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Correlates of sexual quality of life among husbands of Chinese breast cancer survivors

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ABSTRACT

Purpose: Western studies found that sexual quality of life (QoL) among husbands of breast cancer survivors was associated with their stress and coping processes. However, little is known about how breast cancer caregiving might be associated with those husbands' sexual QoL in the Chinese cultural context. Guided by the Stress and Coping model, we examined the psychosocial correlates of sexual QoL among husbands of Chinese breast cancer survivors.

Method: Husbands of Chinese breast cancer survivors (N = 176) recruited from two hospitals in Weifang, China completed a cross-sectional survey. Their individual characteristics, caregiving-related stressors, cognitive appraisals, coping resources and strategies, and sexual QoL were measured.

Results: After controlling for covariates, hierarchical regression results showed that lower caregiving burden ($\beta = -0.34$, $p < .001$), higher marital satisfaction ($\beta = 0.20$, $p < .001$), and lower harm/threat appraisals (β from -0.22 to -0.20, $p < .001$) were associated with better sexual QoL. Moreover, ambivalence over emotional expression (AEE; inner conflict concerning the desire to express emotions yet failing to do so) was found to moderate between protective buffering and sexual QoL ($\beta = 0.20$, $p < .01$), such that the negative association between protective buffering and sexual QoL was only significant among those with higher AEE ($\beta = -0.38$, $p < .003$).

Conclusions: Both the stress and coping variables and their interactions with individual characteristics could be important determinants of those husbands' sexual QoL. Our findings implied that reducing husbands' caregiving burden, increasing their marital satisfaction, helping them reevaluate the negative impact of breast cancer, and reducing barriers for expressing emotions and concerns may increase their sexual well-being.

1. Introduction

The population of Chinese breast cancer survivors is growing, given the increasing incidence rate and decreasing mortality rate of breast cancer in China (Chen et al., 2013). Breast cancer does not only affect the patients, but also the spouses of those patients. Compared to other family caregivers, spouses of breast cancer patients are subject to unique challenges (e.g.,sexual adaptations, household management, worrying about children's future) due to their commitment and obligations in the marital relationship. Western studies have suggested that husbands of breast cancer survivors are subject to multiple aspects of challenges after their wives' cancer diagnosis (Schmid-Buchi et al., 2008). In addition to decreased physical and psychological well-being, it was also common for husbands of breast cancer survivors to report sexual disruptions and struggles to maintain intimacy (Fergus and Gray, 2009).

1.1. Impact of breast cancer caregiving on husbands' sexual well-being

Husbands' adaptation to intimacy/sexuality issues after their wives' breast cancer diagnosis is also noteworthy. It was found that husbands of women who had undergone a mastectomy were reluctant to see the scars of their wives (Fergus and Gray, 2009); the changes in wives' appearance (e.g.,loss of breast, alopecia) also decreased their sexual desire (Holmberg et al., 2001; Nasiri et al., 2012). Some husbands avoid thinking about sex because they believe it is immoral to initiate sex with their suffered wives (Nasiri et al., 2012). However, compared to the survival health of their wives, husbands' own sexual concerns were

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often put in a lower priority and not discussed within the couple (Holmberg et al., 2001). Even those husbands believe that patient's health is of the greatest importance, they still perceive the need to address their sexuality and intimacy-related concerns during their journey of breast cancer caregiving.

1.2. Using the stress and coping model to understand people's cancer adjustment outcomes

Studies have suggested that Chinese and Western husbands share many similarities in the experience taking care of their spouses with breast cancer. Consistent with Western findings, Chinese husbands of breast cancer survivors also reported deterioration of sexual well-being (Mak, 2002; Zhu et al., 2012). To cope with caregiving challenges, they might rely on family members but not actively sought support from other sources (e.g.,friends, colleagues). They also experienced difficulties in expressing their emotions and cancer-related concerns (Zhu et al., 2012). However, these studies were primarily descriptive and did not examine the psychosocial correlates of the husbands' well-being under the guidance of theoretical frameworks.

The Stress and Coping model (Lazarus and Folkman, 1984) provides a suitable framework to examine the psychosocial correlates of health outcomes among husbands of women with breast cancer. This model posits that people who encounter a potentially threatening event (e.g.,spouse's cancer diagnosis) usually go through the primary and secondary appraisals. These processes evaluate the potential impacts of the event (primary appraisal, i.e.,appraising it as a threat, a harm or a challenge), and identify potential resources (e.g., interpersonal and intrapersonal resources) to cope with the associated stressors (secondary appraisal). After these appraisals, people would decide what coping strategies to use, which affect people's adjustment outcomes. Appraisal and coping processes have been found to be predictive of well-being among caregivers of patients with chronic health conditions (e.g.,multiple sclerosis, mental illness) (Mackay and Pakenham, 2012; Pakenham, 2005). These studies generally found that more coping resources (e.g.,higher social/marital support), positive cognitive appraisals (e.g.,lower harm/threat appraisals, higher challenge appraisal), lower reliance on avoidant coping strategies (e.g.,denial) were associated with better caregiver adjustment outcomes. Among caregivers of colorectal cancer patients in Australia, higher social support, lower stress appraisal towards caregiving (i.e.,perception of caregiving burden), using less avoidance coping strategies, and more problem-solving coping (e.g.,planning) were associated with better caregiver adjustment (Fitzell and Pakenham, 2010). Similar studies for caregivers of breast cancer survivors are lacking, leaving the applicability of the model in such context unknown.

1.3. Coping strategies and caregivers' well-being: do individual differences play a role as moderators?

The Stress and Coping model also posits that coping with stressors is transactional, such that the person and the environment are viewed to be in a mutually reciprocal relationship. It implies that the relationship between coping and adjustment outcomes could differ among people with varied individual characteristics. There were only a few studies (e.g., Pakenham, 2005) attempting to explore the interactions between cognitive appraisals and coping variables (e.g., strategies, resources). However, to the best of our knowledge, previous applications have not examined the potential moderating role of individual characteristics in the relationship between coping strategies and caregivers' well-being. This study proposed to examine the moderating role of ambivalence over emotion expression in the relationship between protective buffering and sexual well-being among husbands of Chinese breast cancer survivors.

1.4. Ambivalence over emotional expression as a proposed moderator between protective buffering and sexual well-being

Ambivalence over emotional expression (AEE) refers to individuals' inner conflict concerning the desire to express emotions yet failing to do so (King and Emmons, 1990). Husbands of breast cancer survivors may experience a high level of AEE. Qualitative studies have found that husbands of breast cancer survivors experience difficulties in expressing their emotions and concerns (Lopez et al., 2012; Zhu et al., 2012) and finding someone to talk about their feelings (Hilton et al., 2000). Adding that emotional suppression is encouraged in Chinese culture for maintaining interpersonal harmony, it was not surprising to find that Asian Americans reported a higher level of AEE than Caucasians (Lu and Stanton, 2010). This suggests that AEE may be particularly relevant to the Chinese culture.

AEE was associated with lower quality of life (QoL) and more depressive symptoms among cancer patients (Bardwell et al., 2006; Porter et al., 2005). On the other hand, in the context of provoked vestibulodynia, couples with both partners having lower AEE reported the highest level of sexual satisfaction (Awanda et al., 2014). In addition, it is common for husbands to use protective buffering (i.e.,hiding cancer-related thoughts and concerns from the spouse) to cope with breast cancer-related stressors. They also tend to see that as a way to protect their wives and not to let their wives worried (Fergus and Gray, 2009). However, Manne and colleagues found that protective buffering was associated with higher distress among male partners of breast cancer patients (Manne et al., 2007). These findings suggested that both AEE and protective buffering could be detrimental to well-being among husbands of breast cancer survivors. Therefore, we speculated that AEE and protective buffering would be associated with poorer sexual QoL; and that husbands having a stronger inner conflict to express but fail to do so (higher AEE) would suffer even more from the potential negative impact of protective buffering on their sexual QoL.

1.5. Purpose and hypotheses

This study examined the psychosocial correlates of sexual QoL among husbands of Chinese breast cancer survivors (see Fig. 1 for the conceptual framework). It extended from prior studies in applying the Stress and Coping model in breast cancer caregiving, and in examining the potential interaction between AEE (as an individual characteristic) and protective buffering (as a coping strategy) in affecting those husbands' sexual QoL. Based on the literature, we hypothesized that higher levels of social support, marital satisfaction, challenge appraisal, and planning coping were associated with better sexual QoL; whereas higher levels of AEE, caregiving burden, threat and harm appraisals, denial coping, and protective buffering were associated with poorer sexual QoL. Moreover, we hypothesized that AEE would moderate between protective buffering and sexual QoL, such that the negative association between protective buffering and sexual QoL was stronger among people with higher AEE.

2. Method

2.1. Recruitment

Husbands of Chinese breast cancer patients 1) having diagnosed of Stages 0-III within 3 years and 2) having undergone surgery to treat breast cancer were eligible for the study. Participants were recruited primarily by referrals from physicians and nurses at two hospitals in Weifang, Shandong province, China. Both hospitals had oncology clinics specific for breast cancer patients. Prospective participants were provided with a cover letter and a consent form explaining the purpose and procedure of the study by a research nurse. After informed consent, participants were asked to complete the questionnaires in a quiet room in the hospital, put the completed questionnaires into an envelope, seal

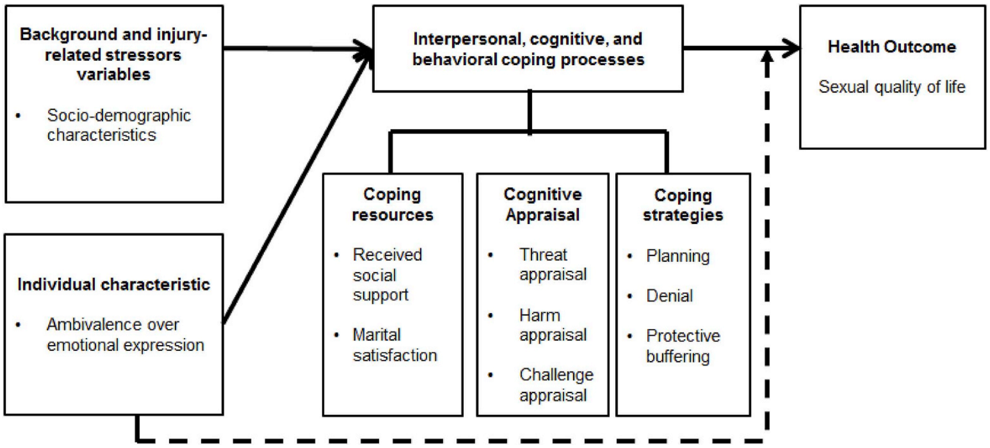

Fig. 1. A Stress and Coping model adapting to explain sexual quality of life among husbands of Chinese breast cancer survivors. The dotted line illustrates our hypothesis that ambivalence over emotional expression might moderate the association between protective buffering and sexual quality of life.

the envelope, and return that to the research nurse. The questionnaires took approximately 30 min to complete. After finishing the questionnaire, participants were given a compensation gift for thanking their participation according to local guidelines (worth RMB25, equivalent to USD3.9). The study protocol was granted approval from the relevant Institutional Review Boards from the Weifang Medical University and the University of Houston. The recruitment lasted for 6 months.

We approached 250 husbands in the hospitals, with 216 expressed interests in the study. Among the interested individuals, 207 were eligible for the study and agreed to participate (83% participation rate). Among the participants, 23 did not answer at least two-third of items the questionnaire and 8 gave obvious biased responses (e.g., giving the same response to all the questions for multiple scales having reverse-scored items). With those participants excluded from the final analysis, the sample size was 176.

2.2. Measures

Sexual quality of life. Four items modified from the Sexual Life subscale of the Impact of Weight on Quality of Life – Lite (IWQOL-Lite) were used to measure participants' sexual QoL (Kolotkin et al., 2001). In this study, the stem of the items was modified from “because of my weight” in the original scale to “because of my wife's breast cancer”. On a 5-point Likert scale (1 as *never true*, 5 as *always true*), participants rated the impact of their wives' breast cancer on their sexual QoL. A sample item was “Because of my wife's breast cancer, I do not enjoy sexual activity”. The item scores were reverse-coded, so that a higher mean score indicated better sexual QoL. The Cronbach's alpha was .76 in this study.

Caregiving burden. The negative impacts of caregiving were measured by the 24-item Caregiver Reaction Assessment Scale (CRA) (Nijober, Triemstra, Tempelaar, Sanderman, & van den bos, 1999). On a 5-point Likert scale (1 as *strongly disagree*, 2 as *disagree*, 3 as *agree nor disagree*, 4 as *agree*, 5 as *strongly agree*), a higher mean score indicates higher caregiver burden. The scale reported satisfactory psychometric properties among Dutch partners of colorectal cancer patients (Nijober et al., 1999) and Chinese family caregivers of cancer patients (Ge et al., 2011). The Cronbach's alpha was .86 in this study.

Social support. The receipt of emotional and instrumental social support from spouse, family, and friends were measured by six items from the Cancer Perceived Agents of Social Support (CPASS) (Goldzweig et al., 2010). On a 5-point Likert scale (1 as *not at all*, 5 as *very much*), a higher mean score represented a higher level of social support received. A sample item was “to what extent do you feel you receive emotional support from your spouse?“. The scale was reliable and valid (associated with less psychological distress) among Israeli spouses of cancer patients (Goldzweig et al., 2010). The Cronbach's alpha was .95 in this study.

Marital satisfaction. Participants' satisfaction with their marital relationship was measured by the 4-item Couple Satisfaction Index (CSI) (Funk and Rogge, 2007). Participants were asked to indicate the degree to which they feel happy, satisfied, rewarding, and comfortable with their partners, with a higher sum score representing higher relationship satisfaction. The measure was reliable and valid among American couples, with strong convergent validity with other relationship satisfaction measures (Funk and Rogge, 2007). The Cronbach's alpha was .88.

Cognitive appraisal. The 10-item Cognitive Appraisal Scale (Stanton et al., 1991) measured participants' three types of appraisals (harm, threat, and challenge) towards their breast cancer caregiving experience. On a 7-point scale (1 as *not at all*, 7 as *a great deal*), participants rated the degree to which they interpreted breast cancer caregiving as a harmful, threatening, or challenging experience. Higher mean scores indicated the stronger endorsements of the specific types of appraisal. The Cronbach's alphas for Harm, Threat, and Challenge were 0.77, 0.65, and 0.75, respectively.

Protective buffering. Nine items from the Protective Buffering Scale were used to measure participants' frequency of protective buffering (Suls et al., 1997). On a 5-point Likert scale (1 as *never*, 3 as *sometimes*, 5 as *very often*), a higher mean score represented more frequent protective buffering behaviors in the past month. The scale was reliable and valid (associated with distress) among partners of heart disease patients (Trost, 2005). The Cronbach's alpha was .85.

Planning and denial coping. Two subscales (Planning and Denial) from the Brief COPE (Carver, 1997) were used to measure participants' frequencies of using planning and denial as coping strategies to deal with stressors related to breast cancer caregiving. The items were rated on a 4-point Likert scale (1 as *I haven't been doing this at all*, 4 as *I've been doing this a lot*) such that higher mean scores indicated more frequent use of using the particular coping strategies more frequently. The scales were reliable and associated with health outcomes (e.g., depressive symptoms) in expected directions among Chinese caregivers of stroke survivors (Qiu and Li, 2008). The Cronbach's alphas for Planning and Denial were 0.55 and 0.68 respectively.

Ambivalence over emotion expression. Four items selected from the Ambivalence over Emotion Expression Questionnaire (AEQ) (King and Emmons, 1990) were used to measure participant's level of conflicts between wanting to express his feelings yet fearing the consequences of such expressions (“I try to keep my deepest fears and feelings hidden, but at times I'd like to open up to others”). On a 5-point Likert scale (1 as *you never feel like the statements*, 5 as *you frequently feel that way*), a higher score indicated higher AEE. The scale was reliable

Table 1
Characteristics of the participants ($N = 176$).

	Frequency (%)/Mean (SD)
Demographic variables	
Age	50.22 (8.49)
Years of marriage	25.99 (9.47)
Monthly personal income (in Chinese Yuan; 1RMB = 0.16USD) [a]	
RMB2000 or below	76 (43.2%)
RMB2001 – 4000	76 (43.2%)
> RMB4000	19 (10.8%)
Missing	5 (2.8%)
Employment status [a]	
Full-time employed	58 (33.0%)
Part-time employed	21 (11.9%)
Currently unemployed	23 (13.1%)
Retired	21 (11.9%)
Others	8 (4.5%)
Missing	38 (21.6%)
Education	
Early high school or below	74 (42.0%)
High school/Some college or specialized training	75 (42.6%)
College or above	26 (14.8%)
Missing	1 (0.6%)
Caregiving experience	
Duration for caregiving	
1 month or less	74 (42.0%)
2–3 months	54 (30.7%)
4–6 months	32 (18.2%)
More than 6 months	13 (7.4%)
Missing	3 (1.7%)
Average number of hours for caregiving per day	
Less than 8 h	80 (45.5%)
More than 8 h	91 (51.7%)
Missing	5 (2.8%)
Having helpers for caregiving tasks	141 (80.1%)

[a] Note: The average personal monthly income in 2015 for Weifang was RMB2588 monthly, which was comparable to the income level of our sample. The average personal annual income for Weifang, Shandong province, and the overall cities in China were RMB31,060, RMB31,545, and RMB31,194 respectively (National Bureau of Statistics of the People's Republic of China, 2016; Shandong Provincial Bureau of Statistics, 2016).

Reported labor participation rate in China among males is 78% in 2016 (Statista, 2018), which was 22% being retired or unemployed. The estimate was comparable to our current sample (24% were retired or unemployed).

and associated with lower depressive symptoms among Chinese American breast cancer survivors (Lu et al., 2015). The Cronbach's alpha was .76.

Self-reported health. The self-reported general health was measured by the General health subscale from the 36-item Medical Outcomes Study (SF-36) (Ware et al., 2003). Its Chinese version was validated (Li et al., 2003). Item responses were scored and converted based on the developers' recommendations (Ware et al., 2003), with 0–100 as the range of the construct score. A higher score represented better general health in the past month. This scale was shown to be reliable and valid among caregivers of breast cancer patients (Grunfeld et al., 2004). The Cronbach's alpha was 0.80.

Socio-demographic and caregiving-related variables. Participants' socio-demographic information (e.g., age, income, education level, length of marriage, etc.) and caregiving-related experience (e.g., average number of hours of providing care per day, and family members helping with breast cancer caregiving) were also measured.

Breast cancer-related and treatment-related variables. Participants were also asked to report information about their spouses' breast cancer and the associated treatments (including stage at diagnosis, time since diagnosis, treatments and surgery undergone, and insurance coverage).

2.3. *Analytic plan*

Descriptive statistics (including means and standard deviations) and Pearson correlations among the major variables were computed. Internal consistencies of the scales were indicated by their corresponding Cronbach's alphas. To examine the associations between the independent variables and sexual QoL, hierarchical regressions were conducted. The sequence of entering independent variables followed the suggestions from previous studies applying the Stress and Coping model in the contexts of chronic illnesses (Mackay and Pakenham, 2012) and other traumatic events (Yeung et al., 2016). Background variables showing significant associations with sexual QoL in bivariate correlations, plus the individual characteristic of interest (i.e.,AEE) were entered in the first step of the regression model. In the second step and third step, caregivers' burden and coping resources (received social support and marital satisfaction) were entered in the model respectively. In the fourth and fifth steps, cognitive appraisal and coping strategies were entered respectively. In the last step, the interaction term between AEE and protective buffering was entered. To compute the interaction term, the mean-centered scores of AEE and protective buffering were multiplied. All continuous independent variables were centered prior to the analyses. For statistically significant interactions, simple slopes analyses were conducted to examine how the main effects of independent variables on the outcomes varied at different levels of AEE.

2.4. *Power analysis*

Expecting a medium effect size ($f^2 = 0.15$) in the association between the independent variables and sexual QoL for the regression analyses, we needed at least 139 participants to achieve a statistical power of .80 (G*Power 3.1.2). With our sample size ($N = 176$), we should be able to detect the expected effect sizes with sufficient statistical power.

3. Results

3.1. *Participants' characteristics*

The participants reported a mean age of 50.2 years (SD = 8.49) and had been married for a mean of 26 years (SD = 9.47). More than half of them received high school or college education (57.4%); 24% of the participants were retired or unemployed. More than two-fifth (43.2%) of the husbands reported having a personal monthly income of RMB2001 – RMB4000 (around USD314–USD635). The employment status and income level in the participants were comparable to those of the general population in Weifang and the China national population (National Bureau of Statistics of the People's Republic of China, 2016; Shandong Provincial Bureau of Statistics, 2016) (Table 1).

3.2. *Breast cancer-, treatment-, and caregiving-related information*

A majority of husbands (72.7%) had been taking care of their wives with breast cancer three months or less; 80.1% reported having other people (e.g.,daughters, patients' friends) helping to take care of their wives. Over 60% of the participants had their wives diagnosed with breast cancer in the past three months (64.8%) and at Stage II (60.2%). All participants' wives had undergone a breast cancer surgery, with 67.1% completed surgery during the past three months (Table 2).

3.3. *Correlations between stress/coping variables and adjustment outcomes*

The correlation analysis results showed that having lower levels of personal income, caregiving burden, threat and harm appraisals, and denial were correlated with better sexual QoL ($rs = -0.46$ to -0.25, $ps < .01$). In addition, having higher levels of self-reported general

Table 2
Breast Cancer Patients' Characteristics reported by the Participants (N = 176).

	Frequency (%)
Patients' breast cancer-related information and treatments undergone	
Time since diagnosis	
1 month or less	44 (25.0%)
2–3 months	70 (40.0%)
4–6 months	38 (21.6%)
More than 6 months	15 (8.5%)
Missing	9 (5.1%)
Stage of diagnosis	
Stage 0	6 (3.4%)
Stage I	15 (8.5%)
Stage II	106 (60.2%)
Stage III	12 (6.8%)
Missing	37 (21.0%)
Surgery undergone[a]	
Lumpectomy	31 (17.6%)
Axillary node dissection	19 (10.8%)
Mastectomy	131 (74.4%)
Mastectomy with breast reconstruction	2 (1.1%)
Treatments undergone [a]	
Radiotherapy	18 (12.2%)
Chemotherapy	140 (79.5%)
Hormonal therapy	107 (60.8%)
Target therapy	10 (5.7%)
Taking medication	125 (71.0%)
Traditional Chinese medicine	22 (12.5%)
Having an insurance coverage for medical expenses	171 (97.2%)

[a] Note: Participants might select more than one type of surgery or treatment if applicable, thus the total frequencies did not add up to 176.

health, marital satisfaction, and planning were correlated with better sexual QoL ($rs = 0.24$ to 0.39, $ps < .01$). However, AEE, received social support, challenge appraisal, and protective buffering did not report significant correlations with sexual QoL ($p > .05$) (Table 3). Other demographic, cancer- and treatment-related variables reported non-significant associations with sexual QoL ($p > .05$, not tabulated). Except self-reported general health and income, the remaining background variables were not statistically controlled as covariates in subsequent analyses.

3.4. Hierarchical regression analyses

Given that the stress and coping variables were moderately correlated, the independent variables were checked for multicollinearity in the regression analysis. We did not find any variables reporting a variance inflation factor (VIF) ≥ 4, implying the absence of evidence for multicollinearity. The background variables and individual characteristics variables (Step 1) accounted for 18% of variance in sexual QoL. Only self-reported health was associated with better sexual QoL ($\beta = 0.35, p < .001$), whereas AEE and monthly personal income were not. In Step 2, caregiving burden was associated with lower levels of sexual QoL ($\beta = -0.34, p < .001$), accounting for an additional 8% of variance in sexual QoL. In Step 3, the coping resource variables explained an additional 5% of variance in sexual QoL. Marital satisfaction was associated with sexual QoL ($\beta = 0.20, p < .05$), whereas received social support was not ($\beta = 0.07, p > .05$). In Step 4, the three cognitive appraisal variables explained an additional 8% of variance in sexual QoL. Among them, only threat and harm appraisals were significantly associated with sexual QoL (threat: $\beta = -0.22$, $p < .05$; harm: $\beta = -0.20$, $p < .05$; challenge: $\beta = 0.14$, $p > .05$). In Step 5, after controlling for the variables in the previous steps, none of the coping strategies were significantly associated with sexual QoL (all $ps > .05$). In Block 6, a significant two-way interaction emerged between AEE and protective buffering when predicting sexual QoL ($\beta = -0.20$, $p < .01$), explaining an additional 4% of variance. Results from the simple slopes analysis indicated that the association between protective buffering and AEE were significant among individuals with higher AEE (+1 SD) ($\beta = -0.38$, $p = .003$), but not among those with lower AEE (−1 SD) ($\beta = 0.04$, $p = .76$) (Fig. 2). It indicated that the negative association between protective buffering and sexual QoL was only evident among those with higher AEE. With all the predictors including the interaction term, the overall model accounted for 44% of variances in the adjustment outcomes (Table 4).

4. Discussion

This was one of the first attempts in examining the psychosocial correlates (i.e.,individual characteristics, stressors, cognitive appraisals, coping resources and strategies) of sexual QoL among husbands of Chinese breast cancer patients. Guided by the Stress and Coping model, this study not only highlighted the importance of stress and coping variables as determinants of those husbands' sexual QoL, but also revealed that AEE (as an individual characteristic) could moderate the relationship between protective buffering (as a coping strategy) and sexual QoL.

Consistent with other studies on caregivers of cancer survivors (Fitzell and Pakenham, 2010; Rhee et al., 2008), we found that

Table 3
Descriptive statistics and correlations among major variables (N = 176).

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Sexual quality of life	–												
2. Monthly personal income [a]	-.25**	–											
3. Self-reported general health	.39***	-.21**	–										
4. Ambivalence over emotional expression	-.10	.22**	-.10	–	–								
5. Caregiving burden	-.46***	.36***	-.45***	.22**	–	–							
6. Received social support	.02	.22***	-.08	-.04	.16*	–	–						
7. Marital satisfaction	.34***	-.19*	.14	− 20**	-.32***	.16*	–	–					
8. Threat appraisal	-.40***	.07	-.15	.23**	.43***	-.14	-.23**	–	–				
9. Harm appraisal	-.42***	.23**	− 24**	.27***	.42***	.05	-.26***	.55***	–	–			
10. Challenge appraisal	.14	-.14	.25***	.08	-.18*	-.13	.07	.27***	.20**	–	–		
11. Planning	.24**	-.18*	.35***	.03	-.45***	-.16*	.27***	.00	-.03	.21**	–	–	
12. Denial	-.29***	-.30***	-.26***	.36***	.45***	.02	-.27***	.20*	.28***	-.13	-.24**	–	–
13. Protective buffering	.05	-.30***	.24**	-.06	-.35***	-.32***	.10	.18*	-.03	.32***	.43***	-.27***	–
Scale score range	1–5	1–6	0–100	1–5	1–5	1–5	4–28	1–7	1–7	1–7	1–4	1–4	1–5
Mean	3.77	–	75.95	2.39	2.27	3.44	16.16	2.62	1.74	3.51	3.34	1.33	3.51
SD	1.06	–	19.6	0.75	.56	1.06	3.37	1.26	.94	1.66	.69	.57	.93
Cronbach's alpha	.76	N/A	.80	.76	.86	.95	.88	.65	.77	.75	.55	.68	.85

Note: $^{*}p \le .05$, $^{**}p \le .01$, $^{***}p \le .001$.

[a] Monthly personal income: ≤ RMB1000 (1), RMB1000-2000 (2), RMB2001-3000 (4); RMB3001-4000 (4); RMB4001-5000 (5), ≥RMB5000 (6)

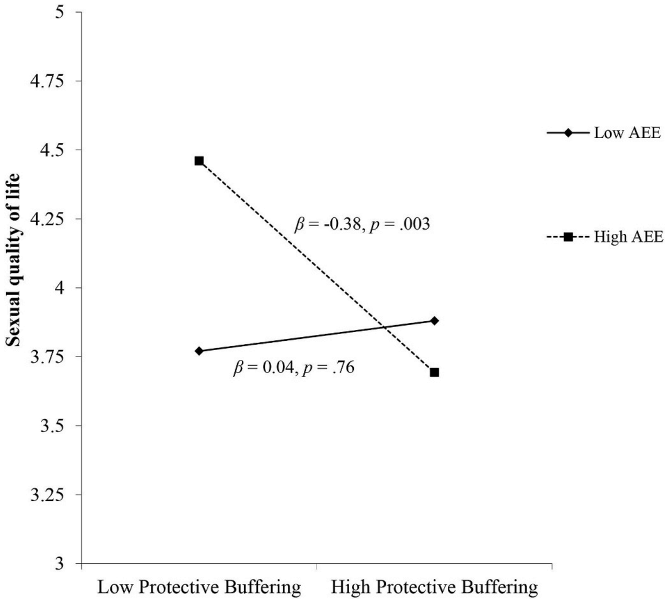

Fig. 2. The relationship between protective buffering and sexual quality of life was significantly moderated by ambivalence over emotional expression (AEE). The negative correlation between protective buffering and sexual QoL was only significant among those with higher AEE.

Table 4

Hierarchical regression analyses predicting participants' sexual quality of life (N = 176).

	Sexual quality of life	
	β	ΔR^2
Step 1 – Background variables		.18***
Monthly personal income[a]	-.16	
Self-reported general health	.35***	
Ambivalence over emotion expression (AEE)	-.03	
Step 2 – Stressors		.08***
Caregiving burden	-.34***	
Step 3 – Coping resources		.05*
Received social support	.07	
Marital satisfaction	.20*	
Step 4 – Cognitive appraisals		.08**
Threat appraisal	-.22*	
Harm appraisal	-.20*	
Challenge appraisal	.14	
Step 5 – Coping strategies		.01
Planning	.07	
Denial	-.06	
Protective buffering	-.13	
Step 6 – Interaction term		.04**
AEE x Protective buffering	-.20**	
Total R^2	.44	

Note: **p ≤ .05, **p ≤ .01, ***p ≤ .001.*

[a] Monthly personal income: ≤ RMB1000 (1), RMB1000-2000 (2), RMB2001-3000 (4); RMB3001-4000 (4); RMB4001-5000 (5), ≥RMB5000 (6).

caregiving burden was associated with lower sexual QoL. Qualitative studies have suggested that many husbands of breast cancer survivors need to deal with numerous demands ranging from managing care after surgeries and treatments, providing emotional support to the patients, performing household chores, to handling financial matters (Hilton et al., 2000). Handling with these practical tasks may make husbands put sexuality outside of their priorities or make sexual behaviors less enjoyable. Addressing such practical concerns (e.g.,altered work schedule, financial difficulties, reassignment of household routines, etc.) may reduce husbands' caregiving burden, which may in turn facilitate better sexual QoL.

Regarding the roles of coping resources in well-being, we found that marital satisfaction was associated with higher levels of sexual QoL, which was in line with prior research (e.g.,Drabe et al., 2015),. Continuing care for spouses is the societal expectation entitled within marriage among Chinese. A higher level of marital satisfaction (e.g.,comfort with closeness and interdependence) could allow individuals to respond to their partner's needs more attentively and see caregiving tasks more positively (Kim and Carver, 2007). In our sample, marital satisfaction was associated with lower caregiving burden, less harm appraisal, less denial coping, and more planning. It implied that marital satisfaction may facilitate more adaptive coping processes, which in turn benefit sexual QoL.

However, social support did not explain significant variances in sexual QoL, above and beyond marital satisfaction. Even Chinese husbands could receive tangible social support from different sources (e.g.,family, relatives, friends), such support may not be useful for addressing sexuality- or intimacy-related issues. Influenced by the traditional Confucianism, Chinese people also tend to avoid open discussions about sexuality outside marriage (Gao et al., 2012), making those husbands unlikely to seek and receive help from others for sexuality issues.

How the husbands interpreted the stressors in the cancer journey was associated with their sexual well-being. Specifically, we found that harm and threat appraisals (but not challenge appraisal) were associated with poorer sexual QoL. Similarly, among spouses of prostate cancer patients, higher levels of perceived threat (but not perceived benefit) and perceived stressfulness towards caregiving were associated with lower sexual satisfaction (Harden et al., 2013). Threat and harm appraisals may be more predictive than challenge appraisal for sexual QoL, regardless of caregivers' gender. Other researchers also examined how the matching of cognitive appraisals between the patients and the caregivers affects the couple's well-being. Bigatti and colleagues (2012) found that caregiver stress was significantly higher when a patient had a positive outlook and the caregiver had a negative outlook for the future. Addressing the contributions of appraisals in a dyadic approach could further enhance our understanding to couple's sexual adjustment.

After controlling for caregiving burden, coping resources, and cognitive appraisals, none of the studied coping strategies still explained unique variance in sexual QoL in the regression model. Such a lack of significant associations may be due to some conceptual overlapping among the coping strategies and other independent variables (e.g., mean inter-correlations of around 0.3 among protective buffering, denial, and planning, and appraisal variables), such that only those variables with strong associations emerged as significant predictors of sexual QoL. Similar patterns have also been reported in other studies applying the Stress and Coping model in predicting caregivers' health outcomes (Fitzell and Pakenham, 2010; Mackay and Pakenham, 2012).

This study was unique in examining how ambivalence over emotional expression (AEE) and its interaction with protective buffering might associate with husbands' sexual well-being in the context of breast cancer caregiving. Previously, AEE was consistently found to be associated with depressive symptoms in both healthy and patient populations (Bardwell et al., 2006; Porter et al., 2005). However, we did not find a significant association between AEE and sexual QoL. It may suggest that having a higher conflict of expressing emotions but fail to do so (i.e.,high AEE) may be less influential than other individual factors (e.g.,self-reported general health) in affecting people's sexual QoL, or that AEE may have a stronger association with mental health outcomes more than sexual QoL.

Protective buffering (i.e., hiding concerns and caregiving-related negative emotions) did not emerge as a significant contributor of sexual QoL, which did not confirm its detrimental role in couples' adjustment as in other Western studies (Manne et al., 2007). Concealing emotions may connect with Chinese cultural expectations to maintain interpersonal harmony (Liu et al., 2005). Suppressing emotions was thought to be critical for not dampening patients' confidence in coping with cancer (Liu et al., 2005). As hiding concerns is encouraged in the broader cultural contexts, protecting buffering may make Chinese husbands feel that they are fulfilling their obligations to protect their wives. Therefore, protective buffering may be regarded as a culturally-appropriate way to protect the patients in Chinese culture, which may reduce the potential negative impact of protective buffering on well-being.

However, we found that the negative association between protective buffering and sexual QoL was only apparent in the context of high AEE. Studies have found that husbands of cancer patients might rely on avoidant coping strategies (e.g.,protective buffering) to deal with sexuality- and intimacy-related problems (Fergus and Gray, 2009). Adding that those husbands may also feel guilty to initiate sex with their wives with breast cancer (Nasiri et al., 2012), couples' communication on sexual issues could become difficult. Previously, Milbury and Badr (2013) found that fewer mutual constructive communications and more demand-withdraw communication between couples living with breast cancer were associated with their sexual problems. The combination of high protective buffering and high AEE may hinder the discussion of sexual concerns within the marital relationship, which is likely to worsen the husbands’ sexual QoL.

4.1. Limitations

This study had several limitations. First, it was a cross-sectional study where the tested relationships were correlational but not causal. Future studies should examine how the stress and coping variables associate with sexual QoL using longitudinal designs. Second, the non-random sampling and self-selection bias might compromise the generalizability of the findings. We recruited the participants from Weifang (a Northeastern third-tier city in China), where the population was diverse with people coming from cities and rural areas. The average income level of Weifang was highly comparable to that of the Shandong province and the national income level (National Bureau of Statistics of the People's Republic of China, 2016; Shandong Provincial Bureau of Statistics, 2016). Compared to major cities (e.g.,Beijing, Shanghai), we saw sampling in Weifang as an advantage due to its higher comparability to average people in China. Third, the regression model explained a moderate proportion of variances in sexual QoL. Other factors may be at play. Caregivers' illness representations, attachment styles, caregiving motivation were found to be associated with spousal caregivers' well-being (Kim et al., 2015; Mackay and Pakenham, 2012). Considering those factors may help to explain additional variance in sexual QoL which was not captured by the variables in this study. Fourth, our sample consisted of husbands recruited shortly after their wives' breast cancer diagnosis (approximately 70% were within three months of diagnosis), which could not capture caregivers' experience at other stages of the illness trajectory. However, the findings were still valuable as this sample primarily focused on recently-diagnosed patients who were undergoing treatment, when caregiver burden was huge. Fifth, this study targeted on an underserved population in the literature. We measured sexual QoL using the modified version (tailored for breast cancer caregiving) of the IWQOL-Lite, which was originally validated and used among people with obesity. Despite its satisfactory psychometric properties, our modified measure was not sufficiently validated in our target population. Cautions should be made when interpreting our findings. We recommend future studies using other established scales (e.g., the Sexual Quality of Life questionnaire-Male (SQoL-M; Abraham et al., 2008), the New Sexual Satisfaction Scale (NSSS; Stulhofer et al., 2010), etc.) to further validate our findings in the contexts of cancer survivorship and cancer caregiving.

4.2. Implications

Attentions towards Chinese breast cancer survivors' sexual well-being have been increased in the recent decade (Wang et al., 2013). However, there are very few interventions attempting to address this issue through the spouses' or couples' perspectives in China. Several Western studies have found that couple-based interventions may improve breast cancer patients' depressive symptoms and sexual well-being (Baucom et al., 2009; Kalaitzi et al., 2007). We recommend future couple-based interventions incorporating at least one separate session to address the unique needs among the spouses of breast cancer survivors. Guided by the Stress and Coping model, our findings imply that reducing husbands' caregiving burden, increasing their marital satisfaction, helping them reevaluate the negative impact of breast cancer (e.g.,harm/threat appraisals), and reducing barriers for expressing emotions and concerns (for AEE and protective buffering) may increase their sexual well-being. Previously, Lewis and colleagues (2008) designed an educational counseling intervention (including training sessions for active listening skills, stress-reducing strategies, and effective use of non-verbal cues) that could increase husbands' self-care self-efficacy, relationship quality, and reduce depression/anxiety. It is important to see if similar interventions could improve Chinese husbands' sexual well-being. In addition, as specific coping strategies (e.g.,protective buffering) may be particularly detrimental to sexual well-being according to people's individual differences (e.g.,AEE), practitioners may also need to take those individual characteristics into account when designing interventions. Integrating our findings with the current literature can help developing theory- and evidence-based interventions to facilitate better sexual well-being among husbands and couples living with breast cancer.

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