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Positive psychological capital as a mediator between body image disturbance and post-traumatic growth in reproductive-age breast cancer patients: a cross-sectional study

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Abstract

Background Reproductive-age breast cancer patients frequently experience significant body image disturbance (BID) following surgery. While such trauma typically triggers distress, it can also catalyze post-traumatic growth (PTG). However, the internal psychological mechanisms facilitating this transformation remain insufficiently understood.

Objective This cross-sectional study aimed to investigate the relationship between BID and PTG, specifically examining the mediating role of positive psychological capital (PsyCap).

Methods A total of 232 hospitalized patients were recruited from two tertiary hospitals in Hunan Province, China. Data on BID, PsyCap, and PTG were collected using the Body Image Disturbance Questionnaire, the Psychological Capital Questionnaire, and the Post-traumatic Growth Inventory. PROCESS Model 4 was employed to analyze the mediating effect.

Results BID significantly and negatively predicted PsyCap (a = − 0.424, $P < 0.001$), while PsyCap significantly and positively predicted PTG (b = 0.256, $P < 0.001$). The direct effect of BID on PTG proved non-significant (c'=0.048, $P = 0.624$). Bootstrap analysis confirmed a significant indirect effect via PsyCap (ab = − 0.108, 95% CI [− 0.227, − 0.033]), indicating a complete mediating role.

Conclusions PsyCap serves as a critical bridge linking BID to PTG. Cultivating PsyCap may effectively transform body image distress into psychological growth among young breast cancer survivors.

Background

Breast cancer constitutes a significant global health burden, ranking as the most prevalent malignancy among women worldwide.In China, breast cancer incidence has been on a steady upward trajectory, and the number of new cases is expected to reach 452,000 by 2030[1]. Notably, a substantial proportion, nearly 40%, affects women of childbearing age (18–49 years)[2]. These patients face distinct adaptive challenges stemming from somatic changes induced by the disease itself and its subsequent treatment regimens—encompassing surgical resection, adjuvant chemoradiotherapy, and endocrine therapies—which invariably trigger a spectrum of body image distress.In reproductive-age breast cancer patients, such body image distress merits focused examination regarding its influence on post-traumatic growth.This study aimed to investigate PTG and its relationship with body image disturbance and psychological capital among breast cancer patients of childbearing age.

Post-traumatic growth (PTG) is conceptualized as the positive psychological transformation experienced following intensive struggle with highly adverse life circumstances[3]. Research indicates that post-traumatic growth unfolds through a sequential process of cognitive-emotional processing: individuals engage in deliberate rumination to make sense of the trauma, modulate their emotional responses, and enact adaptive coping strategies[4]. This facilitative process culminates in positive psychological shifts, including deepened life appreciation, enhanced personal strength, enriched interpersonal relationships,

identification of novel existential possibilities, and spiritual development[5]. Despite the considerable trauma inherent in a breast cancer diagnosis and its arduous treatment regimen, a significant subset of patients reports experiencing PTG[6]. Elucidating the modifiable determinants of PTG in this population, particularly among younger patients navigating unique age-specific stressors, is imperative for designing targeted supportive care interventions that foster adaptive psychological integration.

Positive psychological capital (PsyCap) represents a higher-order, state-like psychological resource comprised of four core capacities: self-efficacy, hope, resilience, and optimism[7–9]. Grounded in positive psychology theory, PsyCap is conceptualized as a malleable, higher-order resource that fuels individuals' capacity for adaptive cognitive processing in the aftermath of adversity[8]. As a higher-order integrative resource, PsyCap facilitates the reappraisal of adversity, sustains motivated agency in the pursuit of meaningful goals, and supports the active construction of meaning from suffering. Notably, PsyCap is intrinsically linked to post-traumatic growth[10]. Empirical evidence consistently affirms that robust PsyCap correlates with superior psychological well-being and adaptive outcomes across diverse populations, including those navigating severe health crises[11]. Yet research focusing on childbearing-age breast cancer patients—who face unique stressors including fertility concerns, caregiving burdens, and body image disturbance—remains limited, leaving its predictive utility in this vulnerable group underexplored. Thus, Hypothesis 1 is proposed: PsyCap exerts a positive predictive effect on PTG among reproductive-age breast cancer patients.

BID is a pervasive and distressing sequela for reproductive-age women undergoing breast cancer treatment[12, 13]. Surgical modalities (e.g., mastectomy, breast-conserving surgery) and adjuvant therapies (chemotherapy, radiotherapy) frequently induce visible somatic alterations, including scarring, alopecia, lymphedema, and modifications in breast morphology and sensitivity. BID manifests as a negative cognitive-affective schema regarding one's physical appearance, functional capacity, and bodily integrity[12, 13], often precipitating feelings of disfigurement, shame, anxiety, and depression. These manifestations critically undermine self-esteem, sexual health, intimate relationships, and overall quality of life[13]. From a Conservation of Resources perspective, BID operates as a chronic psychosocial stressor that progressively depletes finite psychological reserves[14]. For younger patients, societal ideals equating femininity with physical attractiveness exacerbate the dissonance between the post-treatment "actual self" and the pre-illness "ideal self," as postulated by self-discrepancy theory[15]. This self-discrepancy elicits profound distress, depleting resources vital to sustaining hope, self-efficacy, resilience, and optimism[16]. Prior empirical inquiries corroborate that negative body self-perception serves as a robust predictor of attenuated psychological resources[15, 17]. Although extant literature acknowledges correlations among BID, PsyCap, and PTG in cancer survivors, the precise mediational mechanisms linking these constructs remain inadequately characterized. To address this gap, we advance Hypothesis 2: Body image disturbance influences post-traumatic growth in childbearing-age breast cancer patients via the mediating pathway of positive psychological capital.

Investigating the mediating role of PsyCap in the BID–PTG association holds considerable clinical relevance. As a key modulator of long-term mental health, PTG facilitates the positive reinterpretation of

adverse illness experiences and reduces the chronicity of negative affect in cancer patients[18]—a benefit of particular salience to young breast cancer patients navigating career consolidation, family formation, and fertility-related stressors. Delineating how PsyCap intervenes in the BID-psychological adaptation pathway enables breast oncology care teams,with frontline nurses as the primary implementers,to develop precision evidence-based interventions that bolster patients' PsyCap reserves, buffer the deleterious psychological sequelae of BID, and proactively foster PTG.Accordingly, this study focuses on young breast cancer patients to empirically validate PsyCap's mediating role between BID and PTG, thereby providing a theoretical foundation for developing targeted psychobehavioral interventions.

Methods

Study design

This was a descriptive, quantitative, cross-sectional survey. The study was conducted from August 2025 to June 2026 at two Class A tertiary hospitals in Hunan Province, China. All study variables were captured concurrently during a single inpatient ward visit. All data were collected during the participants' hospitalization.We followed the Strengthening the Reporting of Observational Studies checklist to ensure reporting rigor.

Participants

Data were collected from August 2025 to June 2026 among patients in the Departments of Breast Medicine and Breast Surgery at the First Affiliated Hospital of Hunan University of Traditional Chinese Medicine and Hunan Cancer Hospital, located in Changsha, China.Participants were eligible for inclusion if they met the following criteria: (a) female, aged 18–49 years; (b) pathologically confirmed diagnosis of breast cancer; (c) normal communication and comprehension abilities; and (d) voluntary provision of informed consent. Patients were excluded if they had (a) a documented history of mental illness or cognitive impairment, or (b) other severe comorbid conditions.

The sample size was calculated using G*Power 3.1 software. A sample of 163 reproductive-age hospitalized breast cancer patients provided 80% power to detect an effect size of $f^2=0.15$ at $\alpha = 0.05$.

Measurements

Demographic questionnaire

Demographic and clinical characteristics were collected using a self-designed questionnaire, encompassing age, educational level, marital status, residence location, household income, personality

type, employment status, disease duration, clinical stage, engagement in rehabilitation, surgical details, and disease awareness.

Chinese Version of the Post-traumatic Growth Inventory

The Chinese Version of the Post-traumatic Growth Inventory (C-PTGI), adapted from the original Post-Traumatic Growth Inventory by Tedeschi et al.[19]and culturally validated for Chinese populations by Ji et al.[20], is a 20-item self-report scale designed to capture positive psychological changes following traumatic experiences. It comprises five dimensions: appreciation of life (5 items), personal strength (4 items), new possibilities (3 items), relating to others (5 items), and spiritual change (3 items). Responses are rated on a 6-point Likert scale ranging from 0 ("not at all") to 5 ("a great deal"), with total scores ranging from 0 to 100. To facilitate interpretation, total scores were categorized into three levels based on established normative cutoffs for Chinese cancer patients13: low growth (< 60), moderate growth (60–65), and high growth (≥ 66). The C-PTGI demonstrated good internal consistency in this study, with a Cronbach's α of 0.806.

Body Image Disturbance Questionnaire

The Body Image Disturbance Questionnaire (BIDQ), originally developed by Cash et al.[21] and validated within a Chinese cultural context by Shen et al[22, 23], is a unidimensional scale designed to assess the severity of body image disturbance. It comprises 7 items, with responses rated on a 0-to-8 scale, where 0 corresponds to "not at all or none" and 8 corresponds to "extremely or always". Total aggregate scores range from 0 to 56, with higher scores reflecting more pronounced body image disturbance. The Cronbach’s α coefficient for the BIDS in the current study was 0.713.

Psychological Capital Questionnaire for Cancer Patients

The Psychological Capital Questionnaire for Cancer Patients (PCQ-C) functioned as the measurement instrument for psychological capital. This 24-item self-report instrument, adapted and validated by Cui et al.[18] based on the original PCQ developed by Luthans et al.[7] The PCQ is copyrighted by Mind Garden. Permission has been granted to Pengtao Guan and Springer Nature Limited for the use and reproduction of this instrument in this article. Scale assesses psychological capital across four distinct dimensions: optimism, resilience, hope, and self-efficacy, with each dimension comprising six items.Employing a 5-point Likert format (1 = strongly disagree; 5 = strongly agree), the instrument requires reverse coding for items 1 through 6. Aggregate scores range from 24 to 120, where elevated scores denote robust internal resources and superior psychological coping capabilities. The instrument demonstrated satisfactory internal consistency in this sample (Cronbach’s α = 0.789).

Data collection and ethical consideration

This study was approved by the Institutional Ethics Committee (Approval No. ZYYHLLL-2024-03-001) and conducted in strict accordance with the Declaration of Helsinki. Data were collected via face-to-face, interviewer-administered paper-based questionnaires between August 2025 and June 2026, aligned with the cross-sectional study design.

Participation was entirely voluntary. Stringent safeguards were implemented across all data collection and analysis phases to protect participant privacy: sensitive personal information (e.g., marital status, disease stage, age) was maintained under strict confidentiality, all datasets were fully anonymized, and raw data were used exclusively for research purposes. Participants remain entirely non-identifiable in all resultant reports and publications.

The paper-based questionnaire comprised two sections: an information sheet with a written informed consent form on the first page, followed by validated survey instruments measuring study variables. Two trained investigators pre-screened eligible inpatients via retrospective chart review of the hospital's electronic medical record system, strictly applying inclusion and exclusion criteria to identify the target population. Potentially eligible participants were subsequently approached in person on inpatient wards.Upon approach, investigators provided eligible patients with the questionnaire package and instructed them to review the information sheet and informed consent form, which detailed the study's purpose, procedures, data collection protocols, potential risks and benefits, and the unconditional right to withdraw at any time without penalty. Participants who consented to enrollment signed the consent form directly on the first page; returning a completed questionnaire constituted provision of written informed consent. Participants retained the unconditional right to decline participation or withdraw at any stage. Uncompleted questionnaires from non-participating or withdrawing participants were retrieved and excluded from analysis.

Statistical analysis

Using IBM SPSS version 27.0 and the PROCESS macro for SPSS, data were analyzed. Descriptive statistics were employed to summarize the demographic and clinical characteristics of participants, as well as the scores for C-PTGI, PCQ-C, and BIDQ. Frequencies and percentages were calculated for categorical variables, while medians with interquartile ranges [M(P25, P75)] were obtained for continuous variables considering their non-normal distributions. We utilized Spearman's rank correlation analysis to explore the relationships among PTG, Psycap, and BID. Finally, we employed the PROCESS Procedure Model 4[23] to examine the mediating effect of psychological capital between body image disturbance and post-traumatic growth. Furthermore, we selected the bootstrapping method with 5,000 bootstrap resamples in PROCESS. An effect was considered statistically significant if the 95% confidence interval of the indirect effect did not include the value zero with a two-tailed p-value below 0.05.

Results

Demographic and Clinical Characteristics of Participants

Questionnaires exhibiting > 20% missing data, patterned responding, or withdrawal were excluded, resulting in a final sample of 232. All enrolled participants were reproductive-age women with breast cancer. The median age of the participants was 42.50 years (interquartile range [IQR]: 37.00, 46.00).Clinically, the majority of patients were diagnosed with Stage II 48.3, followed by Stage III 30.2, Stage I 13.8, and Stage IV 7.8. In terms of disease duration, 41.8% $n = 97$ were diagnosed in the 1–3 months following initial assessment, 30.6% $n = 71$ in the 4–6 months following diagnosis, 17.2% $n = 40$ in the 7–12 months following diagnosis, and 10.3% $n = 24$ more than 12 months post-diagnosis. Demographically, educational attainment was distributed as follows: 19.8% $n = 46$ had completed primary school or below, 28.4% $n = 66$ middle school, 31.5% $n = 73$ an associate or college degree, and 20.3% $n = 47$ a bachelor's degree or higher. For personality type categorization, 43.1% $n = 100$ self-identified as extroverted, 27.2% $n = 63$ as introverted, and 29.7% $n = 69$ as intermediate.Table 1 presents the characteristics of the study participants.

Table 1

Demographic and disease-related characteristics of participants ($n = 232$)

Characteristic	Category	M (P25, P75) / n (%)
Age (years)		42.0 (36.0, 47.0)
Education	Primary school or below	46 (19.8)
	Middle school	66 (28.4)
	Junior college	73 (31.5)
	Bachelor‘s degree or above	47 (20.3)
Marital status	Married	195 (84.1)
	Single/Divorced/Widowed	37 (15.9)
Residence	Urban	80 (34.5)
	Town	74 (31.9)
	Rural	78 (33.6)
Living arrangement	Living with spouse	145 (62.5)
	Living with children/parents	58 (25.0)
	Living alone	27 (11.6)
	Others	2 (0.9)
Employment status	Employed	83 (35.8)
	Unemployed	149 (64.2)
Monthly household income (CNY)	≤ 3000	63 (27.2)
	3000–5999	106 (45.7)
	≥ 6000	63 (27.2)
Personality type	Extraverted	100 (43.1)
	Introverted	63 (27.2)
	Intermediate	69 (29.7)
Time since diagnosis	1–3 months	97 (41.8)
	4–6 months	71 (30.6)
	7–12 months	40 (17.2)

Note.M=Median; P25, P75 = 25th and 75th percentiles. *CNY*=Chinese Yuan.

Characteristic	Category	M (P25, P75) / n (%)
	> 12 months	24 (10.3)
Pathological diagnosis	Non-invasive carcinoma	24 (10.3)
	Early invasive carcinoma	92 (39.7)
	Special invasive carcinoma	31 (13.4)
	Non-special invasive carcinoma	83 (35.8)
	Rare carcinoma	2 (0.9)
Clinical stage	Stage I	32 (13.8)
	Stage II	112 (48.3)
	Stage III	70 (30.2)
	Stage IV	18 (7.8)
Surgical procedure	Breast-conserving surgery	26 (11.2)
	Modified radical mastectomy	18 (7.8)
	Total mastectomy	42 (18.1)
	Mastectomy with reconstruction	92 (39.7)
	No surgery	48 (20.7)
	Others	6 (2.6)
Engagement in physical exercise	Yes	143 (61.6)
	No	89 (38.4)
Awareness of diagnosis	Fully informed	182 (78.4)
	Partially informed	50 (21.6)
Note.M=Median; P25, P75 = 25th and 75th percentiles. *CNY*=Chinese Yuan.		

Descriptive statistics and correlations among the study variables are presented in Table 2. Spearman's rank correlation analysis revealed a statistically significant negative correlation between body image disturbance and positive psychological capital $rs = -0.342, p < 0.01$, alongside a statistically significant positive correlation between positive psychological capital and post-traumatic growth $rs = 0.180, p < 0.01$. No significant correlation was observed between body image disturbance and post-traumatic growth $rs = -0.075, p > 0.01$ (Table 2).

Table 2
Descriptive statistics and correlations among study variables
$(n = 232)$

Variable	M (P25, P75)	BIDQ	PCQ-C	C-PTGI
BID	17.0 (12.0, 23.0)	1.000		
PsyCap	92.5 (85.0, 100.0)	− .342**	1.000	
PTG	58.5 (50.0, 69.0)	− .075	.180**	1.000

We conducted a multiple linear regression analysis with post-traumatic growth scores as the dependent variable, and both body image disturbance and positive psychological capital scores as independent variables. The results revealed that positive psychological capital $\beta = 0.297, P < 0.01$ entered the regression equation (Table 3). Body image disturbance did not enter the regression equation $\beta = 0.043, P = 0.519$. Higher scores of PsyCap were associated with higher PTG scores. In total, 8.1% of the total variation in post-traumatic growth was explained (adjusted R^2=0.073, F(2, 229)=10.09, *P* < 0.01, Durbin-Watson value=1.580).

Table 3
Results of multiple linear regression analysis on the influencing factors of post-traumatic growth $(\mathrm{n} = 232)$

Constant	B	SE	β	t	*p*
	30.463	**7.241**	**—**	**4.207**	**< 0.001**
BID	0.063	0.098	.043	0.646	0.519
PsyCap	0.307	0.070	.297	4.414	< 0.001

Common method bias was assessed using Harman's single-factor test. Although eigenvalue analysis yielded twelve factors exceeding Kaiser's criterion (> 1), the first factor accounted for only 17.51% of the total variance— below the conventional 40% threshold—indicating that common method bias posed no significant threat to the study's validity.

Mediation effect analysis revealed that body image disturbance significantly and negatively predicted positive psychological capital (a = − 0.424, SE = 0.085, P < 0.001). However, BID did not significantly predict post-traumatic growth directly $c\prime = 0.048, SE = 0.097, P = 0.624$, whereas positive psychological capital significantly and positively predicted post-traumatic growth $b = 0.256, SE = 0.072, P < 0.001$. Bootstrap resampling results indicated that positive psychological capital exerted a significant mediating effect between body image disturbance and post-traumatic growth (ab = − 0.108, BootSE=0.050, 95% CI [− 0.227, − 0.033]), as presented in Table 4. As the direct effect was non-significant, positive psychological capital played a complete mediating role in this

association.The direct effect of body image disturbance on post-traumatic growth was not significant $c\prime = 0.048, P = 0.624$, suggesting a complete mediating role of positive psychological capital between body image disturbance and post-traumatic growth, as depicted in Fig. 1.

Table 4
Mediating effect of psychological capital between body image disturbance and post-traumatic growth ($n = 232$)

Model		B	SE	t	*P*	95% CI
Direct effects	BID → PTG	0.048 (c')	0.097	0.493	0.623	[-0.143, 0.239]
Indirect effects	BID → PsyCap	-0.424 (a)	0.085	-4.99	< .001	[-0.591, -0.257]
	PsyCap → PTG	0.256 (b)	0.072	3.53	< .001	[0.114, 0.399]
Total effects	BID → PTG	-0.061 (c)	0.094	-0.647	0.519	[-0.247, 0.125]
Mediating effect	ab=-0.108	BootSE = 0.050	Boot 95% CI [-0.227, -0.033]			

Discussion

In this study, the median PTG score among reproductive-age breast cancer survivors was 58.5 (50.0,69.0), which was lower than the estimates documented by Danhauer et al. among Western cohorts[24]. Far from signaling a deficit in psychological adjustment, this divergence illuminates profound cultural variations in cognitive processing. While the overwhelming obligations and pervasive entanglement inherent in collectivist support systems are indispensable for pragmatic care, they paradoxically impose significant emotional burdens that can stifle self-oriented post-traumatic growth[25]. Concurrently, Confucian introspection fosters a laudable yet protracted shift from intrusive to deliberate rumination, grounding adaptation not in the Western ideal of autonomous breakthrough, but in a quiet, resilient sense of duty within relational networks[5]. Consequently, moving beyond superficial cross-cultural metrics, future research must prioritize granular analyses of these nuanced, dynamic trajectories—a critical prerequisite for developing culturally responsive clinical interventions.

Our findings revealed a significant positive association between positive PsyCap and PTG among breast cancer of reproductive age, thereby substantiating Hypothesis 1. PsyCap serves as a critical internal resource that facilitates the cognitive processing required for growth. Consistent with the functional descriptive model of PTG, such growth arises from deliberate rumination and the subsequent reconstruction of core beliefs in the aftermath of a traumatic event[26, 27]. Individuals with high levels of PsyCap are better equipped to engage in this constructive cognitive processing: hope enables them to identify pathways to meaningful goals despite physical limitations, while self-efficacy empowers them to

manage treatment side effects and emotional fluctuations effectively[9, 28]. Resilience, a nuclear element of PsyCap, serves as a critical buffer against the immediate destabilization precipitated by a cancer diagnosis, facilitating cognitive flexibility and preventing the maladaptive fixation characteristic of intrusive rumination[29, 30], and instead facilitating transition to deliberate rumination where they actively seek meaning in their suffering. Optimism fosters a positive outlook, encouraging patients to view their cancer experience as a challenge that can lead to personal strengthening rather than an insurmountable threat[31, 32]. Ergo, those possessing a well-honed PsyCap profile demonstrably exhibit salutary shifts characterized by profound interpersonal deepening, affirmative revaluation of life, and heightened self-efficacy, attributes that epitomize the very essence of post-traumatic growth[9, 33].

Consistent with the Conservation of Resources theory, our findings indicate a significant negative association between BID and PsyCap. BID, characterized by negative perceptions of one's physical appearance and functionality following mastectomy or other treatments, acts as a chronic stressor that gradually drains psychological resources[34, 35]. For young breast cancer patients who remain trapped in life’s cruel prime, where relentless societal dictates of femininity and allure govern their worth, the agonizingly vast chasm between their battered actual self and their elusively perfect ideal self assumes a viscerally acute intensity[36]. This self-discrepancy in patients engenders profound emotional distress manifesting as debilitating anxiety, despair, and eroded self-worth, which inexorably diverts the vital cognitive and emotional reserves requisite for sustaining robust hope and self-efficacy[29, 34, 36, 37]. While previous research has established that negative body self-perception is a potent predictor of psychological distress, its specific impact on the multidimensional construct of PsyCap has been less explored in this demographic. Our data indicate that in young patients grappling with BID,the resultant erosion of perceived control over life coincides with a marked dwindling of optimism regarding the future.This depletion of psychological resources fosters a state of vulnerability in which resilience in the face of adversity and confidence in one’s capacity to succeed are progressively undermined, revealing that BID functions not merely as a cosmetic preoccupation but as a fundamental threat to the psychological infrastructure indispensable for adaptive coping[29].Considering that body image disturbance exacerbates the dissonance between patients' actual and idealized selves, thereby undermining hope and self-efficacy, frontline nursing care ought to weave schema-focused cognitive restructuring and embodied mindfulness protocols into routine practice to neutralize the corrosive impact of somatic preoccupation on psychological capital.

Notably, this work establishes PsyCap as a full mediator, as path analysis identifies a non-significant direct pathway from BID to PTG alongside a significant indirect pathway via psychological capital, thus demonstrating that psychological capital entirely explains the link between body image disturbance and post-traumatic growth, support Hypothesis 2. This implies that BID impedes post-traumatic growth only insofar as it depletes positive psychological resources. Crucially, should a patient manage to sustain or rebuild their PsyCap despite ongoing bodily distress, the deleterious impact of BID on growth is effectively nullified.Consistent with recent perspectives, this finding emphasizes that post-traumatic growth is not an automatic outcome of trauma but a result of successful adaptation processes mediated by personal and social resources[27, 38]. The mediating pathway further highlights the

primacy of internal resources over external circumstances alone. While previous studies have highlighted the roles of social support and coping styles[25, 36], our results underscore that these external factors may ultimately work by bolstering internal PsyCap. For instance, supportive dyadic coping can enhance a patient's self-efficacy and hope, thereby protecting their PsyCap from the erosive effects of BID[33, 36].

From a clinical standpoint, this complete mediation model carries profound implications for practice. Considering that BID impedes post-traumatic growth predominantly by depleting positive psychological capital, interventions designed to foster post-traumatic growth among reproductive-age breast cancer survivors should therefore prioritize the systematic cultivation of positive psychological capital. Furthermore, the generalizability of these findings may be constrained by cultural contextual factors, as conceptualizations of BID and PTG differ markedly across societies[25, 34].Prior research has identified several mediators linking BID to PTG among cancer patients, including self-compassion, coping styles, and cognitive processing of bodily changes[32, 34]. Whereas the present study establishes PsyCap as a complete mediator, and acknowledging other documented pathways, future research should test a comprehensive model incorporating these constructs as parallel mediators alongside PsyCap.

Conclusion

The mediation analysis conducted in our study revealed that BID exerted a direct negative effect on PsyCap. Concurrently, PsyCap served as a complete mediator in the relationship between BID and PTG, with the direct effect of body image disturbance on post-traumatic growth proving non-significant. Interventions aimed at enhancing PTG among young breast cancer should prioritize theory-driven strategies to mitigate the erosive impact of BID and foster PsyCap.

Limitations

This cross-sectional design precludes causal inference regarding directional associations among BID, PsyCap, and PTG. Sampling was restricted to two tertiary hospitals in Hunan Province, limiting generalizability to young breast cancer in rural settings or regions with divergent sociocultural norms. While PsyCap emerged as a complete mediator, unmeasured constructs like social support and self-compassion may also operate as parallel mediators or moderators. Future longitudinal studies with diverse sampling and additional mediators are needed to fully elucidate PTG mechanisms in this population.

Implications of the study

The results of this investigation indicate that clinical nurse specialists should implement tailored strategies to PsyCap among reproductive-age breast cancer survivors, particularly those with pronounced BID following mastectomy or adjuvant therapies. Nurse leaders should prioritize establishing a supportive clinical environment that addresses patients' core psychological needs for safety, belonging, and self-worth, thereby cultivating and sustaining PsyCap. Furthermore, enhancing

self-efficacy and hope by empowering patients to positively reframe their altered body image and derive meaning from their cancer journey represents a high-yield approach to advancing PTG in this population.

Abbreviations

PTG
Post-traumatic growth
PsyCap
Positive psychological capital
BID
Body image disturbance
BIDQ
Body Image Disturbance Questionnaire
PCQ-C
Psychological Capital Questionnaire for Cancer Patients
C-PTGI
Chinese Version of the Post-traumatic Growth Inventory

Declarations

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Author contributions

P.T.G. conceived and designed the study, drafted the original manuscript. X.F and P.T.G. performed data collection. W.X.Z and X.H.S conducted statistical analyses, revised the manuscript critically for important intellectual content. M.H.C and H.T.C, provided overall project administration. All authors reviewed manuscript.

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Data availability

The datasets are available from the corresponding author upon reasonable request and with the permission of the Ethics Committee of the Science Technology at Hunan University of Traditional

Chinese Medicine, but are not publicly available due to ethical restrictions.

Ethics approval and consent to participate

This study was approved by the Ethics Review Committee for Nursing, Behavioral Medicine, and Science Technology at Hunan University of Traditional Chinese Medicine (Approval No. ZYYHLLL-2024-03-001).and conducted in strict accordance with the Declaration of Helsinki.All participants were informed that participation was entirely voluntary and were invited to sign an informed consent form.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests

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Figures

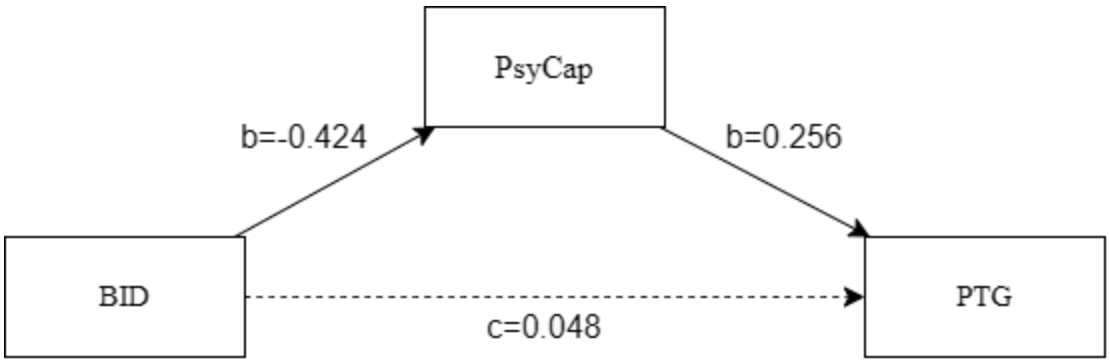


Figure 1

Final model