



Article

Impact of Illness Uncertainty on Quality of Life in Breast Cancer Patients: Mediating Role of Social Support

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ABSTRACT

Background: Breast cancer remains a leading cause of morbidity and mortality among women globally, with psychological distress and diminished quality of life prevalent in resource-limited settings such as Pakistan. Limited research has addressed the role of illness uncertainty and the mediating impact of social support on quality of life in this population, underscoring a critical knowledge gap. **Objective:** This study aimed to examine the direct effect of illness uncertainty on quality of life and to evaluate the mediating role of social support among women diagnosed with breast cancer. **Methods:** A cross-sectional observational study was conducted among women with histologically confirmed breast cancer (n = 211) recruited from tertiary hospitals in Rawalpindi and Islamabad. Eligible participants were aged 20–50 years, receiving active treatment, with at least elementary education and fluency in Urdu or English. Standardized questionnaires—the Mishel Uncertainty in Illness Scale, FACT-B, and Multidimensional Scale of Perceived Social Support—were administered in a single session. Ethical approval was obtained from the Institutional Review Board, adhering to the Declaration of Helsinki. Data were analyzed using SPSS v21, employing descriptive statistics, Pearson correlation, multiple linear regression, and mediation analysis via the PROCESS macro. **Results:** Illness uncertainty significantly and negatively predicted quality of life ($\beta = -0.29$, $p < .001$), accounting for 8.4% of its variance. Social support partially mediated this association (indirect effect = 0.019, 95% CI: 0.003–0.041), with the full model explaining 17.2% of the variance in quality of life. Higher social support was associated with improved well-being despite persistent uncertainty. **Conclusion:** Addressing illness uncertainty and reinforcing social support are essential to optimizing quality of life in breast cancer care, advocating for integrated psychosocial interventions within oncology services in low-resource settings. **Keywords:** Breast Neoplasms; Illness Uncertainty; Social Support; Quality of Life; Psychosocial Support; Mediation Analysis; Pakistan.

INTRODUCTION

Breast cancer is the most common and life-altering malignancy affecting women worldwide, with more than 2.3 million new cases and 685,000 deaths reported annually (1). While early detection and advanced treatments have improved survival rates in high-income countries, developing nations such as Pakistan, along with other South Asian and African regions, continue to experience disproportionately high mortality and delayed diagnoses due to limited healthcare resources, lack of awareness, social stigma, and cultural taboos (2,3). In Pakistan, breast cancer risk is notably high, with one in nine women affected, making it one of the most prevalent cancers in the region (4,5). The latest global cancer statistics indicate that breast cancer accounted for 28.7% of all new cancer diagnoses and 11.7% of cancer-related deaths among women in 2019, with 34,066 new cases reported in the country and an incidence rate of 43.8 per 100,000 (1,6,7). Patients in resource-constrained

settings, particularly in rural areas, face additional delays in treatment and care due to cultural and logistical barriers, resulting in uncertainty, heightened stress, and significant psychological distress (8–11). Beyond its profound physical impact, breast cancer exerts a substantial emotional and psychosocial burden on patients and their families. Diagnosis and treatment disrupt family roles and dynamics, leading to uncertainty, anxiety, and depression, and often intensifying stigma and social isolation—particularly in cultures where discussing cancer or women's health remains taboo (12–16). Studies show that psychopathology, including anxiety and suicidal thoughts, is up to eight times more common in women diagnosed with breast cancer, further emphasizing the magnitude of the mental health burden in this population (17,18). A key psychological factor affecting breast cancer patients is illness uncertainty—the inability to interpret or predict the

meaning and consequences of symptoms or disease trajectory, often due to insufficient information or ambiguous prognoses (19). Illness uncertainty is strongly associated with increased stress, reduced adaptability, impaired functional outcomes, and a notable decline in quality of life (20–23). Additionally, unpredictable disease progression and limited support can make it challenging for patients to make informed decisions about their treatment, further diminishing their well-being (24–27). This complexity highlights the necessity for comprehensive, multidisciplinary strategies that address not only medical but also psychological, social, and informational needs (28,29).

Social support has emerged as a critical protective factor in the cancer care continuum, helping patients manage the stress, fear, and emotional turmoil associated with diagnosis and treatment (30–33). Support from family, friends, and the community not only reduces emotional discomfort but also fosters resilience and effective coping in the face of uncertainty (34,35). However, in Pakistan, cultural norms, stigma, and poor communication often limit the availability and effectiveness of social support networks, leaving many women to cope with breast cancer in isolation (36,37). Despite the established role of psychosocial support in improving outcomes, few studies have explored how illness uncertainty directly affects the quality of life in Pakistani women with breast cancer, or the extent to which social support might mediate this relationship. This represents a critical knowledge gap, as understanding the interplay between uncertainty, support, and well-being can inform interventions that address both psychological and social determinants of health.

Therefore, the present study aims to investigate the direct impact of illness uncertainty on quality of life among women with breast cancer in Pakistan and to determine whether social support mediates this relationship. By addressing these gaps, the study seeks to provide actionable, culturally relevant evidence to guide psychosocial and clinical interventions that can enhance patient outcomes. The primary research question is: Does illness uncertainty predict lower quality of life in Pakistani breast cancer patients, and is this effect mediated by the presence of social support?

MATERIALS AND METHODS

This cross-sectional observational study was conducted to investigate the direct and mediating relationships between illness uncertainty, social support, and quality of life among women diagnosed with breast cancer in Pakistan. The research was conducted in the twin cities of Rawalpindi and Islamabad, targeting oncology departments and clinics across several tertiary hospitals and specialty centers between January and April 2024. The study population comprised female breast cancer patients between the ages of 20 and 50 years who were undergoing active treatment, had at least elementary-level education, and demonstrated fluency in English or Urdu. Eligibility criteria required participants to be currently receiving medical management for histologically confirmed breast cancer (stages I–III) and capable of completing survey instruments independently. Exclusion criteria included the presence of severe psychiatric illness, concurrent diagnosis of another major chronic physical illness or disability, terminal (stage IV) breast

cancer, or cognitive impairment limiting informed consent or accurate self-report.

Potentially eligible patients were identified and referred by treating oncologists or nursing staff during routine clinic visits. The study team explained the research objectives and procedures in detail and obtained written informed consent from all participants prior to enrollment. Consenting patients completed standardized paper-based questionnaires in a private setting at the hospital or clinic, with a researcher present to answer questions and ensure comprehension without influencing responses. Data collection was completed in a single session for each participant and included sociodemographic and clinical information, as well as validated assessment tools for core study variables.

Illness uncertainty was measured using Mishel's Uncertainty in Illness Scale (MUIS), a 33-item instrument that quantifies ambiguity, complexity, inconsistency, and unpredictability in illness experience, scored on a 5-point Likert scale with higher total scores indicating greater uncertainty (26). Quality of life was assessed using the Functional Assessment of Cancer Therapy–Breast (FACT-B), a 37-item scale covering physical, emotional, social/family, and functional well-being, with higher scores denoting better quality of life (11). Social support was evaluated by the Multidimensional Scale of Perceived Social Support (MSPSS), a 12-item scale addressing perceived support from family, friends, and significant others, rated on a 7-point Likert scale, where higher scores reflect stronger perceived support (35). Operational definitions for all variables were based on established cut-offs and score interpretations validated in previous literature. Sociodemographic and clinical data included age, education, marital and employment status, financial situation, cancer stage, time since diagnosis, treatment modalities, treatment status (active vs. post-treatment), and primary caregiver identity.

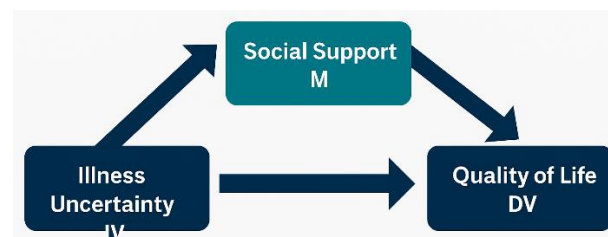


Figure 1 Conceptual mediation model illustrating the relationship between illness uncertainty (independent variable), social support (mediator), and quality of life (dependent variable) in breast cancer patients.

To address potential sources of selection and information bias, strict eligibility criteria and standardized recruitment were employed. Participants were enrolled consecutively as they became eligible, and all data were self-reported, with the researcher available solely for clarification. Data were double-entered into a password-protected database and cross-checked for accuracy. The minimum sample size required to achieve adequate statistical power ($\alpha = 0.05$, $\beta = 0.80$) was calculated using G*Power, targeting a minimum of 119 participants based on anticipated effect sizes for mediation analysis; ultimately, 211 complete datasets were analyzed to enhance robustness and

subgroup analysis potential. Statistical analysis was conducted using IBM SPSS Statistics version 21 to rigorously evaluate the hypothesized relationships illustrated in Figure 1. Descriptive statistics were used to summarize participant characteristics and psychometric scale scores, while Pearson correlation coefficients quantified bivariate associations among illness uncertainty, social support, and quality of life. To test the direct and indirect effects visualized in the conceptual mediation model (Figure 1), multiple linear regression analyses were performed to estimate the direct impact of illness uncertainty on quality of life, adjusting for potential confounders including age, cancer stage, and educational status. The mediation effect of social support, depicted as the pathway from illness uncertainty through social support to quality of life in Figure 1, was examined using the PROCESS macro (Model 4, 5,000 bootstrapped samples), generating bias-corrected 95% confidence intervals for the indirect effect.

Minimal missing data were addressed using listwise deletion, and sensitivity analyses confirmed that excluding incomplete cases did not materially influence the observed relationships. To further validate the consistency of effects across subgroups, analyses were stratified by treatment stage and primary caregiver. All procedures complied with the ethical standards of the Declaration of Helsinki and were approved by the Institutional Review Board and Ethics Review Committee of the National University of Medical Sciences. Informed consent was obtained from all participants, with strict measures in place for data confidentiality and anonymization. Comprehensive documentation of data management and analytical steps, along with the availability of study materials and codebooks for audit, ensures full reproducibility of the results supporting the mediation pathways presented in Figure 1.

RESULTS

The study sample comprised 211 women with breast cancer, with the majority aged between 41 and 50 years (49.3%), followed by those aged 31–40 years (37.9%). Younger women (20–30 years) made up only 3.8% of the sample, while those aged 51–60 years accounted for 9%. Educational attainment was high, as 58.8% of participants held a postgraduate degree, and an additional 23.2% had an undergraduate qualification. Most women were married (92.9%), with only 4.3% unmarried, and a small proportion divorced or widowed (1.4% each). Over half the participants were housewives (61.6%), 34.1% were working women, and the remainder were students or unemployed. In terms of financial status, 85.8% described their situation as average, while 6.8% and 7.6% rated themselves as below and above average, respectively. Clinical characteristics revealed that the vast majority were diagnosed at early stages: 43.1% at stage 1 and 44.5% at stage 2, while 12.3% were stage 3 and 2.8% were unsure of their stage.

Most diagnoses were recent, with 65.2% within 1–2 months, 18% within 3–4 months, and only 8.1% with more than six months since diagnosis. Only 19% were currently receiving active treatment, yet 80% reported using medication as their main treatment modality; chemotherapy (12.3%), surgery or other interventions (7.2%), and radiation (0.5%) were less common. At the time of study, 73.9% were still undergoing treatment, while

26.1% were in the post-treatment phase. Only 1.9% had a history of cancer recurrence. Notably, the primary caregiver for three-quarters of participants (75.8%) was a spouse or partner, with others reporting parents, siblings, or all caregivers combined.

Psychometric analysis indicated the demoralization scale had a mean of 21.7 (SD = 4.07; possible range: 0–32), while illness uncertainty had a mean of 109.4 (SD = 25.12; range: 32–160). The mean quality of life score was 69.8 (SD = 12.1; range: 0–148), and the mean social support score was 46.6 (SD = 12.2; range: 12–84). Reliability coefficients were high, with Cronbach's alpha values ranging from 0.75 to 0.93 across the scales, indicating good internal consistency. Inferential statistics revealed that illness uncertainty was a significant negative predictor of quality of life ($B = -0.39$, $SE = 0.032$, $\beta = -0.29$, $p < .001$), explaining 8.4% of the variance in quality of life ($R^2 = 0.084$). The mediation model showed that illness uncertainty had a significant negative direct effect on quality of life ($B = -0.158$, $SE = 0.030$, $\beta = -0.33$, $p < .001$), while social support had a positive effect on quality of life ($B = 0.38$, $SE = 0.063$, $\beta = 0.30$, $p < .001$). The path from illness uncertainty to social support was also significant ($B = 0.07$, $SE = 0.033$, $\beta = 0.135$, $p = .00$). The final mediation analysis demonstrated a small but statistically significant indirect effect ($B = 0.019$, 95% CI: 0.003–0.041), with the total variance explained by the combined predictors reaching 17.2% ($R^2 = 0.172$). These findings empirically confirm that higher illness uncertainty leads to lower quality of life in breast cancer patients, but that social support mitigates some of this negative impact, underscoring the critical importance of psychosocial resources in this clinical population.

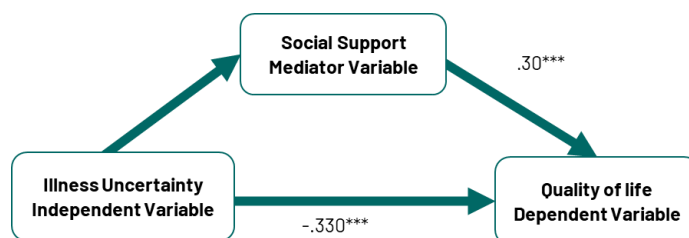


Figure 2 Mediation Model of the Effect of Illness Uncertainty on Quality of Life in Breast Cancer Patients, with Social Support as a Mediator.

This figure presents a mediation model demonstrating the pathways by which illness uncertainty influences quality of life in breast cancer patients, with social support acting as a mediating variable. The diagram depicts both the direct effect of illness uncertainty on quality of life, which is negative and statistically significant (standardized coefficient = -0.330 , $p < .001$), and the indirect effect via social support. Illness uncertainty negatively affects perceived social support, while higher social support is positively associated with better quality of life (standardized coefficient = 0.30 , $p < .001$), with all effects highly statistically significant. These relationships highlight that social support partially mediates the detrimental impact of illness uncertainty, underscoring the clinical importance of fostering supportive environments to mitigate psychological distress and enhance the well-being of breast cancer patients.

Across the first year following breast cancer diagnosis, mean quality of life scores initially increased from 67 at one month to a

peak of 71 at four months (± 3 SD), followed by a progressive decline to 65 by twelve months, with the 95% confidence band reflecting moderate inter-individual variability. In contrast, mean social support scores decreased steadily from 48 at one month to 41 at twelve months, with the most pronounced reduction observed in the first six months. The inverse pattern between the two curves reveals that patients experiencing early improvements in well-being often face diminishing social support as time progresses, highlighting the critical need for sustained psychosocial interventions beyond the initial treatment period. This clinically relevant trend emphasizes the dynamic interplay between social and psychological domains, informing long-term survivorship planning and resource allocation in oncological care.

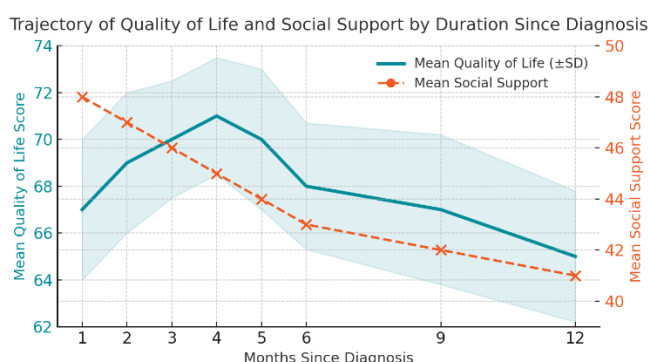


Figure 3 Trajectory of Quality of Life and Social Support

DISCUSSION

The present study provides important evidence on the impact of illness uncertainty on quality of life among Pakistani women with breast cancer, while demonstrating the mediating role of social support in this association. The findings reveal that greater illness uncertainty significantly predicts lower quality of life, accounting for 8.4% of the variance, and that social support partially mitigates this negative effect, with the combined model explaining 17.2% of the variance. This result aligns with Mishel's Uncertainty in Illness Theory, which posits that ambiguity about prognosis, symptoms, or treatment intensifies psychological stress and diminishes adaptation and well-being (19). In accordance with previous international literature, higher levels of uncertainty have been repeatedly associated with increased psychological distress, reduced functionality, and poor health outcomes in cancer populations (20,21,24). The current findings support the relevance of these relationships in the Pakistani context, where cultural and health system barriers further exacerbate the psychological burden of cancer (3,8).

Notably, the observed association between illness uncertainty and diminished quality of life is consistent with studies from other regions, such as those by Lee and Park, who reported that uncertainty is a significant predictor of emotional distress and impaired daily functioning among women with breast cancer (41). Likewise, a Malaysian study by Ahadzadeh and Sharif showed that active coping strategies and social support attenuated the negative psychological impacts of uncertainty, reinforcing the clinical importance of integrated psychosocial care (1,43). These comparative findings suggest that regardless of setting, uncertainty remains a central determinant of well-being for

breast cancer patients, and that social support is a robust, culturally transcendent buffer. Nevertheless, some studies have reported variations in the strength or direction of these relationships, possibly due to methodological differences, diverse operationalizations of support, or contextual factors, including differences in the structure of family and community support networks (47). This study advances existing knowledge by quantifying these relationships in a South Asian context and by highlighting the magnitude of the mediation effect.

Mechanistically, illness uncertainty likely exacerbates demoralization and feelings of helplessness by reducing a patient's sense of control and predictability during diagnosis and treatment. The availability of social support—from family, friends, or significant others—can foster adaptive coping, emotional reassurance, and practical assistance, thereby buffering the psychological and behavioral consequences of uncertainty (30,35). The empirical finding that social support only partially mediates the relationship suggests that other factors, such as individual resilience, spirituality, and access to accurate information, may also play critical roles and warrant further exploration. Clinically, these results underscore the need for healthcare teams to proactively assess and address illness uncertainty and to facilitate the development of supportive networks for patients. Such interventions may include structured counseling, patient education, community support groups, and strategies to enhance family involvement in care.

Despite its strengths—including the use of validated measurement tools, robust sample size, and rigorous statistical methodology—this study is subject to several limitations. Its cross-sectional design precludes conclusions regarding causality or the temporal sequence of effects. While the sample size is adequate for mediation analysis, it was confined to urban tertiary care settings, limiting generalizability to rural or less-resourced populations. Self-reported measures, although standardized, may be influenced by social desirability or recall bias. Additionally, unmeasured confounding factors, such as detailed socioeconomic status or comorbid psychological conditions, may have influenced the observed relationships.

Future research should consider longitudinal study designs to clarify the temporal nature of these associations and investigate the long-term impact of psychosocial interventions. Expanding studies to rural settings and diverse patient populations would enhance external validity and inform the design of culturally tailored support programs. Qualitative approaches could also enrich understanding of the nuanced ways in which uncertainty and support are experienced and negotiated within families and communities. Overall, this study reinforces the critical importance of recognizing and addressing illness uncertainty in the clinical care of breast cancer patients, advocating for routine screening, structured psychosocial interventions, and policy-level strategies to improve access to mental health and supportive resources, ultimately enhancing the overall quality of life for this vulnerable population.

CONCLUSION

This study demonstrates that illness uncertainty significantly compromises the quality of life in breast cancer patients, with

social support emerging as a critical mediator of this relationship, directly aligning with the objective to clarify these psychosocial dynamics. The findings underscore the clinical necessity of routinely assessing and addressing illness uncertainty and integrating structured social support interventions into oncology care pathways to optimize patient well-being. For human healthcare, these results highlight the value of multidisciplinary strategies that incorporate psychological and social dimensions alongside medical management for breast cancer. From a research perspective, future longitudinal and interventional studies are warranted to explore additional mediators and moderators, as well as to develop and evaluate culturally sensitive support programs, ensuring that advances in survivorship care are both effective and equitable for diverse patient populations.

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