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Determinants of supportive care experiences for women living with breast cancer in rural communities of British Columbia

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ABSTRACT

Background: *Enabling women with breast cancer to actively participate in their care requires a better understanding of the interplay between contextual factors and mediators. This research explored the determinants of supportive care experiences for women living with breast cancer in rural communities of British Columbia.*

Methods: *The study used a quantitative, descriptive, cross-sectional design. A survey regarding demographic, health, decision support, and breast cancer supportive care experiences was administered to 100 participants.*

Results: *The combination of being less than 40 years old, having an undergraduate education, and being three to five years post-diagnosis is associated with higher (more positive) total survey scores. A linear combination of undergraduate school and health problems post-treatment showed higher medical treatment scores, with* $R^2 = 23\%$.

Conclusion: *The findings emphasize the growing need for psychosocial and emotional supportive care for cancer survivors. The results highlight the potential benefits of informed decision-support tools to fortify supportive care, emphasizing the need to facilitate better supportive care services for women battling breast cancer.*

Recommendation: *Supportive care plays a crucial role in guiding individuals' experiences with cancer through the healthcare system. Increasing supportive care centres, especially in rural areas, could improve patient-reported outcomes, and experiences, and ensure timely access to care.*

Keywords: oncology, cancer, breast, women, adult, patient, healthcare, supportive care, navigation, survivorship, reported outcome

AUTHOR NOTES

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INTRODUCTION

Breast cancer is the most common cancer and the second leading cause of cancer death in Canadian women (Canadian Cancer Statistics Advisory Committee, 2023). It is estimated that in 2024, 30,500 Canadian women were diagnosed with breast cancer, representing 25% of all new cancer cases in women in that year (Canadian Cancer Society, 2024; Brenner et al., 2024). The new breast cancer cases in Canada were distributed in 2021 among those of European, East Asian, African, West Central Asian, Middle Eastern, and South Asian ancestry (Hwee & Bougie, 2021).

The overall incidence of breast cancer in British Columbia, with one in eight women in the province expected to be diagnosed during their lifetime (HealthLink BC, 2021), has clear implications for women's emotional, physical and spiritual well-being. In 2018, 3,820 women in British Columbia were newly diagnosed with breast cancer and 640 women in the province died from the disease (BC Cancer Registry 2022a; BC Cancer Registry 2022b; Brenner et al., 2024). Numerous studies have been published highlighting the myriad needs these women have (Altherr et al., 2023; D'Souza et al., 2023; Herbert et al., 2021). The psychological impact of breast cancer encompasses the fear of mortality, financial concerns, identity loss, and altered self-worth. However, Sherman and Fessele (2019) demonstrated women with high social support, when navigating the complexities of breast cancer, experienced improved quality of life.

Awareness regarding the impact of breast cancer treatment among women has increased and is gaining significance in cancer research. The consequences of cancer treatment include a spectrum of late side effects, including cognitive changes, infertility, early menopause, osteoporosis, subsequent cancer risks, lymphedema, and cardiovascular complications (Mayo Clinic, 2023; Dibble et al., 2023). Breast cancer survivors have reported myriad post-treatment challenges, including anxiety, depression, and chronic pain, which can significantly impact their quality of life (Ramirez et al., 2020). Addressing these long-term effects is crucial for enhancing the quality of life of cancer survivors.

The value of various support services has been reported. Wittal (2018) emphasized that individuals' ability to

self-manage their health is becoming increasingly important, highlighting the need for regular care aligned with the advancing needs of cancer survivors. D'Souza and Leslie (2022) noted the potential impact of limited access to work benefits, health insurance, and social disability support on the well-being of cancer survivors in rural settings. Racine et al. (2023) advocated for a combined approach involving education and navigator interventions for this population, highlighting the synergistic effects of these novel strategies.

Post-treatment distress encompasses physical, mental, emotional and spiritual effects, making it essential for survivors to engage in supportive cancer care to achieve a sustained quality of life. Support groups are recognized for their role in sharing knowledge and self-care practices as well as fostering supportive relationships, particularly when dealing with discouraging experiences (Jablotschkin et al., 2022). Trevillion et al. (2015) emphasized the importance of providing patients with thorough information about treatment side effects, having observed there was a lack of awareness among women with breast cancer concerning potential treatment-related outcomes. Supportive cancer care initiatives, such as using nurse navigators, have demonstrated positive outcomes in facilitating access to diverse services, including social work and dieticians, and improving the likelihood of treatment continuation (Mertz et al., 2017). Emotional support is a frequent concern among cancer patients (Hemingway et al., 2015), emphasizing the key role played by cancer navigators in providing psychosocial guidance and helping to reduce or mitigate unwanted psychological effects (Trevillion et al., 2015). Various studies (D'Souza et al., 2021a; Jablotschkin et al., 2022; Jackson et al., 2023) highlight the need for supportive care for those living in rural and remote communities.

In many jurisdictions, community services and resources have emerged as core hubs for inclusive and ongoing support to address the complex challenges faced by breast cancer survivors following treatment. With the absence of cancer navigators for cancer care in treatment centres across the province of British Columbia, patients must seek care from healthcare practitioners such as surgeons, oncologists, and emergency room practitioners instead (D'Souza et al., 2022a). One study revealed that 76% of those experiencing side effects during cancer treatment consulted healthcare practitioners, with oncologists and surgeons being the most sought-after professionals for follow-up care. Seventy-seven percent of those who had completed cancer treatment reported moderate to severe side effects post-treatment, often leading to emergency room visits in rural areas (D'Souza et al., 2022a). Limited accessibility, especially in rural areas, highlights the need for alternative opportunities that consider individual preferences, health literacy, and technological capabilities. Geographic barriers, including long travel distances and associated costs, can impede the use of supportive care services, as the services are often centralized in urban areas. Hence, understanding the determinants of supportive care could inform the development of responsive patient-centred care, and enhance communication networks, care coordination, and interdisciplinary collaboration between healthcare providers and women with breast cancer.

RESEARCH AIM

This research explored the determinants of supportive care experiences for women living with breast cancer in rural communities in British Columbia.

METHODS

Design

A quantitative, descriptive, cross-sectional research approach was employed, utilizing a survey. This study was approved by Thompson Rivers University, Interior Health, and the BC Cancer Agency Research Ethics Board (REB H19-02099).

Eligibility criteria

Participants were eligible to participate if they were 18 years and older, had been diagnosed with breast cancer, had completed primary treatment such as surgery, radiation, and chemotherapy, and expressed willingness to participate. Participants were excluded if they self-reported secondary cancer; advanced metastasis; severe dementia; cognitive, speech or neurological impairment that impacted their abilities from participation.

G*Power software was employed to calculate the sample size (Lachenbruch, 1991). A sample of 81 participants was determined to achieve 95% power to detect differences, with a medium effect size ($f2 = 0.20$), Power ($1- \beta$ err prob) = 0.95 using $\alpha = 0.05$ in a linear multiple regression fixed model.

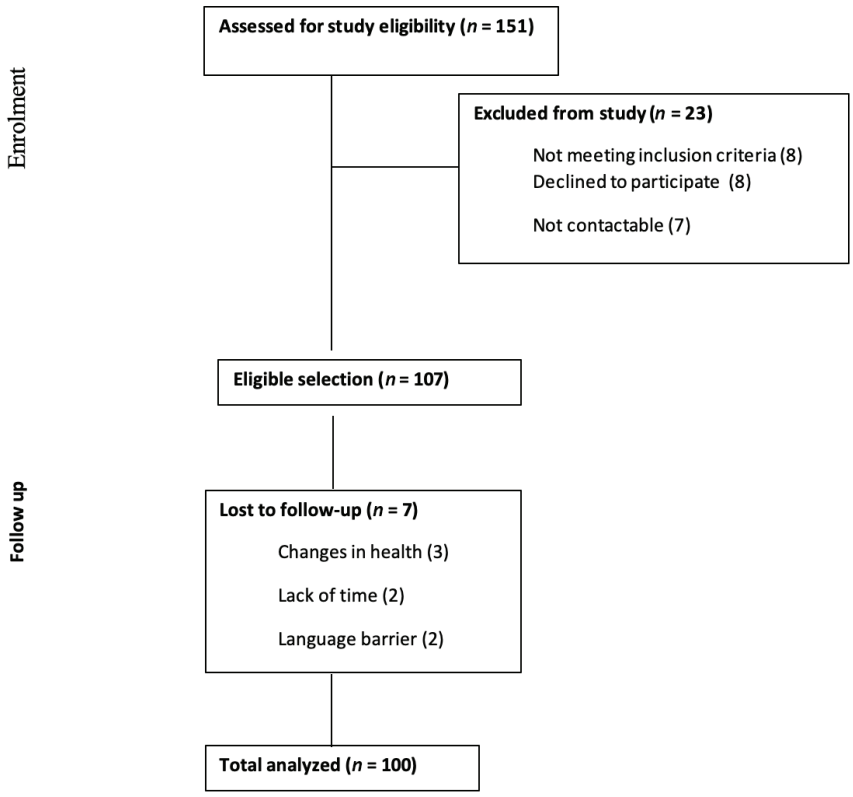
Study recruitment and data collection

The participants were recruited from hospitals, clinics, and support groups in Cariboo, Central Okanagan, Columbia-Shuswap, Okanagan-Similkameen, and Thompson-Nicola in the rural communities of the British Columbia Interior. To recruit women, letters describing the study were mailed as a first step to hospitals, clinics, support groups, and not-for-profit organizations to obtain operational approval. Recruitment posters with instructions for potential participants were placed in each of these settings. Interested individuals were instructed to contact the trained research assistants for further study information. One hundred and fifty-one potential participants expressed interest and were screened for eligibility. Twenty-three were found ineligible. One hundred and seven were selected randomly, of which seven were lost to follow-up (Figure 1).

The eligible women were given the study package containing a letter of invitation, study information, a survey, and a stamped addressed envelope for returning the survey to the research assistant. This process involved seeking the participant's permission to record their information to contact them for the study. Written informed consent was obtained from the participants one week later, allowing them time to read the study information, before deciding to participate. On average, participants took 60 minutes to complete the survey. The self-administered survey was returned through postal mail, online, and face-to-face avenues between January 2021 and December 2022.

Figure 1

Recruitment Process of the Participants



Data measurements and instruments

A Breast Cancer Supportive Care Survey (BCSCS) with three sections was designed for the study based on literature and validated measurement instruments (See **copy in supplemental file**). Demographic questions included age, marital status, education, employment, family history, and general practitioners, modified from the Breast Cancer Awareness Measure (Breast CAM) toolkit version 2 survey instrument (Htay et al. 2020; Liu et al., 2020). The supportive care questions were modified from the SCCS Cancer Survivor Navigation Questionnaire (Signorello et al., 2010) to include diagnosis, treatment decision-making, support care, and quality of life. The survey was modified for the British Columbia context, reviewed and validated by content experts. Content validity was ensured by involving an expert panel to refine the SCE survey and ensure alignment with the study objectives. The BCSCS survey was piloted with participants for readability, literacy, and understanding levels. A good validity coefficient was reported for the SCE tool with the entire sample (r = 0.83).

Participants completed our BCSCS (Box 1) including the Demographic and Health section (nine items, A1–A9) and the Decision Support section (eight items, B1–B8), which included decisions to see healthcare practitioners, consultation, emergency visits, cancer treatment, healthcare services, engagement, decisions, access and use of healthcare services. The third section, the Supportive Care Experiences Survey, with 14 items, was utilized to assess three dimensions of supportive care experiences including medical and healthcare treatment (four items, C1–C4), psychosocial support benefits (five items C5–C9), and complementary and alternative therapies (five items, C10–C14; Box 1). Based on the type of question and responses, all answers were categorized into yes (positive) and no (negative) groups with 1 and 0 scores respectively. If one answers 'yes' to the 14 items, a maximum score of 14 is achievable, and if one answers 'no' to all the 14 items, a 0 score is achieved. The yes category included yes/very informed and satisfied/highly effective/very prepared/very easy (1) responses. The no category included no/not informed and satisfied/not effective/not prepared/difficult (0) for respective questions in different sub-dimensions. Sub-dimension scores were calculated by summing the respective items in each of the sub-dimensions, medical and healthcare treatment (4), psychosocial support benefits (5), and complementary and alternative therapies (5). The total survey score is the summation of three sub-dimensions, a total of 14. All three sub-dimension scores and the total survey score were used for further data analysis.

Data analysis

The data analysis involved both descriptive and inferential statistics via SPSS, version 25. Frequencies were determined for all variables and scores were calculated for each sub-dimension

and the total survey. The differences between the demographic characteristics and supportive care experience were examined for continuous variables using a one-way analysis of variance (ANOVA). The ANOVA model summary explained the variance data, while the multiple linear regression model identified demographic and health characteristics impacting supportive care experiences. Confidence intervals were used to determine likely ranges for the differences and to determine whether the differences were significant. The multiple linear regression (MLR) model uses independent variables, such as age, trade and vocational school, undergraduate school, part-time employment, retirement, first breast cancer diagnosis, and health problems post-treatment, to predict the supportive care experiences outcomes or dependent variables including supportive care experiences (total survey score), medical and health care treatment (medical treatment score), psychosocial support benefits (psychosocial support score), and complementary and alternative therapy (complementary therapy score). For the multiple regression analysis, a reference value of 0 was established for the first group of demographic characteristics. This reference point allows for comparison against other groups. The reference values included 0 for high school, married, income less than 35,000 CAD, full-time employment, access general family practitioner, first breast cancer diagnosis less than three years, second/recurrent breast cancer less than three years, and stating no health problems.

RESULTS

Demographic and health characteristics

A total of 100 participants completed the survey, giving a 93% response rate. The proportion of participants over the age of 60 years was 46.0% (Table 1). Twenty-seven percent of participants have a family history of breast cancer, 28.0% were diagnosed three to five years ago, and 40.0% reported major problems stemming from breast cancer treatment.

Decision support

A considerable portion of participants (77.0%) reported experiencing major to moderate problems that necessitated emergency room visits (Table 2). Fifty-two percent of participants reported feeling uninformed about the healthcare services, while 20.0% indicated they were somewhat informed about healthcare services. Thirty-five percent reported receiving follow-up and advice from healthcare practitioners.

Supportive care experiences and demographic characteristics

Each of the demographic variables and their sub-groups were analyzed to check if any significant differences existed among the demographic variables with mean total survey scores and each of the mean subdimension scores (Table 3). The mean total survey score for participants showed statistically significant differences among the three groups, with age less than 40 years at 8.65, followed by 40–60 years at 7.29, and older than 60 years at 6.59 ($p = 0.00$). A similar pattern was observed among all the medical treatment, psychosocial support benefits, and complementary therapy scores with the younger age participants having the highest score followed by those between 40–60 and above 60 showing statistically significant differences.

Table 1

Frequency and Percentage of Demographic Characteristics of Women Living with Breast Cancer

Determinants	Categories	Frequency (*n*)	Percentage
Age	Below 40 years	23.00	23.0%
	40–60 years	31.00	31.0%
	Above 60 years	46.00	46.0%
School	High school	18.00	18.0%
	Trade and vocational	43.00	43.0%
	Undergraduate and above	39.00	39.0%
Marital status	Married, common-law partner	73.00	73.0%
	Widow, single	10.00	10.0%
	Divorced, separated	17.00	17.0%
Employment	Full-time employment	34.00	34.0%
	Part-time employment	22.00	22.0%
	Retirement	44.00	44.0%
Family history of breast cancer	Yes	27.00	27.0%
	No	73.00	73.0%
Access to and having a healthcare practitioner	General family practitioner	86.00	86.0%
	Nurse practitioner	3.00	3.0%
	Oncologist, specialist	11.00	11.0%
First breast cancer diagnosis	Less than 3 years	32.00	32.0%
	3–5 years	28.00	28.0%
	6–10 years	13.00	13.0%
	More than 10 years	27.00	27.0%
Health problems index post-treatment	No problems, 0 problem	18.00	18.0%
	Minor problems, 1–3 problems	7.00	7.0%
	Moderate problems, 4–6 problems	35.00	35.0%
	Major problems > 7 problems	40.00	40.0%

Table 2

Frequency and Percentage of Decision Support Characteristics of Women Living with Breast Cancer

Determinants	Categories	Frequency (*n*)	Percentage
Health problems consultation and advice from healthcare practitioners	Yes	76.00	76.0%
	No	24.00	24.0%
Follow-up and advice from healthcare practitioners	General family physician	10.00	13.2%
	Nurse practitioner	5.00	6.6%
	Oncologist, specialist	35.00	46.1%
	Surgeon, plastic surgeon, reconstruction	16.00	21.1%
	Registered nurse	3.00	3.9%
	Physiotherapist, dietician, pharmacist, psychologist, social worker, counsellor	1.00	1.3%
	Massage therapist, physical therapist	6.00	7.9%
Emergency visits for cancer treatment distress	Major to moderate problems	77.00	77.0%
	Minor to negligible problems	23.00	23.0%
Informed about cancer treatment effects	Well-informed	31.00	31.0%
	Partly informed	23.00	23.0%
	Not informed	46.00	46.0%
Informed about healthcare services	Very informed	28.00	28.0%
	Somewhat informed	20.00	20.0%
	Uninformed	52.00	52.0%
Patient engagement with treatment plans	Fully satisfied	3.00	13.0%
	Partly satisfied	13.00	56.5%
	Not satisfied	7.00	30.4%
Access and use of healthcare services	Very satisfied	45.00	45.0%
	Somewhat satisfied	20.00	20.0%
	Not satisfied	17.00	17.0%
	Not aware	18.00	18.0%

The mean total survey score for participants showed statistically significant differences among the three groups regarding education, with undergraduate and above at 8.41, followed by trade and vocational at 7.02 and high school at 5.44 ($p = 0.00$). A similar pattern of statistically significant differences was also observed among all the medical treatment, psychosocial support benefits, and complementary therapy scores regarding education, with the undergraduate and above having the highest score followed by the trade and vocational group and high school (Table 3).

The ANOVA results indicated that participants less than 40 years of age have higher total survey scores, with statistically significant differences between medical treatment and complementary therapy scores. Participants with higher educational attainment exhibit significant differences in their total survey, medical treatment, psychosocial support benefits, and complementary therapy scores. Married participants or those with a common-law partner show a statistically significant difference with complementary therapy scores. Full-time employed participants have statistically significant differences in their total survey and medical treatment scores.

Supportive care experiences and health characteristics

Each of the health variables and their sub-groups were analyzed to check if any significant differences existed among the health variables with mean total survey scores and each of the mean subdimension scores (Table 4). The mean total survey

Table 3

Differences in Supportive Care Experiences Based on Demographic Characteristics Using ANOVA

Supportive Care and Demographic Characteristics	Categories	Mean±Standard Deviation	95% Confidence Interval for Mean Lower Bound – Upper Bound	Level of Significance $p < 0.05$* ns = not significant
Age group and total survey score	Below 40	8.65±2.03	7.77–9.53	
	40–60	7.29±3.09	6.16–8.42	
	Above 60	6.59±2.23	5.92–7.25	
	Total	7.28±2.59	6.76–7.80	0.00*
Age group and medical treatment score	Below 40	2.87±0.96	2.45–3.29	
	40–60	2.45±1.17	2.02–2.88	
	Above 60	2.09 ±1.17	1.74–2.43	
	Total	2.38±1.16	2.15–2.61	0.02*
Age group and psychosocial support score	Below 40	2.35±1.11	1.87–2.83	
	40–60	2.06±1.31	1.58–2.55	
	Above 60	1.91±1.34	1.51–2.31	
	Total	2.06±1.28	1.80–2.32	0.42ns
Age group and complementary therapy score	Below 40	3.43±1.19	2.92–3.95	
	40–60	2.77±1.68	2.16–3.39	
	Above 60	2.59±1.42	2.16–3.01	
	Total	2.84±1.48	2.54–3.14	0.05*
School groups and total survey score	High school	5.44±2.57	4.17±6.72	
	Trade and vocational	7.02±2.36	6.30–7.75	
	Undergraduate and above	8.41±2.33	7.65–9.17	
	Total	7.28±2.59		0.00*
School groups and medical treatment score	High school	1.78±0.87	1.34–2.21	
	Trade and vocational	2.37±1.19	2.00–2.74	
	Undergraduate and above	2.67±1.15	2.29–3.04	
	Total	2.38±1.16		0.02*
School groups and psychosocial support score	High school	1.61±1.57	0.83–2.40	
	Trade and vocational	1.91±1.26	1.52–2.30	
	Undergraduate and above	2.44±1.07	2.09–2.78	
	Total	2.06±1.28		0.04*
Complementary therapy score	High school	2.06±1.34	1.38–2.73	
	Trade and vocational	2.74±1.39	2.31–3.17	
	Undergraduate and above	3.31±1.50	2.82–3.80	
	Total	2.84±1.48		0.01*

continued...

Supportive Care and Demographic Characteristics	Categories	Mean±Standard Deviation	95% Confidence Interval for Mean Lower Bound – Upper Bound	Level of Significance $p < 0.05$* ns = not significant
Marital status and total survey score	Married, common-law partner	7.51±2.72	6.87–8.14	
	Widow, single	7.40±2.71	5.46–9.34	
	Divorced, separated	6.24±1.64	5.39–7.08	
	Total	7.28±2.59	6.76–7.80	0.19^{ns}
Marital status and medical treatment score	Married, common-law partner	2.42±1.01	2.19–2.66	
	Widow, single	2.40±1.43	1.38–3.42	
	Divorced, separated	2.18±1.59	1.36–2.99	
	Total	2.38±1.16	2.15–2.61	0.73^{ns}
Marital status and psychosocial support score	Married, common-law partner	2.01±1.26	1.72–2.31	
	Widow, single	2.30±0.94	1.62–2.98	
	Divorced, separated	2.12±1.57	1.31–2.93	
	Total	2.06±1.28	1.80–2.32	0.79^{ns}
Marital status and complementary therapy score	Married, common-law partner	3.07±1.41	2.74–3.40	
	Widow, single	2.70±1.56	1.58–3.82	
	Divorced, separated	1.94±1.47	1.18–2.70	
	Total	2.84±1.48	2.54–3.14	0.01*
Employment group and total survey score	Full-time employment	7.94±2.46	7.08–8.80	
	Part-time employment	7.45±2.04	6.55–8.36	
	Retirement	6.68±2.85	5.81–7.55	
	Total	7.28±2.59	6.76–7.80	0.05*
Employment group and medical treatment score	Full-time employment	2.73±1.30	2.10–3.01	
	Part-time employment	2.56±0.93	2.31–3.14	
	Retirement	2.07±1.08	1.74–2.40	
	Total	2.38±1.16	2.15–2.61	0.05*
Employment group and psychosocial support score	Full-time employment	2.24±1.41	1.74–2.73	
	Part-time employment	2.18±0.95	1.76–2.61	
	Retirement	1.86±1.32	1.46–2.27	
	Total	2.06±1.28	1.80–2.32	0.39^{ns}
Employment group and complementary therapy score	Full-time employment	3.15±1.28	2.70–3.59	
	Part-time employment	2.55±1.65	1.81–3.28	
	Retirement	2.75±1.54	2.28–3.22	
	Total	2.84±1.48	2.54–3.14	0.29^{ns}

Note. Medical and health treatment is referred to as medical treatment score. Psychosocial support benefits are referred to as psychosocial support scores. Complementary and alternative therapies are referred to as complementary therapy.

Table 4

Differences in Supportive Care Experiences Based on Health Characteristics Using ANOVA

Supportive Care and Health Characteristics	Categories	Mean±Standard Deviation	95% Confidence Interval for Mean Lower Bound–Upper Bound	Level of Significance $p < 0.05$* ns = not significant
Family breast cancer history and total survey score	Yes	7.30±2.30	6.39–8.21	
	No	7.27±2.71	6.64–7.91	
	Total	7.28±2.59	6.76–7.80	0.17^{ns}
Family breast cancer history and medical treatment score	Yes	2.41±1.04	1.99–2.82	
	No	2.37±1.20	2.09–2.65	
	Total	2.38+1.16	2.15–2.61	0.13^{ns}
Family breast cancer history and psychosocial support score	Yes	2.33±1.10	1.89–2.77	
	No	1.96±1.33	1.65–2.27	
	Total	2.25±1.13	1.80–2.32	0.05*
Family breast cancer history and complementary therapy score	Yes	2.95±1.52	1.95–3.16	
	No	2.56±1.47	2.60–3.29	
	Total	2.84±1.48	2.54–3.14	0.05*
First breast cancer diagnosis and total survey score	Less than 3 years	7.31±2.34	6.47–8.16	
	3–5 years	8.46±2.13	7.64–9.29	
	6–10 years	6.69±2.98	4.89–8.49	
	More than 10 years	6.30±2.75	5.21–7.39	
	Total	7.28±2.59	6.76–7.80	0.01*
First breast cancer diagnosis and medical treatment score	Less than 3 years	2.66±0.93	2.32–2.99	
	3–5 years	2.79±1.03	2.39–3.19	
	6–10 years	2.00±1.35	1.18–2.82	
	More than 10 years	1.81±1.21	1.34–2.29	
	Total	2.38±1.16	2.15–2.61	0.00*
First breast cancer diagnosis and psychosocial support score	Less than 3 years	1.63±1.28	1.16–2.09	
	3–5 years	2.62±1.15	1.84–2.73	
	6–10 years	2.29±1.44	1.74–3.49	
	More than 10 years	2.07±1.23	1.58–2.56	
	Total	2.06±1.28	1.80–2.32	0.05*
First breast cancer diagnosis and complementary therapy score	Less than 3 years	3.03±1.44	2.51–3.55	
	3–5 years	3.39±1.34	2.87–3.91	
	6–10 years	2.08±1.65	1.08–3.08	
	More than 10 years	2.41±1.39	1.86–2.96	
	Total	2.84±1.48	2.54–3.14	0.01*
Health problem group and total survey score	No problems	6.35±2.76	4.93–7.77	
	Major problems > 7	7.71±3.09	4.85–10.5	
	Moderate problems 4–6	7.25±2.45	6.42–8.08	
	Minor problems 1–3	7.63±2.56	6.80–8.45	
	Total	7.28±2.59	6.76–7.80	0.38^{ns}
Health problem group and medical treatment score	No problems	1.76±0.75	1.38–2.15	
	Minor problems 1–3	2.71±1.38	1.44–3.99	
	Moderate problems 4–6	2.56±1.08	2.19–2.92	
	Major problems > 7	2.42±1.27	2.02–2.83	
	Total	2.38±1.16	2.15–2.61	0.99^{ns}

continued...

Supportive Care and Health Characteristics	Categories	Mean±Standard Deviation	95% Confidence Interval for Mean Lower Bound–Upper Bound	Level of Significance $p < 0.05$* ns = not significant
Health problem group and Psychosocial support score	No problems	1.88±1.45	1.14–2.63	
	Minor problems 1–3	1.43±0.78	0.70–2.16	
	Moderate problems 4–6	1.83±1.36	1.37–2.29	
	Major problems > 7	2.45±1.13	2.09–2.81	
	Total	2.06±1.28	1.80–2.32	0.04*
Health problem group and Complementary therapy score	No problems	2.71±1.44	1.96–3.45	
	Minor problems 1–3	3.57±1.27	2.39–4.75	
	Moderate problems 4–6	2.86±1.41	2.38–3.34	
	Major problems > 7	2.75±1.61	2.23–3.27	
	Total	2.84±1.48	2.54–3.14	0.58^{ns}
Health Professional consultation, advice, follow-up yes or no and Total survey score	Yes	7.47±2.53	6.92–8.02	
	No	6.35±2.76	4.93–7.77	
	Total	7.28±2.59	6.76–7.80	0.10^{ns}
Health Professional consultation, advice, follow-up yes or no and Medical treatment score	Yes	2.51±1.19	2.25–2.77	
	No	1.76±0.75	1.38–2.15	
	Total	2.38±1.16	2.15–2.61	0.01*
Health Professional consultation, advice, follow-up yes or no and Psychosocial support score	Yes	2.10±1.25	1.82–2.37	
	No	1.88±1.45	1.14–2.63	
	Total	2.06±1.28	1.80–2.32	0.53^{ns}
Health Professional consultation, advice, follow-up yes or no and Complementary therapy score	Yes	2.87±1.50	2.54–3.20	
	No	2.71±1.44	1.96–3.45	
	Total	7.28±2.59	2.50–3.30	0.10^{ns}
Access to health care practitioners (HCP) and Total survey score	General family practitioner	7.27±2.61	6.71–7.83	
	Nurse practitioner	9.33±2.08	4.16–14.50	
	Oncologist, Specialist	6.82±2.56	5.10–8.54	
	Total	7.28±2.59	6.76–7.80	0.33^{ns}
Access to HCP and Medical treatment score	General family practitioner	2.43±1.14	2.19–2.68	
	Nurse practitioner	2.67±1.52	-1.13–6.46	
	Oncologist, Specialist	1.91±1.22	1.09–2.73	
	Total	2.38±1.16	2.15–2.61	0.34^{ns}
Access to HCP and Psychosocial support score	General family practitioner	1.99±1.31	1.71–2.27	
	Nurse practitioner	2.67±0.57	1.23–4.10	
	Oncologist, Specialist	2.45±1.12	1.70–3.21	
	Total	2.06±1.28	1.80–2.32	0.37^{ns}
Access to HCP and Complementary therapy score	General family practitioner	2.85±1.47	2.53–3.17	
	Nurse practitioner	4.00±1.00	1.52–6.48	
	Oncologist, Specialist	2.45±1.63	1.36–3.55	
	Total	2.84±1.48	2.54–3.14	0.28^{ns}

Note. Medical and health treatment is referred to as medical treatment score. Psychosocial support benefits are referred to as psychosocial support scores. Complementary and alternative therapies are referred to as complementary therapy.

score for participants showed statistically significant differences among the three groups, with the first breast cancer diagnosis at three to five years at 8.46, followed by less than three years at 7.31 and 6–10 years at 6.69 ($p = 0.01$). A similar pattern of statistically significant differences was observed among all the medical treatment, psychosocial support benefits and complementary therapy scores with the three-to-five years group having the highest score followed by the less than three years group and more than 10 years group. Participants with a family history of breast cancer report significantly higher psychosocial support and complementary treatment scores compared to medical treatment scores. Participants who received their first breast cancer diagnosis within the past three to five years exhibit significantly higher scores with the total survey score, medical treatment, psychosocial support, and complementary treatment scores compared to those diagnosed less than three years ago, 6–10 years ago, or more than 10 years ago. Participants with a high health problems index, indicating major health issues, report significantly higher psychosocial support scores compared to those with no, minor, or moderate health problems.

Multiple linear regression model

The multiple linear regression model was used to explore the relationships of demographic and health-related variables all together with the total survey score and each of the three sub-dimensions as dependent variables (Tables 5, 6, 7 and 8).

Multiple regression analysis of *Total Survey Scores* with explanatory variables has a moderate level of predictive power, explaining 31% of the variance in total scores (Table 5). The statistical significance ($p = 0.000$) indicates that the model is reliable in predicting supportive care experiences. The combination of being under 40 years old, having an undergraduate education, and being 3–5 years post-diagnosis is associated with higher total survey scores, with $R^2 = 31\%$, indicating these predictors explained 31% of the variance in supportive care experiences in the predictive model.

Multiple regression analysis of *Medical and Health Care Treatment Scores* with explanatory variables has a moderate level of association between the predictors and the medical treatment score, with the ability to significantly predict the dependent variable (Table 6). The analysis identified

Table 5

Multiple Linear Regression Analysis Between Total Survey Scores and Demographic and Health Characteristics

Coefficients[a]	Unstandardized Coefficients		Standardized Coefficients		Level of Significance[d]
Models[c]	Beta	Standard Error	Beta	t	$p < 0.05$*
Predictors[b] (constant)	9.87	1.56		6.31	0.00*
Age Reference below 40 years	-0.07	0.02	-0.35	-2.80	0.00*
Trade and vocational school	0.77	0.69	0.14	1.11	0.26[ns]
Undergraduate school Reference high school	2.10	0.72	0.39	2.91	0.00*
Part-time employed	-0.37	0.66	-0.06	-0.56	0.57[ns]
Retired Reference full-time employment	0.08	0.68	0.01	0.12	0.90[ns]
First breast cancer diagnosis 3–5 years	1.65	0.61	0.28	2.71	0.00*
6–10 years	0.33	0.78	0.03	0.42	0.67[ns]
Above 10 years Reference less than 3 years	0.56	0.68	0.09	0.81	0.41[ns]
Health problems post-treatment Reference no problems	-0.16	0.47	-0.03	-0.34	0.73[ns]

[a] Dependent variable: Supportive care total score.

[b] Predictors: (Constant), Access to health care practitioners Y or N, Health problems Y or N, Retired, Undergraduate school, 3–5 years, 6–10 years, part-time Employed, Above 10 years, Age, trade and vocational school.

[c] ANOVA Model: R = 0.56[b], R^2 = 0.31[b]. Adjusted R^2 = 0.25, Sum of Squares = 213.15, df = 9, Mean Square = 23.68

[d] Level of significance: $p < 0.00$*, ns = not significant.

Table 6

Multiple Linear Regression Analysis Between Medical and Health Care Treatment Scores and Demographic and Health Characteristics

Coefficients[a]	Unstandardized Coefficients		Standardized Coefficients		Level of significance[d]
Models[c]	Beta	Standard Error	Beta	t	$p < 0.05$*
Models[c]	Beta	Standard Error	Beta		
Predictors[b] (Constant)	3.31	0.74		4.45	0.00*
Age	-0.01	0.01	-0.11	-0.89	0.37[ns]
Reference below 40 years					
Trade and vocational school	0.41	0.33	0.18	1.26	0.20[ns]
Undergraduate school	0.69	0.34	0.29	2.03	0.04*
Reference high school					
Part-time Employed	0.37	0.31	0.13	1.19	0.23[ns]
Retired	-0.05	0.32	-0.02	-0.16	0.87[ns]
Reference full-time employment					
First breast cancer diagnosis 3–5 years	0.14	0.29	0.05	0.48	0.63[ns]
6–10 years	-0.57	0.37	-0.16	-1.55	0.12[ns]
Above 10 years	-0.39	0.32	-0.15	-1.21	0.22[ns]
Reference less than 3 years					
Health problems post-treatment	-0.43	0.22	-0.18	-1.91	0.05*
Reference no problems					

[a] Model summary: Dependent variable: Medical and health care treatment score.
[b] Predictors: (Constant), Health Yes or N, Retired, Undergraduate school, 3–5 years, 6–10 years, part-time Employed, Above 10 years, Age, trade and vocational school.
[c] ANOVA Model: R = 0.48[a], R^2 = 0.23, Adjusted R^2 = 0.13, Sum of Squares = 30.71, df = 9, Mean Square = 3.41
[d] Level of significance
p < 0.00*, ns = not significant.

two main predictors that showed higher medical treatment scores, undergraduate school education and health problems post-treatment. A linear combination of undergraduate school and health problems post-treatment showed higher medical treatment scores, with R^2 = 23%, indicating that these predictors explained 23% of the variation in medical and health care treatment in the predictive model.

Multiple regression analysis of *Psychosocial Support Benefits Scores* with explanatory variables has a moderately strong association between the predictors and the psychosocial support benefits score, with the ability to significantly predict the dependent variable (Table 7). A linear combination of age, undergraduate school, first breast cancer diagnosis 3–5 years, 6–10 years, and above 10 years and health problem from breast cancer treatment showed higher benefits of support scores, with R^2 = 23%, indicating that these predictors explained 23% of the variation in psychosocial support benefits index in the predictive model.

Multiple regression analysis of *Complementary and Alternative Therapy Scores* with explanatory variables has a moderate association between the predictors and the complementary therapy score, with the ability to significantly predict the dependent variable (Table 8). The analysis identified a linear combination of factors that showed higher complementary therapy scores below 40 years of age and first breast cancer diagnosis at 3–5 years. A linear combination of below 40 years of age, and first breast cancer diagnosis at 3–5 years showed higher complementary therapy scores, with R^2 = 24%, indicating that these predictors explained 24% of the variation in complementary and alternative therapy in the predictive model.

DISCUSSION

This cross-sectional study was conducted to identify the determinants of supportive care experiences for women diagnosed with cancer who were living in rural settings of British

Table 7

Multiple Linear Regression Analysis Between Psychosocial Support Benefits Scores and Demographic and Health Characteristics

Coefficients[a]	Unstandardized Coefficients		Standardized Coefficients		Level of significance[d]
Models[c]	Beta	Standard Error	Beta	t	$p < 0.05$*
Predictors[b] (Constant)	1.75	0.82		2.13	0.03*
Age Reference below 40 years	-0.02	0.01	-0.22	-1.69	0.04*
Trade and vocational school	0.10	0.36	0.04	0.28	0.77[ns]
Undergraduate school Reference high school	0.69	0.37	0.26	1.84	0.04*
Part-time Employed	-0.23	0.34	-0.07	-0.68	0.49[ns]
Retired Reference full-time employment	-0.22	0.35	-0.08	-0.63	0.52[ns]
First breast cancer diagnosis 3–5 years	0.80	0.32	0.28	2.51	0.01*
6–10 years	1.35	0.40	0.35	3.31	0.00*
Above 10 years Reference less than 3 years	1.00	0.36	0.34	2.77	0.00*
Health problems post-treatment Reference no problems	0.49	0.25	0.19	1.98	0.05*

[a] Model summary: Dependent variable: Psychosocial support benefits score.
[b] Predictors: (constant), Health Yes or No, Retired, Undergraduate school, 3–5 years, 6–10 years, part-time Employed, Above 10 years, Age, trade and vocational school.
[c] ANOVA Model: R = 0.48[b,] R^2 = 0.23, Adjusted R^2 = 0.15, Sum of Squares = 38.26, df = 9, Mean Square = 4.25
[d] Level of significance: p<0.00*, ns = not significant.

Columbia. Women were recruited from rural settings and reflected a range of time since diagnosis.

Of the participants, 27.0% had a family history of breast cancer, 28.0% were diagnosed three to five years ago, and 40.0% reported major problems stemming from breast cancer treatment. The observations have been reported in other studies. The problems stemming from treatment are similar to those reported by D'Souza et al. (2022a), who found that 46% of participants were unaware of treatment side effects, underscoring the extent to which patients may be unprepared for the challenges associated with their treatment. Older age is strongly associated with increased intensity of various aging-related symptoms, including those related to cancer (Echeverri et al., 2018). Lower educational attainment is linked to poorer cancer knowledge, health literacy, and difficulties navigating the healthcare system, potentially leading to delays in diagnosis and suboptimal treatment adherence (Echeverri et al., 2018; Etindele Sosso et al., 2022).

Younger participants, those with higher education, married individuals, and full-time employees generally reported higher scores, particularly in the areas of medical treatment and complementary therapy. Participants with a family history of breast cancer have higher social support and complementary treatment scores compared to their medical treatment scores, reflecting more positive responses. Participants diagnosed with breast cancer within the past three-to-five years reported the highest support scores, suggesting a critical period for intervention and support. Forty-six percent of the participants reported feeling uninformed about cancer treatment effects. This lack of information can lead to increased anxiety, decreased treatment adherence, and poorer health outcomes. Only 20.0% of the participants indicated they were somewhat informed about available healthcare services. While 35% of the participants reported receiving follow-up and advice from healthcare practitioners, a substantial portion did not think they received adequate support.

The findings highlight the complex interplay of demographic and health-related factors in determining supportive care experiences. The model identifies predictors of higher scores or more positive experiences, namely younger age, undergraduate

Table 8

Multiple Linear Regression Analysis Between Complementary and Alternative Therapy Scores and Demographic and Health Characteristics

Coefficients[a]	Unstandardized Coefficients		Standardized Coefficients		Level of Significance[d]
Models[c]	Beta	Standard Error	Beta	t	$p < 0.05$*
Predictors[b] (Constant)	4.81	0.94		5.09	0.00*
Age Reference below 40 years	-0.03	0.01	-0.32	-2.46	0.01*
Trade and vocational school	0.25	0.42	0.08	0.59	0.55[ns]
Undergraduate school Reference high school	0.70	0.43	0.22	1.62	0.10[ns]
Part-time Employed	-0.51	0.40	-0.14	-1.27	0.20[ns]
Retired Reference full-time employment	0.36	0.43	0.12	0.87	0.38[ns]
First breast cancer diagnosis 3–5 years	0.71	0.36	0.21	1.93	0.05*
6–10 years	-0.45	0.47	-0.10	-0.96	0.33[ns]
Above 10 years Reference less than 3 years	-0.04	0.41	-0.01	-0.10	0.91[ns]
Health problems post-treatment Reference no problems	-0.22	0.28	-0.07	-0.77	0.43[ns]

[a] Model summary: Dependent Variable: Complementary and alternative therapy score.
[b] Predictors: (Constant), Health Yes or No, Retired, Undergraduate school, 3–5 years, 6–10 years, Part-time Employed, Above 10 years, Age, trade and vocational.
[c] ANOVA Model: R = 0.49[b], R^2 = 0.24, Adjusted R^2 = 0.16, Sum of Squares = 53.32, df = 9
[d] Level of significance: p < 0.00*, ns=not significant.

education, and being three-to-five years post-diagnosis. These insights can be valuable for healthcare providers in tailoring supportive care strategies for different patients/survivors. Younger participants, those with a background in higher education, those who were married or in common-law partnerships, and those who were employed full-time demonstrated greater engagement scores in the current study. This finding aligns with the finding that 76% of participants had sought consultation for treatment side effects, thereby underlining the pivotal role healthcare providers can play in supporting patients throughout their breast cancer journey. Health problems consultation and advice from healthcare practitioners highlight the importance of providing comfort (Deshwal & Bhuyan, 2018), education, knowledge and alternative care approaches in oncology care. D'Souza et al. (2022b) also emphasized the importance of immediate access to medical and healthcare coverage, as well as the need to include community navigators, peer support and expanded coverage in cancer care.

In this study, participants who had a family history of breast cancer had higher scores compared to those without a family history of the disease. Participants who were diagnosed with breast cancer 3 to 5 years ago also had higher scores compared to those diagnosed at other intervals. Participants who reported major health problems (> 7) had benefits of a support group (mean score of 2.45, $p = 0.04$), which was significantly higher than participants with no problems, minor problems and moderate problems. In other studies, it was reported that support was important for navigating the healthcare system and supporting psychological health (Okati-Aliabad et al., 2022). Developing multiple methods to provide information to cancer survivors can be beneficial for ensuring that such information can be translated to different individuals (Herbert et al., 2020).

Age, education level, time from diagnosis, and ongoing health problems emerged as factors associated with higher perceived psychosocial support. The influence of demographic factors on the observed problems among marginalized populations pertained primarily to age, sex, and years of schooling, each of which played a role in shaping the challenges faced by marginalized individuals, thereby emphasizing the importance of considering these factors when designing targeted interventions (D'Souza et al., 2021). Age-related differences in

scores were noted in this study, with older participants reporting lower scores or less positive expeirences. This significant finding aligns with those generated in studies that highlighted the psychological distress and cancer treatment distress associated with cancer experiences (İnan et al., 2023). D'Souza & Mirza (2021) highlighted the negative impact of lacking a healthcare card and experiencing negative healthcare interactions, demonstrating how these factors contribute to reduced access to equitable healthcare services. In this current study, individuals with an undergraduate education tended to have higher medical treatment scores, and individuals with more severe health problems tended to have lower medical treatment scores. Healthcare providers must consider stressful life events associated with increased intensity of aging-related symptoms when developing personalized cancer care plans and implementing regular surveillance for potential issues related to age, education, employment status, and overall health profile (Echeverri et al., 2018; Etindele Sosso et al., 2022).

The findings highlight factors influencing complementary therapy use among participants. Being younger (under 40 years) and having a first breast cancer diagnosis 3 to 5 years ago emerge as predictors of higher complementary therapy scores. This suggests that younger patients and those in the mid-term post-diagnosis period are more likely to see a benefit from or value complementary therapies. Another study (D'Souza et al., 2022b) identified younger age, higher education, living with a spouse and full-time employment as determinants in this regard.

Healthcare providers play a crucial role in the cancer care journey, as emphasized by participants in one study (D'Souza et al., 2023). The importance of seeking advice and follow-up from healthcare professionals, as well as actively engaging with treatment options, has become a recurring theme in promoting positive outcomes during cancer treatment.

Undergraduate education and the presence of post-treatment health problems emerge as factors associated with higher medical treatment scores. This suggests that educational background and ongoing engagement with the healthcare system due to health issues may positively influence the experiences of their medical care. In this study, older age was associated with lower benefits of support scores, whereas individuals with an undergraduate education tended to have higher benefits of support scores. Meanwhile, individuals with no health problems tended to have higher medical treatment scores. Older age was also associated with lower complementary therapy scores, and participants diagnosed early tended to have higher complementary therapy scores. D'Souza et al. (2022b) stressed the importance of providing survivors with adequate time to discuss signs of recurrence and treatment options with healthcare professionals, indicating that informed decision-making (Lluch et al., 2023) is critical to the cancer care process.

In this study, demographic and health characteristics mutually explained significant variances in medical treatment, social support, and complementary therapy scores. Age, education level, and health problems emerged as crucial predictors, suggesting a complex interplay of individual factors influencing supportive care experiences. These results shed light on demographic and health determinants that could be considered in planning for supportive care following cancer treatment for rural dwelling survivors of breast cancer.

LIMITATIONS

The sample size used in the study was small and included people living in rural communities of British Columbia. Consequently, the results may not be generalizable to remote communities and/or large cities, which differ in terms of access to and utilization of resources and support available for healthcare, as well as the nature of governance. Future research involving a longitudinal, prospective, and more extensive study, including health literacy, income, standard of living, nutrition, status, rank, culture, and language, among other factors, is needed to advance predictive supportive care models further. However, despite these limitations, this study contributes to the body of knowledge and sciences regarding women living with breast cancer.

IMPLICATIONS

Healthcare providers and policymakers should consider the findings when designing and implementing supportive care programs and community resources for those living in rural settings. Tailoring supportive care interventions based on age, education level, time since diagnosis, and health challenges could potentially enhance the effectiveness of supportive care initiatives. Supportive cancer care education and navigation play a crucial role in guiding experiences with cancer through the healthcare system. Increasing access to supportive care centres, navigation services, and survivorship programs, especially in rural areas, could improve the patient-reported outcomes and experiences, and ensure timely access to care.

The British Columbia government's new cancer action plan recognizes the need to support patients who must travel for treatment from rural communities. Providing increased funding for primary oncology networks, family practitioners, transportation, travel, accommodation, parking, and finances, and establishing more supportive care centres across the province could help address the inequities and disparities faced by rural populations. Aging and cultural considerations in care for emphasizing mobility and culturally inclusive supportive care services could improve reported outcomes for people in rural communities.

Leveraging virtual health technologies like telemedicine could enhance supportive care services in rural areas. Virtual consultations, remote monitoring, and digital literacy could bridge language, cultural, and geographical barriers. Increasing the availability and accessibility of counselling, nutrition, and rehabilitation services in supportive care centers could better address the psychosocial needs of patients and their families throughout the cancer journey. Supportive care programs and services could be better integrated with cancer care to provide an experience for people and their caregivers navigating their healthcare. Social support and survivorship networks specifically designed for women, conducted in their native language, can also provide a safe and supportive space

for discussions. These supportive care centres can foster connections among individuals with similar experiences, address psychosocial concerns and offer a sense of belonging. Such centres are crucial for integrating communication networks, care coordination, and system navigation and strengthening partnerships and alliances between specialized services, primary oncology, and community networks.

CONCLUSION

The study findings emphasize the growing need for psychosocial and emotional supportive care for cancer survivors, as more than 70% experience significant physical and emotional challenges after treatment. The findings highlight the long-term side effects and potential quality of life issues faced by cancer survivors, suggesting a need for increased access to symptom management resources, rehabilitation services, and survivorship care programs. The full examination of the determinants and mediators of supportive care presented in this study elucidated components crucial for effectively adapting to life with breast cancer. The findings contribute valuable insights that can be used to inform the development of more holistic supportive care, one that aims to enhance the well-being of individuals grappling with breast cancer.

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