon.750
- Chittem, M., & Butow, P. (2015). Responding to family requests for nondisclosure: The impact of oncologists' cultural background. *Journal of Cancer Research and Therapeutics, 11*, 174-180.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of health and social behavior, 385-396*.
- Cole, S. R. (1999). Assessment of differential item functioning in the Perceived Stress Scale-10. *Journal of Epidemiology and Community Health, 53*(5), 319-320. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1756880/>
- Corrigan, P. W., & Watson, A. C. (2002). The Paradox of Self-Stigma and Mental Illness. *Clinical Psychology: Science and Practice, 9*(1), 35-53. doi:10.1093/clipsy.9.1.35
- Eap, S., DeGarmo, D. S., Kawakami, A., Hara, S. N., Hall, G. C., & Teten, A. L. (2008). Culture and personality among European American and Asian American men. *Journal of Cross-Cultural Psychology, 39*(5), 630-643.

- Else-Quest, N. M., & Jackson, T. L. (2014). Cancer stigma. In C. P. W. (Ed.), *The stigma of disease and disability: Understanding causes and overcoming injustices* (pp. 165-181). Washington, DC: American Psychological Association
- Gibson, A. F., Lee, C., & Crabb, S. (2014). 'If you grow them, know them': Discursive constructions of the pink ribbon culture of breast cancer in the Australian context. *Feminism & Psychology, 24*(4), 521-541. doi:10.1177/0959353514548100
- Graves, K. D., Jensen, R. E., Cañar, J., Perret-Gentil, M., Leventhal, K.-G., Gonzalez, F., . . . Mandelblatt, J. (2012). Through the lens of culture: quality of life among Latina breast cancer survivors. *Breast Cancer Research and Treatment, 136*(2), 603-613. doi:10.1007/s10549-012-2291-2
- Gupta, A., Leong, F., Valentine, J. C., & Canada, D. D. (2013). A Meta-Analytic Study: The Relationship Between Acculturation and Depression Among Asian Americans. *American Journal of Orthopsychiatry, 83*(2pt3), 372-385. doi:10.1111/ajop.12018
- Hatzenbuehler, M. L., Phelan, J. C., & Link, B. G. (2013). Stigma as a Fundamental Cause of Population Health Inequalities. *American Journal of Public Health, 103*(5), 813-821. doi:10.2105/AJPH.2012.301069
- Johnson, P. O., & Fay, L. C. (1950). The Johnson-Neyman technique, its theory and application. *Psychometrika, 15*(4), 349-367.
- Kagawa-Singer, M., Wellisch, D. K., & Durvasula, R. (1997). Impact of Breast Cancer on Asian American and Anglo American Women. *Culture, Medicine and Psychiatry, 21*(4), 449-480. doi:10.1023/A:1005314602587
- Karim, K. (2003). Informing cancer patients: Truth telling and culture. *Cancer Nursing Practice, 2*, 23-31.

- Kim, H., Edwards, A. B., Sweeney, K. A., & Wetchler, J. L. (2012). The Effects of Differentiation and Attachment on Satisfaction and Acculturation in Asian-White American International Couple Relationships: Assessment With Chinese, South Korean, and Japanese Partners in Relationships With White American Partners in the United States. *The American Journal of Family Therapy, 40*(4), 320-335.
doi:10.1080/01926187.2011.616409
- Kohout, F. J., Berkman, L. F., Evans, D. A., & Cornoni-Huntley, J. (1993). Two shorter forms of the CES-D depression symptoms index. *Journal of Aging and Health, 5*(2), 179- 193.
doi:10.1177/089826439300500202
- Lam, W. W. T., & Fielding, R. (2003). The evolving experience of illness for Chinese women with breast cancer: A qualitative study. *Psycho-Oncology, 12*(2), 127-140.
doi:10.1002/pon.621
- Lau, Y., Wong, D. F. K., Wang, Y., Kwong, D. H. K., & Wang, Y. (2014). The Roles of Social Support in Helping Chinese Women with Antenatal Depressive and Anxiety Symptoms Cope With Perceived Stress. *Archives of Psychiatric Nursing, 28*(5), 305-313.
doi:10.1016/j.apnu.2014.05.009
- Li, Z., & Hicks, M. H.-R. (2010). The CES-D in Chinese American women: Construct validity, diagnostic validity for major depression, and cultural response bias. *Psychiatry Research, 175*(3), 227-232. doi:10.1016/j.psychres.2009.03.007
- Lim, J. w. (2014). Communication, coping, and quality of life of breast cancer survivors and family/friend dyads: a pilot study of Chinese-Americans and Korean-Americans. *Psycho-Oncology, 23*(11), 1243-1251.

- Lu, Q., Wong, C. C. Y., Gallagher, M. W., Tou, R. Y., Young, L., & Loh, A. (2017). Expressive writing among Chinese American breast cancer survivors: A randomized controlled trial. *Health Psychology, 36*(4), 370.
- Lu, Q., Yeung, N. C., You, J., & Dai, J. (2016). Using expressive writing to explore thoughts and beliefs about cancer and treatment among Chinese American immigrant breast cancer survivors. *Psycho-Oncology, 25*(11), 1371.
- Lu, Q., You, J., Man, J., Loh, A., & Young, L. (2014). Evaluating a Culturally Tailored Peer-Mentoring and Education Pilot Intervention Among Chinese Breast Cancer Survivors Using a Mixed-Methods Approach. *Oncology nursing forum, 41*(6), 629-637.
doi:10.1188/14.ONF.629-637
- Mak, W. W., & Cheung, R. Y. (2010). Self-Stigma Among Concealable Minorities in Hong Kong: Conceptualization and Unified Measurement. *American Journal of Orthopsychiatry, 80*(2), 267-281.
- Mitchell, A. M., Crane, P. A., & Kim, Y. (2008). Perceived stress in survivors of suicide: Psychometric properties of the perceived stress scale. *Research in nursing & health, 31*(6), 576-585.
- Pearson, C. R., Micek, M. A., Pfeiffer, J., Montoya, P., Matediane, E., Jonasse, T., . . . Gloyd, S. S. (2009). One Year After ART Initiation: Psychosocial Factors Associated with Stigma Among HIV-Positive Mozambicans. *AIDS and Behavior, 13*(6), 1189.
doi:10.1007/s10461-009-9596-0
- Preacher, K. J., Curran, P. J., & Bauer, D. J. (2006). Computational tools for probing interactions in multiple linear regression, multilevel modeling, and latent curve analysis. *Journal of educational and behavioral statistics, 31*(4), 437-448.

- Stephenson, M. (2000). Development and validation of the Stephenson Multigroup Acculturation Scale (SMAS). *Psychological Assessment, 12*(1), 77-88. doi:10.1037/1040-3590.12.1.77
- Suinn, R. M., Ahuna, C., & Khoo, G. (1992). The Suinn-Lew Asian Self-Identity Acculturation Scale: Concurrent and Factorial Validation. *Educational and Psychological Measurement, 52*(4), 1041-1046. doi:doi:10.1177/0013164492052004028
- Sulik, G. A. (2010). *Pink ribbon blues: How breast cancer culture undermines women's health*. New York: Oxford University Press.
- Taylor, J. M. (2015). Psychometric analysis of the Ten-Item Perceived Stress Scale. *Psychological Assessment, 27*(1), 90-101. doi:10.1037/a0038100
- Tsai, T.-I., Morisky, D. E., Kagawa-Singer, M., & Ashing-Giwa, K. T. (2011). Acculturation in the adaptation of Chinese-American women to breast cancer: a mixed-method approach. *Journal of Clinical Nursing, 20*(23-24), 3383-3393. doi:10.1111/j.1365-2702.2011.03872.x
- Warmoth, K., Cheung, B., You, J., Yeung, N. C. Y., & Lu, Q. (2017). Exploring the Social Needs and Challenges of Chinese American Immigrant Breast Cancer Survivors: a Qualitative Study Using an Expressive Writing Approach. *International Journal of Behavioral Medicine*. doi:10.1007/s12529-017-9661-4
- Warmoth, K., Yeung, N. C. Y., Xie, J., Feng, H., Loh, A., Young, L., & Lu, Q. (2019). Benefits of a psychosocial intervention for Chinese American breast cancer survivors: a pilot study. *Behavioral Medicine*. doi:10.1080/08964289.2018.1541862
- Wellisch, D., Kagawa-Singer, M., Reid, S. L., Lin, Y.-J., Nishikawa-Lee, S., & Wellisch, M. (1999). An exploratory study of social support: a cross-cultural comparison of Chinese-,

- Japanese-, and Anglo-American breast cancer patients. *Psycho-Oncology*, 8(3), 207-219.
doi:10.1002/(sici)1099-1611(199905/06)8:3<207::Aid-pon357>3.0.Co;2-b
- Wong-Kim, E., Sun, A., & DeMattos, M. C. (2003). Assessing cancer beliefs in a Chinese immigrant community. *Cancer Control*, 10(Suppl 5), 22-28.
- Wong-Kim, E., Sun, A., Merighi, J. R., & Chow, E. A. (2005). Understanding quality-of-life issues in Chinese women with breast cancer: a qualitative investigation. *Cancer Control*, 12(Suppl 2), 6-12.
- Wong, C. C. Y., Pan-Weisz, B. M., Pan-Weisz, T. M., Yeung, N. C. Y., Mak, W. W. S., & Lu, Q. (2019). Self-stigma predicts lower quality of life in Chinese American breast cancer survivors: exploring the mediating role of intrusive thoughts and posttraumatic growth. *Quality of Life Research*. doi:10.1007/s11136-019-02213-w
- Yoon, E., Chang, C.-T., Kim, S., Clawson, A., Cleary, S. E., Hansen, M., . . . Gomes, A. M. (2013). A meta-analysis of acculturation/enculturation and mental health. *Journal of counseling psychology*, 60(1), 15.

Table 1. Descriptive statistics, and correlation matrix of major study variables (n = 136)

	M	SD	2	3	4
1. Self-Stigma	1.92	0.85	-.12	.50**	.48**
2. Acculturation	0.97	0.87	-	-.27**	-.27**
3. Depressive symptoms	1.03	0.76		-	.83**
4. Perceived stress	1.61	0.94			-

* $p < .05$, ** $p < .01$

Table 2. Hierarchical regression analysis predicting depressive symptoms and perceived stress from self-stigma, acculturation, and the self-stigma x acculturation interaction

	Depressive symptoms					Perceived stress				
	<i>B</i>	SE <i>B</i>	β	ΔR^2	$\Delta F(df)$	<i>B</i>	SE <i>B</i>	β	ΔR^2	$\Delta F(df)$
Step 1				.09	10.82**				.11	14.79***
Family income	-.20	.06	-.29**		(1, 114)	-.29	.08	-.34***		(1, 115)
Step 2				.22	17.81***				.21	17.90***
Family income	-.14	.06	-.20*		(2, 112)	-.21	.07	-.25**		(2, 113)
Self-stigma	.38	.07	.44***			.47	.09	.43***		
Acculturation	-.14	.07	-.16			-.16	.09	-.15		
Step 3				.03	4.51*				.03	5.78*
Family income	-.12	.06	-.18*		(1, 111)	-.19	.07	-.22**		(1, 112)
Self-stigma	.38	.07	.43***			.46	.08	.42***		
Acculturation	-.14	.07	-.16			-.16	.09	-.15		
	-.17	.08	-.17*			-.23	.10	-.18*		

Self-stigma x

Acculturation

* $p < .05$, ** $p < .01$, *** $p < .001$

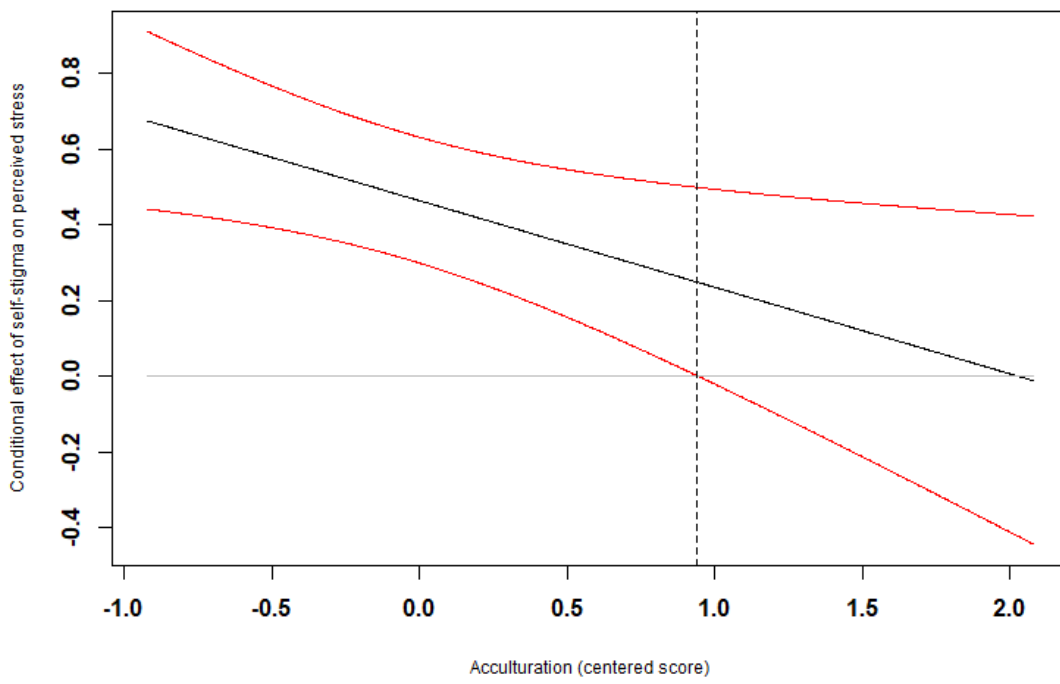
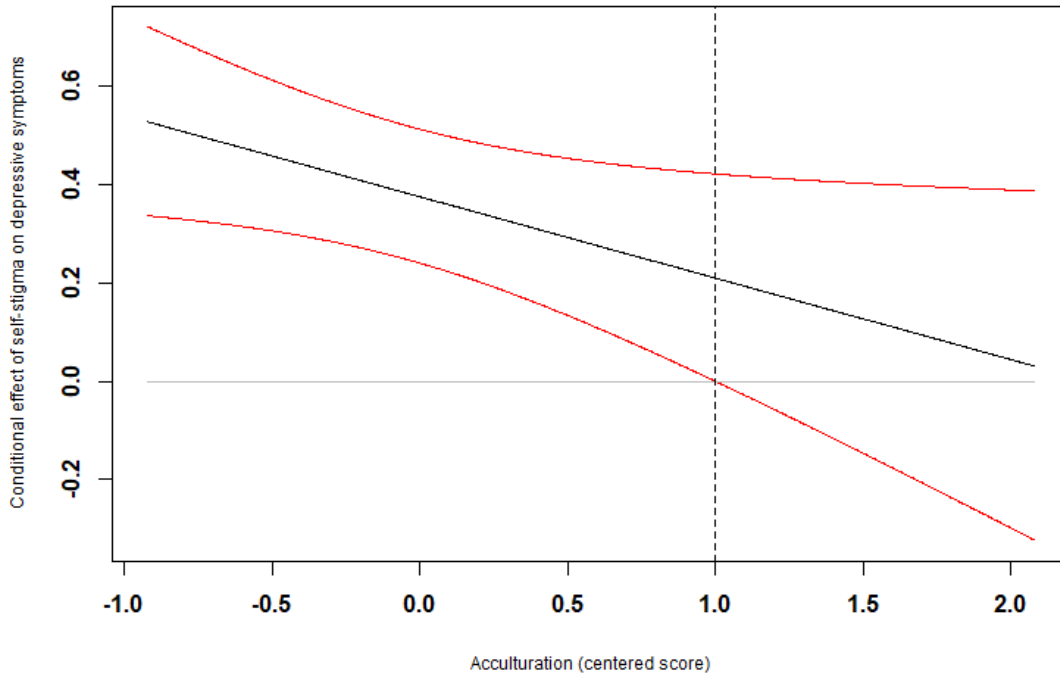


Figure 1. Conditional effect of self-stigma on depressive symptoms (1a) and perceived stress (1b) moderated by acculturation.

Note. Black diagonal line represents the regression coefficient for self-stigma on perceived stress or depressive symptoms. Red diagonal lines are confidence bands, namely, upper and lower bounds of 95% confidence interval for the regression coefficient. The dashed vertical line indicates the critical value (JN point) of acculturation at which regression coefficient transitions from statistical significance (left of dashed vertical line) to nonsignificance (right of dashed vertical line).

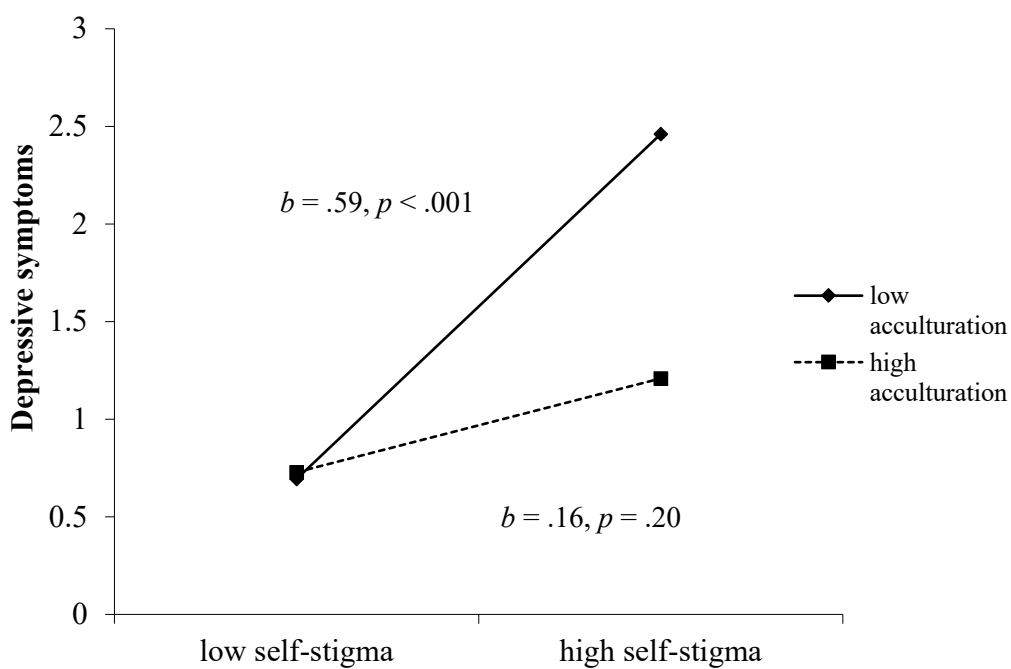


Figure 2a. Interaction of self-stigma and acculturation in predicting depressive symptoms

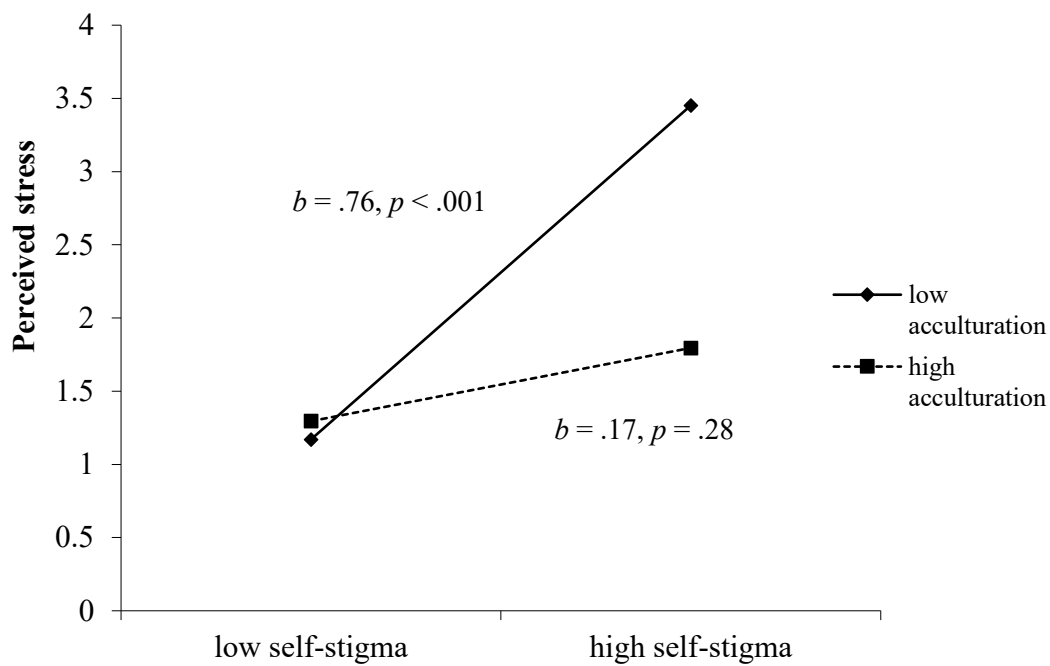


Figure 2b. Interaction of self-stigma and acculturation in predicting perceived stress

