Assessing the Relationship between Body Image and Quality of Life Among Rural and Urban Breast Cancer Survivors in China

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Abstract

Purpose

This study aimed to examine the associations between multidimensional body image and quality of life (QoL) and test whether the associations between body image and QoL are moderated by rural-urban residence in Chinese breast cancer survivors.

Methods

A cross-sectional design was adopted. Breast cancer survivors were recruited via a convenience sampling method. Two validated questionnaires (Body Image Self-Rating Questionnaire for Breast Cancer and SF-36) and questions assessing demographic and clinical covariates were administered.

Results

In our sample of 354 breast cancer survivors, half (50.28%) lived in rural areas. After adjusting for demographic and clinical variables, better perception of body image-related sexual activity change, role change, and psychological change was significantly associated with better physical and mental well-being. Better perception of body image-related social and behavior change domains was only significantly associated with better mental well-being. The association between body image and mental well-being was much stronger in urban subjects (b = -0.38, $p < 0.001$) than in rural subjects (b = -0.20, $p < 0.001$).

Conclusions

Our findings suggest that multidimensional body image is associated with physical and mental well-being in Chinese breast cancer survivors. Body image appears to play a larger role in urban breast cancer survivors' mental well-being. Our findings indicate that incorporating interventions that address body image issues would be advantageous for survivorship care programs focused on enhancing QoL in breast cancer survivors. Considering the rural-urban differences supports strategic design of the care programs in rural and urban settings.

Introduction

In China, breast cancer is the most common cancer diagnosed among women, and it is the fourth in cancer death in women [1]. Breast cancer surgery and adjuvant therapies can result in loss of a breast, scarring, alopecia, and skin alterations as well as weight changes. These physical appearance changes, together with various symptoms such as sensation alteration, arm function impairment, and fatigue can change breast cancer survivors' mental image of their bodies [2-4]. Body image encompasses one's body-related self-perceptions, attitudes, and behaviors [5], and body image concerns are one of the most common

psychosocial issues experienced by breast cancer survivors. Poor body image has been linked to depression [6,7], sexual concerns [8,9], and psychological distress in breast cancer survivors [3,10].

Helping breast cancer patients adapt to aesthetic and functional changes resulting from the disease and its treatment, whether temporary or permanent, has the potential to reduce body image-related distress and thus improve patients' quality of life (QoL) as they transition into survivorship [11,12]. Thus, the nature of the relationships between major domains of body image and different domains of QoL need to be understood, as different aspects of body image may play different roles in influencing survivors' QoL [11]. Researchers have reported that overall body image was correlated with QoL in breast cancer survivors [7,13], but few have explored the relationship between the various body image and QoL domains. Moreover, few findings regarding the relationship have been reported for Chinese breast cancer survivors, who are more likely to be diagnosed before the age of 50 years and have more advanced staging than western women [14,15]. They also tend to undergo more aggressive treatments and are less likely to have breast reconstruction; a stable low reconstruction rate at about 3.5% was observed among Chinese breast cancer survivors [15,16]. The reasons for the low reconstruction rate were reported to be smaller breast volume of Chinese women, patients' traditional beliefs that cancers should be radically resected, their lack of awareness of the possibility of breast reconstruction, shortage of radiation therapy and skilled surgeons, and lack of insurance coverage [16,17].

In addition, little research attention has been given to body image among rural breast cancer survivors. In China, rural breast cancer survivors tend to exhibit more progressive breast cancer than urban survivors [18]. This leads to a higher proportion of modified radical mastectomies and more adjuvant treatments in rural women with breast cancer, which can greatly influence their body image and QoL [18,19]. The relationship between body image and QoL also likely differs due to various determinants of rural-urban disparities [20]. However, it appears that no previous research has examined rural-urban residence as a moderator of the relationship between body image and QoL in breast cancer survivors. Understanding the role of place of residence may support strategic design of care plans for breast cancer survivors in urban and rural settings. In this study, we aim to investigate the associations between the multiple domains of body image and QoL in Chinese breast cancer survivors and to test whether place of residence has a moderation effect on the associations.

The conceptual framework for this study (Figure 1) was derived from a literature review of the two concepts of interest— QoL [21,22] and body image [23,5]— and the theoretical frameworks addressing relationships between body image and QoL in the contexts of medical conditions [12] and breast reconstruction [11]. Body image is here defined as a multifaceted construct that refers to the individual's mental image of her body, which extends beyond the perception of her appearance and involves adaptations to her changing body [11,4]. The body image-related changes are not static; they are experiences of the moment, influenced by the individual's dynamic adaptation to the disease and its treatment [12]. Thus, the concept of body image does not only address how a woman views her appearance and femininity, but also encompasses body image-related changes in her roles (in conducting daily activities and functioning as a mother and worker), changes in social involvement, changes in behaviors (such as avoiding attention to her body and repeatedly checking her breast), and sexual functioning changes (such as decreased sexual desire and arousal) [4]. Similar to

body image, QoL is recognized to be multidimensional in nature and entirely subjective [24,25]. In this study, we focus on two major QoL domains that body image may affect: physical and mental well-being. Physical well-being encompasses one's perceived physical function, bodily pain, and role limitations due to physical problems [26,22]. Mental well-being mainly involves social functioning, emotional and mental health, and role limitations due to emotional problems [25,26,22].

According to Pruzinsky [12], body image related changes can be pervasive and strong enough to impact QoL in populations with medical conditions. We posit that different domains of body image-related changes are correlated with mental and physical well-being in breast cancer survivors. The constructs of body image and QoL affect each other and overlap from a conceptual standpoint, but each has unique features [11]. Our theoretical framework suggests that body image may both influence and be influenced by QoL. Based on the literature, other factors also influence breast cancer survivors' body image and QoL. One broad category is premorbid influences, which refer to past experience and one's position in society [11,19]. This category encompasses socioeconomic status, place of residence, access to healthcare services, social culture, and psychological factors. The other category is the breast cancer disease and its treatment factors, which include clinical stage, surgery type, post-surgery time, adjuvant therapy, and post-surgery time [11,2,19]. In this study, we define the place of residence in terms of self-identification because this is especially useful when focusing on individual subjective experience such as body image and QoL, which is influenced by self-identity as well as cultural perceptions.

Based on our conceptual framework, this study aimed to (1) examine the associations between body image and QoL subdomains in Chinese breast cancer survivors and (2) test whether the associations between body image and QoL are moderated by place of residence. The findings of this investigation will enhance the understanding of rural-urban disparities in psychosocial health and shed light on the development of evidence-based clinical practice and survivorship care to address the body image concerns of the growing population of breast cancer survivors and improve their overall QoL.

Method

Study design

A cross-sectional, associational design was adopted.

Study sample

Data were collected in two tertiary hospitals in Xi'an, a large city in northwestern China. Due to the high concentration of healthcare resources in China's cities, rural residents almost always travel to larger hospitals in urban areas to obtain diagnosis and treatment. Hospitals in rural regions and small towns typically do not have the equipment or skilled staff needed to diagnose or treat major conditions such as breast cancer.

A convenience sample of 354 subjects was recruited. All subjects were aged 18 years or older, were female, had been pathologically diagnosed with breast cancer, and had undergone breast cancer surgery. Women with metastatic breast cancer or having been diagnosed with other cancers were excluded. Women who provided informed consent to participate completed the research survey and returned it to trained researchers

who remained in the hospitals during the data collection period. Subjects with reading or writing difficulties were interviewed by the researchers to record their responses.

Measures

Demographic and Clinical Covariates

Using a questionnaire prepared by the researchers, subjects provided information on their demographics (e.g., place of residence, educational attainment, and employment status) and clinical treatment (e.g., their clinical stage and surgery type). Unlike many studies that defined place of residence in terms of subjects' *Hukou* (their registered household of origin in rural or urban areas), we defined place of residence as the subjects' reported main residence during the past 3 months; this operationalization reflects current place of residence, which is often inconsistent with *Hukou* registrations. The residence options were rural (agricultural areas) and urban areas (cities), defined by the National Bureau of Statistics [27].

Body Image

Body image domains were measured with the Body Image Self-Rating Questionnaire for Breast Cancer (BISQ-BC) developed by Zhou et al [4]. This instrument was developed specifically for use with breast cancer patients in China. Also, it highlights key aspects of changes related to body image, which serves to enhance understanding of the process of psychological adjustment to bodily changes. The BISQ-BC includes five subscales: body image (BI)-related behavior change, BI-related sexual activity change, BI-related role change, BI-related psychological change, and BI-related social change. The questionnaire employs a 5-point Likert scale; responses to each item range from 1 (strongly disagree) to 5 (strongly agree). Higher scores of the scale and its subscales indicate poorer body image. For this study, the Cronbach's alpha values for the five subscales ranged from 0.72 to 0.82.

Quality of Life

QoL domains were assessed with the Chinese version of the 36-item Short-Form Health Survey (SF-36 v2.0) [25]. It consists of eight subscales: physical function, role-physical, bodily pain, general health, vitality, social function, role-emotional, and mental health. These subscales are used to calculate the physical component summary (PCS) and mental component summary (MCS). Health Outcomes Scoring Software 2.0 (QualityMetric Incorporated) was used to calculate the eight subscale scores and two summary components [25]. In our conceptual framework, physical well-being and mental well-being were defined as the PCS and MCS of the SF-36. Higher scores of PCS and MCS indicate better QoL. The Cronbach's alpha values for the eight subscales ranged from 0.73 to 0.90.

Statistical Analyses

The two-sample t-test and chi-square test were used to compare demographic and clinical characteristics of subjects currently living in rural and urban areas. Descriptive statistics were calculated for QoL and body image, and comparisons were made between rural and urban subjects employing the two-sample t-test.

Multiple linear regressions were subsequently conducted to assess the relationship between body image subscales and the two QoL summary components after adjusting for covariates.

Next, to test the moderating effect of place of residence, we followed the procedures outlined by Aiken and West [28]. After controlling for demographic and clinical covariates, the body image total score and place of residence (reference: rural areas) were entered in Step 1, and the interaction term (place of residence × body image) was entered in Step 2 to test the moderation effect and yield the changed R square. The predictors were centered around 0 to reduce multicollinearity. Post-hoc simple slope analyses were conducted to determine the nature of the significant interactions.

Results

Table 1 depicts demographic and clinical covariates for the study subjects. Overall, subjects' mean age was 49.65 years (SD = 9.83). Most subjects were married (95.76%), with an education level of secondary school or less (78.81%), and a monthly household income per capita over the past year (monthly income) of less than 3,000 yuan (68.27%). Half of the subjects (n = 178, 50.28%) lived in rural areas. Rural subjects had significantly lower educational attainment; only 2.81% had tertiary education, compared with 39.77% of their urban counterparts. Rural subjects also had lower monthly income; 10.67% of rural subjects were paid > 3,000 yuan, compared with more than half of the urban subjects. Similar proportions of rural (37.08%) and urban subjects (35.80%) were employed at the time of our research, but 58.99% of the rural women were unemployed compared to only 21.02% of the urban women. As to their clinical characteristics, rural and urban subjects differed significantly in their surgery types. Rural subjects tended to have undergone more aggressive surgeries, with 69.10% having modified radical mastectomy versus 57.39% of urban subjects.

Table 2 summarizes the scoring of the eight subscales and two summary components (PCS and MCS) for QoL, the five subscales for body image, and the body image total score. Urban subjects had better mental well-being than rural subjects, while their physical well-being did not differ significantly. Urban subjects had significantly better overall body image. They also had higher body image scores for all five domains, and the differences were statistically significant for BI-related role change and BI-related psychological change.

Table 3 shows the relationships between the five body image domains and two QoL components. Through analysis of adjusted regression models, the five body image domains were significantly associated with mental well-being after controlling for demographic and clinical covariates, with standardized coefficients ranging from -0.46 to -0.33. Also, three body image domains (BI-related sexual activity change, BI-related role change, and BI-related psychological change) were significantly associated with physical well-being after controlling for covariates; the standardized coefficients were smaller, ranging from -0.15 to -0.11. On the whole, breast cancer survivors with a better perception of their body image reported greater mental and physical well-being.

Table 4 summarized the test of the moderation effect of place of residence. In hierarchical linear regression, the addition of the interaction term at Step 2 explained an additional 1.66% of the variance (p = 0.007) in mental well-being. Post-hoc slope analyses demonstrated that the association between body image and mental well-being was much stronger in urban subjects (b = -0.38, p < 0.001) than in rural subjects (b = -0.20,

p < 0.001). Figure 2 displays this moderation effect of place of residence. In explaining physical well-being, no significant interaction between body image and place of residence was found in Step 2.

Discussion

Our study focused on rural and urban Chinese breast cancer survivors whose body image and its associations with QoL have not received adequate attention in research and practice. After controlling for demographic and clinical covariates, having better body image in any of the five domains (BI-related social change, BI-related behavior change, BI-related sexual activity change, BI-related role change, and BI-related psychological change) was associated with better mental well-being. The close correlation between all 5 domains of body image and mental well-being was supported by past research. Breast cancer survivors with poorer body image typically had higher levels of anxiety and depression [6,7,29]. A meta-synthesis concluded that breast cancer survivors' perception of physical appearance changes triggered discrepancy between self and societal image of femininity, leading to altered identity; women who were unable to renegotiate or reposition their identity experience emotional distress [10]. Also, a longitudinal study in breast cancer survivors found that body image-related psychological changes (fear of recurrence and death, lower satisfaction with physical appearance) predicted negative affections (unpleasantness and subjective distress such as anger and sadness) 6 months after mastectomy [29]. Our study indicated that improving all subdomains of body image is key to promoting mental well-being in breast cancer survivors.

Among the five domains of body image, poorer BI-related sexual activity changes, role changes, and psychological changes were associated with worse physical well-being, indicating correlations between mind and body. Failing to adapt to altered body image resulted in psychological distress and chronic stress, which were shown in research to cause cancer patients' fatigue, impaired sleep, and cognitive dysfunction by affecting the neuroendocrine system and inducing inflammation [30]. This mind-body interaction has received much research attention in cancer survivors; lower positive psychosocial factors (e.g., less social support) and higher negative psychosocial factors (e.g., higher anxiety and perceived stress) were associated with biomarkers (e.g., chronic elevations of cortisol) indicating worse clinical outcomes [31,32].

Our study framework and findings suggest that there may be some universal benefits of improving positive perception of body image. To improve Chinese breast cancer survivors' body image, access to lumpectomy and reconstruction needs to be increased. Survivors with lumpectomy were shown to experience better overall body image than those with mastectomy [33-35]. Reconstruction also contributes to women's wholeness and addresses their body image concerns to some extent [35]. The advantages and disadvantages of these surgery options should be discussed with Chinese breast cancer patients to assist informed decision-making on surgeries. Also, in line with a review on managing body image in adult cancer patients [36], healthcare professionals are recommended to discuss body image with every breast cancer survivor and refer them to a mental health specialist if needed. In addition, psychological interventions that assist in adapting to body image-related changes need to be developed and integrated into survivorship care.

Regarding the moderation effect of rural-urban residence, body image appears to be more important to urban women than rural women. The mechanism of how place of residence moderates the association is beyond the scope of this study. Yet there are three potential explanations. First, rural breast cancer survivors may

have health needs or concerns more important than body image. They were reported to have many more unmet needs for healthcare system information and more limited access to supportive care than their urban counterparts [37]. Thus, rural survivors may have to prioritize their healthcare system information needs and health service needs, with body image becoming less important for them even if they have significantly worse body image and mental well-being than urban survivors.

Second, rural breast cancer survivors in China may focus more on practical livelihood issues such as financial needs and impaired ability to perform manual labor, rather than body image. In our study, only 10.67% of rural subjects had a monthly income of over 3,000 yuan, compared with over half of urban subjects who were earning this much. Rural subjects were thus more likely to experience financial toxicity than urban subjects. In addition, among subjects who were employed at the time of our study, 77.27% of rural subjects were peasants, whereas very few urban subjects (6.35%) were peasants; only 3.93% of rural subjects were retired, compared with 43.18% of urban subjects. In China, peasants mostly reside in rural areas and usually do not "retire" at a specific age. Thus, such subjects would have continued to work and produce wealth for their family if they had not been diagnosed with breast cancer. Similar to our finding of more rural subjects being unemployed than urban subjects (58.99% versus 21.02%), a recent study reported that rural Chinese cancer survivors were at higher risk for stopping work after treatment compared with urban Chinese and rural American cancer survivors; 40% of rural Chinese cancer survivors reported stopping work or farming due to cancer, and 39% reported reducing working hours [38].

Finally, urban breast cancer survivors may put more effort into addressing their body image-related concerns and cope with them more effectively. Our urban subjects had a populous living environment and their occupations typically involved less manual labor but more interaction with people; for example, 49.21% of urban employed subjects were professionals/managers, compared with 1.52% of rural subjects. Therefore, urban survivors being diagnosed and treated for breast cancer usually impaired their working ability less, and they might have valued their body image more due to frequent social contact. A study in Australian adult women showed that engagement in more social interactions was predictive of subsequently improved body satisfaction [39]. In addition, previous research [40] showed that living in rural China and having less education predicted less adaptive coping patterns in breast cancer patients. Thus, rural breast cancer survivors may cope with body image less effectively.

Limitations

This study has some limitations. First, our sample was convenience-based and was recruited in only two hospitals. Our non-probability sampling strategy limited the generalizability of our findings. However, the two tertiary hospitals serve populations living in Shaanxi and nearby provinces, so our subjects were likely representative of Chinese breast cancer survivors living in northwestern China, where the economy is less developed than in coastal areas. In addition, we did not consider the influence of migrant-worker status. Many rural women migrate to urban areas to access more job opportunities in rapid urbanizing China. As a result, they are geographically closer to quality healthcare resources, but also face new barriers to healthcare, such as reimbursement for health services [41,18]. It is unclear how migration influences the associations between body image and QoL among women with breast cancer.

FUTURE IMPLICATIONS

Based on previous theories and research, we developed a conceptual framework to better understand body image and QoL in breast cancer survivors. Breast cancer survivors with better body image reported greater mental and physical well-being. Our findings indicate that the incorporation of interventions that address body image issues would be advantageous for the growing array of survivorship care programs focused on enhancing QoL in Chinese breast cancer survivors. Also, access to lumpectomy and reconstruction should be increased in women diagnosed with breast cancer. Prospective research is warranted to investigate the potential bidirectional associations between body image and QoL.

Body image appears to play a larger role in urban breast cancer survivors' mental well-being. Further research is called for to disentangle the underlying reason of the moderation effect because it is essential for strategically improving these survivors' well-being as well as for promoting the development of policies for cancer survivorship care. Qualitative research should be considered to explore breast cancer survivors' experiences and views of body image, its association with their QoL, and the role played by place of residence. Finally, to play a key role in educating and supporting breast cancer survivors and provide personalized care plans, healthcare professionals should evaluate body image and QoL in breast cancer survivors and understand the moderating role played by rural-urban residence.

Declarations

Conflict of interest

The authors declare that they have no conflicts of interest.

Availability of data and material

Not applicable.

Code availability

Not applicable.

Ethical approval

The study protocol was approved by the Research Ethics Committee of Xi'an Jiaotong University Health Science Center (Reference No.: 2015–170).

Consent to participate

Each participant provided informed consent prior to their enrollment.

Consent for publication

Yes.

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Tables

Table 1

Demographic and clinical characteristics of participants [a] (n = 354)

Characteristics	Rural Participants	Urban Participants	Statistics (t/χ^2)	P value
Demographics				
Years of age, mean (SD)	49.04 (9.56)	50.26 (10.09)	-1.17	0.88
Educational attainment, N (%)			117.46	< 0.001
Primary and lower	62 (34.83)	11 (6.25)		
Secondary	111 (62,36)	95 (53.98)		
tertiary	5 (2.81)	70 (39.77)		
Marital status, N (%)			0.06	0.81
Married	170 (95.51)	169 (96.02)		
other	8 (4.49)	7 (3.98)		
Monthly household income per capita over the past year (Chinese Yuan), N (%)			98.37	< 0.001
< 1000	76 (42.70)	11 (6.25)		
1000−3000	83 (46.63)	71 (40.34)		
> 3000	19 (10.67)	93 (52.84)		
Employment status, N (%)			89.98	< 0.001
Employed	66 (37.08)	63 (35.80)		
Unemployed	105 (58.99)	37 (21.02)		
Retired	7 (3.93)	76 (43.18)		
If employed, occupation			69.41	< 0.001
Peasants	51 (77.27)	4 (6.35)		
Self-employed	5 (7.58)	5 (7.94)		
Elementary Laborers	6 (9.09)	5 (7.94)		
Professionals/managers	1 (1.52)	31 (49.21)		
Others	3 (3.55)	18 (28.57)		
Clinical characteristics				

Characteristics	Rural Participants	Urban Participants	Statistics (t/χ^2)	P value
Surgery type, N (%)			6.13	0.047
Modified radical mastectomy	123 (69.10)	101 (57.39)		
Total mastectomy	43 (24.16)	53 (30.11)		
Lumpectomy	12 (6.74)	22 (12.50)		
Chemotherapy, N (%)			0.96	0.62
Undergoing	136 (76.40)	133 (75.57)		
Completed	37 (20.79)	35 (19.89)		
No chemotherapy	5 (2.81)	8 (4.55)		
Clinical stage, N (%)			3.06	0.22
0 & I	29 (16.29)	42 (23.86)		
II	102 (57.30)	91 (51.70)		
III & IV	47 (26.40)	43 (24.43)		
Post-surgery time, mean (SD)	2.80 (2.75)	3.18 (3.40)	-1.15	0.87

Abbreviation: SD, standard deviation.

[a] Significant associations/differences (p < 0.05) were marked in bold.

Table 2
Body image and quality of life [a] (n = 354)

	Overall (Mean ± SD)	Rural (Mean ± SD)	Urban (Mean ± SD)	MD (95% CI)	P value
Physical function	45.33 ± 6.47	44.77 ± 6.75	45.68 ± 6.12	-0.91(-2.26, 0.43)	0.19
Role limitations due to physical problems	34.91 ± 9.42	34.03 ± 8.35	35.49 ± 10.12	-1.46 (-3.40, 0.48)	0.14
Bodily pain	47.64 ± 10.11	47.79 ± 10.21	47.14 ± 9.98	0.64 (-1.47, 2.76)	0.55
General health	43.06 ± 9.33	42.04 ± 8.60	43.79 ± 9.74	-1.74 (-3.66, 0.18)	0.07
Vitality	48.75 ± 8.85	47.81 ± 8.64	49.41 ± 8.94	-1.60 (-3.44, 0.24)	0.09
Social functioning	39.04 ± 10.77	38.72 ± 10.28	39.11 ± 11.08	-0.39 (-2.62, 1.85)	0.73
Role limitations due to emotional problems	38.80 ± 10.83	37.61 ± 10.31	39.73 ± 11.27	-2.12 (-4.38, 0.13)	0.07
Mental health	44.47 ± 8.77	43.24 ± 8.54	45.52 ± 8.90	-2.28 (-4.10, -0.45)	0.01
Physical component summary	43.66 ± 6.52	43.38 ± 6.05	43.64 ± 6.82	-0.26 (-1.61, 1.08)	0.70
Mental component summary	42.49 ± 9.49	41.30 ± 9.06	43.46 ± 9.79	-2.15 (-4.13, -0.18)	0.03
BI-related social change	6.17 ± 1.89	6.35 ± 1.80	6.05 ± 1.96	0.30 (-0.09, 0.70)	0.13
BI-related behavior change	24.61 ± 4.05	24.63 ± 3.98	24.67 ± 4.13	-0.04 (-0.89, 0.81)	0.92
BI-related sexual activity change	12.36 ± 2.60	12.45 ± 2.51	12.31 ± 2.72	0.15 (-0.40, 0.69)	0.60
BI-related role change	14.77 ± 3.37	15.44 ± 3.17	14.21 ± 3.44	1.24 (0.54, 1.93)	< 0.01
BI-related psychological change	25.20 ± 5.27	26.03 ± 4.76	24.58 ± 5.61	1.45 (0.37, 2.54)	< 0.01
BI summary	83.17 ± 14.42	84.95 ± 13.24	81.87 ± 15.30	3.08 (0.09, 6.07)	0.04

Abbreviation: BI, body image; MD, mean difference; SD, standard deviation; 95% CI, 95% confidence interval.

[a] Significant differences (p < 0.05) were marked in bold.

Table 3

Adjusted multiple linear regression models assessing relationships between body image and quality of life domains [a,b] (n = 354)

	PCS			MCS		
	Std. β	95% CI	P value	Std. β	95% CI	P value
BI-related social change	-0.07	-0.16, 0.02	0.20	-0.40	-0.49, -0.32	< 0.001
BI-related behavior change	-0.09	-0.18, 0.00	0.11	-0.33	-0.41, -0.24	< 0.001
BI-related sexual activity change	-0.11	-0.21, -0.03	0.03	-0.34	-0.42, -0.25	< 0.001
BI-related role change	-0.14	-0.23, -0.05	0.01	-0.38	-0.47, -0.30	< 0.001
BI-related psychological change	-0.15	-0.24, -0.06	0.01	-0.46	-0.54, -0.38	< 0.001

Abbreviation: BI, body image; MCS, mental component summary; PCS, physical component summary; Std. β, standard coefficient; 95%CI, 95% confidence interval.

[a] All linear regression models were adjusted for the following covariates: age, education attainment, marital status (ref: married), reside (ref: rural areas), monthly income, employment status (ref: employed), clinical stage (ref: stage 0 & I), surgery type (ref: modified radical mastectomy), adjuvant chemotherapy status (ref: undergoing chemotherapy), and post-surgery time.

[b] Significant associations (p < 0.05) were marked in bold.

Table 4

Hierarchical linear regression testing the interaction effects of place of residence[a] (n = 354)

	PCS					MCS				
	Std. β	95% CI	P value	ΔR^2	adjR$^2_{cum}$	Std. β	95% CI	P value	ΔR^2	adjR$^2_{cum}$
Step 1				0.10	0.06				0.24	0.21
BI	-0.14	-0.23, -0.05	0.009			-0.46	-0.53, -0.38	< 0.001		
Place of residence (Ref: rural areas)	0.08	-0.20, 0.05	0.32			0.10	-0.21, 0.02	0.17		
Step2				0.003	0.06				0.02	0.23
BI	-0.08	-0.16, 0.003	0.34			-0.31	-0.44, -0.19	< 0.001		
Place of residence (Ref: rural areas)	0.08	-0.05, 0.20	0.30			0.11	-0.009, -0.22	0.13		
Place of residence × BI	-0.09	-0.22, 0.05	0.28			-0.20	-0.32, -0.08	0.007		

Abbreviation: BI, body image; MCS, mental component summary; PCS, physical component summary; Std. β, standard coefficient; 95%CI, 95% confidence interval.

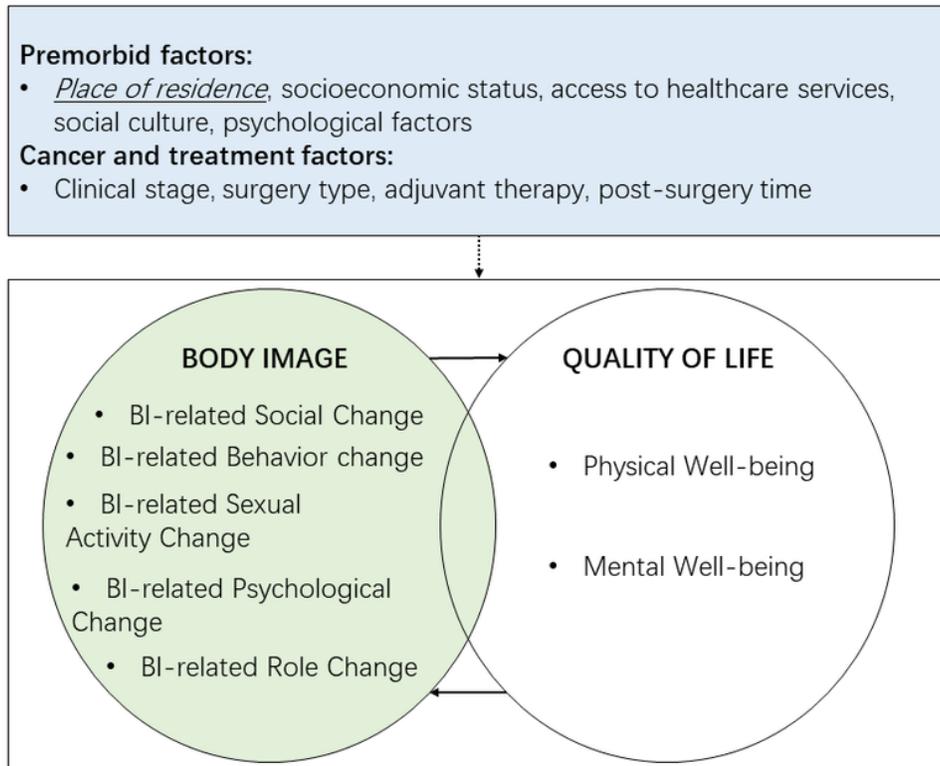[a] Regression models with p < 0.05 and significant coefficients (p < 0.05) were marked in bold.

Figures

Figure 1

Conceptual Framework of associations between body image and quality of life in breast cancer survivors
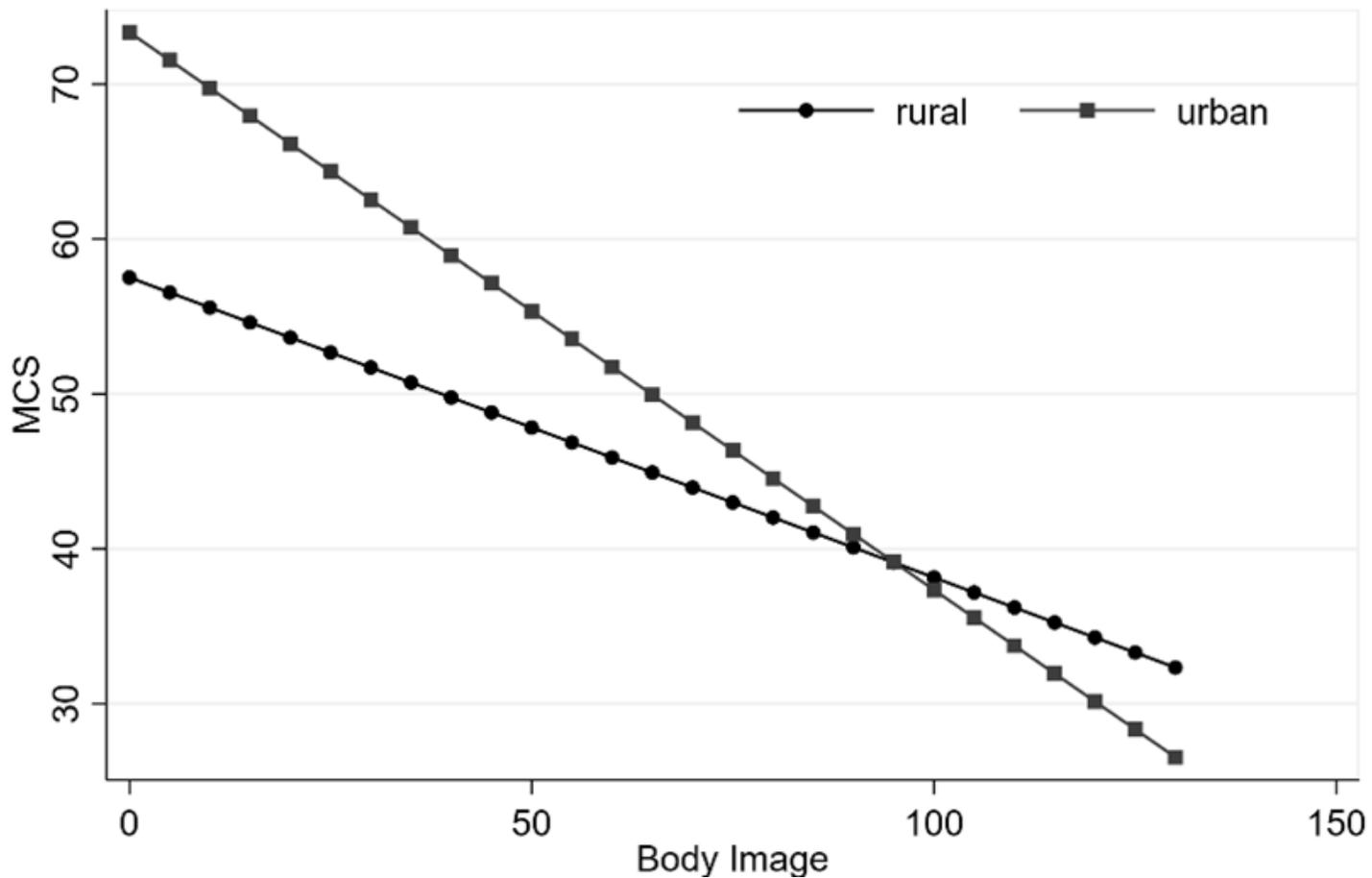
Figure 2

Moderation effects of rural-urban residence on associations between body image and mental well-being (N = 354)