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Research Article

Anxiety Improvement after Oncology Massage

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Abstract

Literature suggests Oncology Massage (OM) reduces anxiety. However, research is limited in large, diverse, nonexperimentally manipulated outpatient samples of cancer patients. The purpose of this study was to 1) describe OM visit patterns, 2) describe anxiety response to OM, and 3) determine if OM resulted in significantly reduced anxiety at first visit, across all visits, and longitudinally over time controlling for demographic factors. From January 2015-June 2019, a cohesive, consecutive, retrospective sample evaluated their anxiety before and

immediately after OM from 0=no anxiety to 10=worst possible anxiety during routine clinical therapy within an Integrative Oncology program at an academic hybrid, multi-site, community-based cancer institute. Descriptive statistics summarized patient characteristics, visit patterns, and anxiety outcomes. A paired t-test compared pre- to post- anxiety before and after the first OM visit and a variance component model evaluated anxiety scores across all visits. Pre-therapy anxiety was modelled longitudinally. A mixed model and a weighted least squares linear model estimated anxiety over time. 749 patients attended 2,666 total visits. 428 of the 749 (57.1%) recorded at least two visits. OM therapy usage patterns were diverse for all characteristics measured (i.e., days between first and second visits, days between adjacent visits, duration of OM therapy). OM was associated with significantly decreased anxiety after the first visit ($p<0.01$) and across all visits ($p<0.01$), although not associated with decreased anxiety longitudinally ($p=0.516$). Diverse OM therapy usage patterns suggest wide variations in utilization of routine clinical services. Evidence suggests OM provides short-term anxiety reduction, yet may not have a cumulative effect across multiple visits. Future research should examine characteristics of OM therapy (e.g., frequency, duration) most effective for anxiety and the impact of OM on anxiety among diverse demographic groups (e.g. cancer stage at diagnosis).

Keywords
Anxiety; oncology massage; cancer

1. Introduction

Approximately 40% of men and 38% of women will be diagnosed with cancer during their lifetime, and 67% will survive at least five years [1]. Those with cancer report significantly worse mental health quality of life than the population [2]. Research suggests 1.5%-58% of cancer patients will experience depression [3] and 6%-48% will experience anxiety [4, 5]. They are also approximately twice as likely to take medication for anxiety or depression compared to those without a cancer history, 16.8% v. 8.6% and 14.1% v. 7.8% respectively [6]. As an influential factor in well-being, it is important to address the impact of cancer on mental health throughout the disease trajectory. Integrative Oncology provides patient-centered, evidence-informed practices alongside conventional cancer treatments to help manage symptoms and improve quality of life [7]. The Society of Integrative Oncology strongly recommends massage as part of multimodality treatment approach for patients with anxiety [8].

Oncology Massage (OM) is a specific therapeutic modality for cancer patients and survivors that may be beneficial for psychological well-being. It is an adaptation of traditional massage therapy with specialized oncology techniques [9]. Those with a cancer history are at risk for lymphedema, bleeding/bruising due to thrombocytopenia, skin sensitivities from radiation therapy, and fractures from bone metastases [9, 10]. Oncology trained massage therapists (OM therapists) are cautious of these risks and painful areas such as chemotherapy ports, tumor sites, and sensitive skin. OM therapists may adjust the pressure applied, stroke used, positioning of client, and visit duration to increase comfort [7, 11]. It is important to note that not all therapeutic massage and

bodywork provided to those with cancer is true OM. Massage has an attractive risk-benefit ratio. When performed by a trained practitioner, there are few adverse events [12]. Though increasing numbers of cancer patients seek out complementary therapies such as OM [13], hospitals have been slow to adapt, accounting for only 1% of all massages in 2018, compared to 11% at a physician's office or other medical clinic [14].

OM is endorsed by multiple professional organizations as beneficial for psychological symptoms. The National Comprehensive Care Network's (NCCN) Guidelines for Supportive Care identify massage as an appropriate therapy for cancer patients [15]. The Society for Integrative Oncology (SIO) recommends massage by an oncology-trained therapist as a part of a multimodality treatment plan for anxiety [8]. The Society for Integrative Oncology's Clinical Practice Guidelines for Breast Cancer also recommend massage for mood disturbances after breast cancer treatment [16]. Likewise, The American College of Chest Physicians' Clinical Practice Guidelines for Lung Cancer identify massage as an evidence-based therapeutic option for patients with anxiety refractory to conventional therapy [17].

Reduced anxiety is frequently reported after OM [18]. After a single OM session, 59.9% of patients with at least moderate baseline anxiety reported reduced anxiety [19]. Hand-only massage during chemotherapy reduced anxiety scores by 19.5% [20]. Patient-reported distress and emotional discomfort measures have also significantly improved after OM [21, 22]. Additionally, those who receive OM have significant and lasting improvements in quality of life measures following therapy [21, 23, 24].

However, some studies do not find a significant difference in anxiety after massage [25], and many OM studies suffer from methodological, longitudinal, and population data flaws [26]. There is a lack of standardization in the anxiety evaluation tools and control/comparator groups. Thus, determination of comparative efficacy between OM and other relaxation techniques such as "quiet time", aromatherapy, and reiki/healing touch has been challenging [23, 27, 28]. Additionally, most research has been limited to sample sizes of 12 to 50 cancer patients [23, 29-31].

Little research has described the impact of oncology massage on anxiety in a large, diverse outpatient cancer sample. Based on this research gap, the purpose of this research was to:

1. Describe OM therapy usage patterns (patient characteristics, number of visits, days between visits, duration of therapy in months);
2. Describe pre- and post-OM anxiety scores by type of cancer;
3. Determine if OM resulted in significantly-reduced anxiety scores immediately (i.e., pre- to post-therapy at first visit) and/or longitudinally.

We hypothesized therapy usage patterns would be diverse, there would be significant differences in anxiety scores by cancer type, and anxiety would reduce significantly immediately and over time longitudinally.

2. Materials and Methods

Prior to data analysis, expedited approval by the Institutional Review Board of Atrium Health with consent waiver for retrospective study was secured on October 17, 2017.

2.1 Oncology Massage Therapy

OM was provided as a part of routine clinical practice at an academic hybrid, multi-site, community-based cancer institute. Oncology Massage which is client-specific and customized to meet the unique and changing needs of patients across all stages of the cancer continuum (recent diagnosis, in treatment, finished with treatment, long-term survivorship) [32] was offered. Conditions treated include stress, fatigue, depression, anxiety, pain, sleep trouble, muscle and joint stiffness, and general wellness concerns. OM was the only form of Therapeutic Massage and Bodywork (TMB) offered, excluding other practices such as neuromuscular, deep tissue, lymphatic drainage, etc. Licensed massage and bodywork therapists had additional OM training. The same services were offered across five regional locations. Data from all OM therapists at all locations were included in the retrospective analysis. One OM therapist was employed full-time while the others were contractors to allow scheduling flexibility to meet demand. All OM therapists had between 600-900 base hours of TMB training and 25-48 hours of OM training. OM training was received from Tracy Walton & Associates and Oncology Massage Workshop with Vickie Torrey. At the start of data collection in 2015, OM therapists had between 7 and 36 years of experience.

OM occurred in private, dedicated rooms set up by the OM therapist. Patients were instructed to undress to their level of comfort and change positions on the massage table at the appropriate times. Meditative music was played to enhance relaxation and minimize outside noise. A space heater and fan were available to adjust the room's temperature to the patient's comfort. OM occurred on the Walton Pressure Scale at levels 1, 2, or 3 depending on the patient's comfort level for safety [33]. Pressure level 3 was typically only used in those patients in survivorship who have completed cancer treatment. Hypoallergenic, unscented massage lotion was used as lubricant. Modifications to increase comfort such as alternate positioning (e.g., side-lying or seated vs. traditional prone/supine positioning) and supplemental cushions to reduce pressure on wounds, tumors, medical devices and surgical sites were used. Light Swedish massage techniques including effleurage (gliding, rhythmic strokes), petrissage (gentle kneading) and gentle "energy" holds were used.

Sessions were documented in the electronic medical record by the OM therapist including symptoms, duration of symptoms, aggravating factors of symptoms, impact of symptoms on occupational and social activities, presence of other treatments to mitigate symptoms (e.g., pain medication), response of symptoms to previous OM visits, and a summary narrative following the OM therapists' interview of the patient. The frequency of OM was determined by the patient and/or healthcare professional and recommendations of the OM therapist. Patients were usually but not always treated by the same OM therapist for repeat visits.

Each OM visit lasted approximately 45 minutes. To enhance patient safety, OM therapists followed Standard Operating Procedures which included a comprehensive review of the patient's medical chart before each visit, a patient-reported medical intake form at each visit which included health history, current symptoms, presenting problems and areas of concern. A Medical Doctor or Registered Nurse was consulted if needed (e.g. skin erosion at a chemotherapy port). Sessions were suspended very rarely and usually not for reasons attributed to cancer and/or its treatments (e.g. a patient became ill during the session and was later found to have clostridium difficile infection). OM therapists completed annual competency evaluations and continuing education. OM therapists did not give home care recommendations but could suggest additional

potentially beneficial services such as oncology yoga or Tai Chi for stretching or referral to other integrative modalities (e.g. Healing Touch, Acupuncture) which may ameliorate patients' symptoms. OM therapists could also refer patients to other medical services as needed.

Patients were either self-referred or referred by a healthcare professional. Patients learned about OM through flyers and brochures throughout the institution, fellow patients, referral from a medical provider, or referral from other allied health professionals (e.g., social workers, nurse navigators). Those receiving their first chemotherapy also receive a booklet of support services, including massage. Patients scheduled appointments with the receptionist, not the OM therapist.

OM is a self-pay service which costs $45 per visit. This cost is comparatively less than within community settings [34]. For those with financial need, scholarships from philanthropic funds were available to cover visit costs. Patients who reported financial strain as a barrier to OM or those with a clinician's assessment of financial distress were provided with full scholarships. Scholarship recipients were mostly without insurance or on Medicare or Medicaid.

2.2 Data Collection

From January 2015-June 2019, a cohesive, consecutive, retrospective sample of all cancer patients at any stage of the cancer continuum (recent diagnosis, in treatment, finished with treatment, long-term survivorship) given OM evaluated their anxiety before and immediately after receiving OM on a scale from 0=*no anxiety* to 10=*worst possible anxiety* during routine clinical therapy. This measure is similar to the Edmonton Symptom Assessment Scale (ESAS-r scale) [35] and permitted as an adaptation by the ESAS-r authors. Data was collected by the OM therapist on paper, reviewed for completeness, and then manually entered into REDCap, a secure, web-based, electronic data capture tool [36]. All OM therapists' sessions were included in the data.

2.3 Statistical Analyses

Descriptive statistics summarized patient characteristics, visit patterns, and anxiety scores and outcomes. Pre-OM anxiety scores were compared amongst cancer diagnoses with one-way analysis of variance methods. Differences in self-reported anxiety from pre- to post-OM assessments were compared at the first OM visit using a paired t-test and compared across all visits using a variance component model adjusted for age at first visit, gender, cancer type, and cancer treatment history. The longitudinal effect of oncology massage on pre-OM anxiety scores was explored in patients presenting with pre-OM anxiety score ≥1 at first visit and having subsequent consecutive visits no longer than three months apart. Due to unbalanced clinic visits, pre-OM anxiety scores were averaged across their visits in three-week intervals from the baseline clinic visit. A mixed model was used to estimate pre-OM anxiety scores (and standard errors) by time from baseline visit with a random effect for patient. The model-based anxiety score estimates and standard errors were then used as the outcome measure and weight variables, respectively in a weighted least squares linear model estimating the time trend in anxiety scores. Significance was assessed at $p<0.05$; analyses were performed using SAS 9.4 (Cary, NC) [37].

3. Results

3.1 Patient Demographics

Patients were mostly breast cancer patients and had been treated with chemotherapy and/or surgery. The average age at first OM visit was 56, ranging from 19 to 87 (Table 1).

Table 1 Patient demographics (n=749).

	Median [Minimum, Maximum]
Age at first visit	56 [19, 87]
	Frequency (Percent)
Gender	
Female	621 (82.9)
Male	128 (17.1)
Other	0 (0.0)
Cancer Type	
Brain	18 (2.4)
Breast	362 (48.3)
GI/GU	104 (13.9)
Gynecologic	67 (8.9)
Head & Neck	30 (4.0)
Hematologic	105 (14.0)
Lung	38 (5.1)
Melanoma	9 (1.2)
Other	16 (2.1)
Cancer Treatment Type (multi-select)	
Chemotherapy	580 (77.4)
Surgery	562 (75.0)
Radiation	351 (46.9)
Hormone Therapy	147 (19.6)
No Treatment	10 (1.3)

Note: GI/GU= Gastrointestinal/Genitourinary, GYN= Gynecologic, Other= Bone Cancer, Carcinoma, Osteosarcoma, Neuroendocrine Cancer, and Sarcoma

3.2 Oncology Massage Visit Patterns

749 patients attended 2,666 total visits; the median number of patient visits was 2, ranging from 1 to 21 with a maximum therapy duration of 50.4 months. More than half of patients (n=428, 57.1%) recorded at least two visits. Median time between both the first and second visits and all adjacent visits was 21 days. Summary statistics of OM usage patterns (days between first and second visits, days between adjacent visits, duration of OM therapy) are presented in Table 2.

Table 2 Oncology massage visit patterns.

	Median [Min, Max]	**Mean (SD)**	**Mode**
Number of OM visits	2.0 [1, 21]	3.6 (4.4)	1
For patients with ≥ 2 visits (n=428)			
Number of OM visits	4 [2, 21]	5.5 (5.0)	2
Number of days between 1st and 2nd visits	21.0 [2, 1535]	63.5 (150.0)	7.0
Number of days between adjacent visits	21.0 [1, 1535]	47.1 (103.3)	7.0
Duration of OM therapy in months	2.8 [0.1, 50.4]	6.9 (9.4)	0.5

Note: OM=Oncology Massage, Min = minimum; Max= maximum; SD= standard deviation

3.3 Anxiety Scores by Cancer Type

Mean pre-OM scores were relatively low on the 0-10 point scale (1.5 Brain cancer – 3.3 'Other'). Mean pre-OM anxiety score exceeded 2.5 in Breast, GI/GU, Head/Neck, Melanoma, and 'Other' cancer patient groups (Table 3). Pre-OM scores did not vary significantly across cancer type (p=0.133).

Table 3 Pre-OM anxiety scores by cancer type.

Cancer Type	**Pre-Therapy Anxiety Score**		
	N	Median [Range]	Mean (Std)
Brain	18	1 [0, 5]	1.5 (1.7)
Breast	362	2 [0, 10]	2.6 (2.8)
GI/GU	104	2 [0, 10]	3.0 (3.0)
GYN	67	2 [0, 10]	2.4 (2.7)
Head/Neck	30	1 [0, 8]	2.7 (2.9)
Hematologic	105	1 [0, 10]	1.9 (2.4)
Lung	38	2 [0, 8]	2.4 (2.5)
Melanoma	9	3 [0, 8]	2.8 (3.0)
Other	16	3 [0, 10]	3.3 (2.9)

Note: GI/GU= Gastrointestinal/Genitourinary, GYN= Gynecologic, Other= Bone Cancer, Carcinoma, Osteosarcoma, Neuroendocrine Cancer, and Sarcoma.

3.4 Pre- and Post- OM Anxiety Scores and Differences

Over all 2,666 visits, most pre- and post-OM anxiety scores were stable (50.6%). 49.1% experienced a decrease in anxiety score, and in seven visits (0.3%) post-OM anxiety exceeded pre-OM anxiety. Minimal clinically important differences were defined as a 1-point reduction on the 0 to 10 scale from pre-to post-massage [38]. At the first visit, a statistically significant reduction in pre- to post-OM anxiety was noted ($p<0.001$). Similarly, this reduction in pre- to post-OM anxiety was observed across all visits when adjusted for gender, type of cancer, cancer treatment, and age at first OM visit ($p<0.001$) (Table 4).

Table 4 Adjusted pre- and post-OM anxiety scores for first and all visits.

	First visit (n=749)			**All visits (n=2666)**		
	Pre-OM	Post-OM	Difference	Pre-OM	Post-OM	Difference
Mean (SD)	2.5 (2.7)	1.0 (1.7)	-1.5 (1.8)*‡	2.2 (2.6)	0.9 (1.6)	-1.2 (1.7)*‡

Note: OM=Oncology massage. SD=standard deviation. ‡ Minimal clinically important differences were defined as a 1-point reduction on the 0 to 10 scale from pre-to post-massage [38].

3.5 Longitudinal Anxiety Response to Oncology Massage

Patients presenting with anxiety greater than or equal to 1 with consecutive visits no longer than three months apart (n=177) had a maximum follow-up of 81 weeks. In this subpopulation, evidence did not suggest that pre-OM anxiety decreased longitudinally ($p=0.516$), suggesting OM was not associated with decreasing pre-therapy anxiety scores over time (Figure 1).

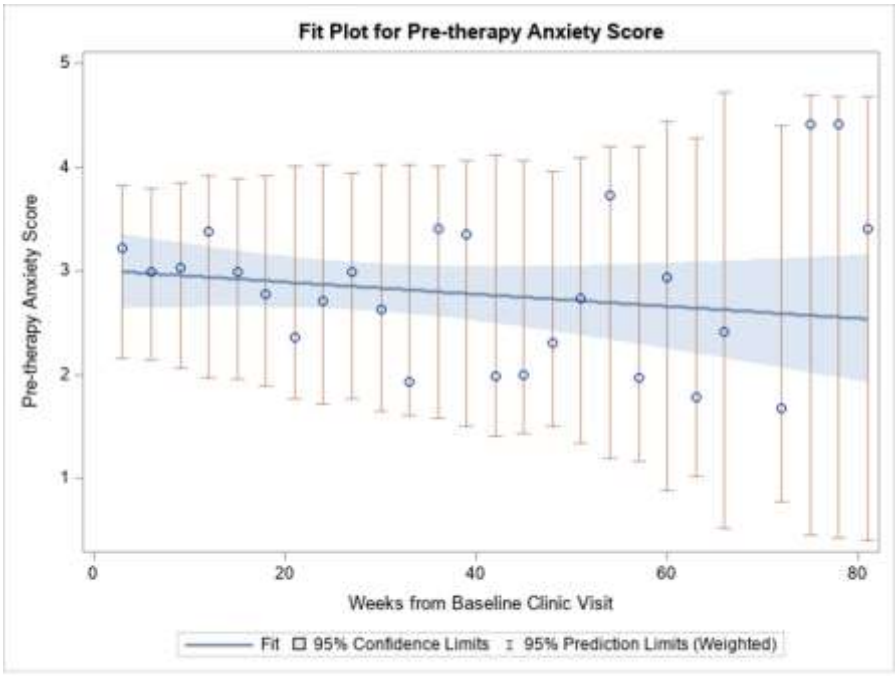

Figure 1 Longitudinal anxiety response to oncology massage N=177.

4. Discussion

The hypotheses that OM therapy usage patterns would be diverse and that anxiety would significantly decrease at first visit and across all visits were supported. The hypothesis that anxiety would significantly decrease longitudinally, however, was not supported. Diverse visit patterns suggest routine, clinical OM serves a wide range of patient access patterns. We hypothesize that visit patterns are impacted by barriers such as transportation, scheduling, OM appointment availability, and the burden of additional healthcare visits. Similarities in pre- and post- anxiety scores across cancer type suggest OM is likely an appropriate treatment for anxiety within all cancer types. Pre-therapy anxiety did not significantly reduce longitudinally although anxiety did reduce significantly within the first visit and across all visits. This suggests that OM may not have a cumulative effect across multiple OM visits but is rather beneficial for predictable short-term reduction of anxiety. Evidence suggests recurrent anxiety is lowered within each OM visit.

Our findings bolster previous research which suggests massage is helpful for cancer patients' anxiety and distress [18-23]. It also extends the body of knowledge of studies that compare pre-to post- massage anxiety scores [19, 20, 22, 23]. The short-term anxiety reduction found in our study is also similar to extant research [18]. Mean pre-OM anxiety scores were relatively low, which were similar to other studies which measured anxiety on the same 0 to 10 point scale in samples of cancer outpatients (2.56 in those receiving chemotherapy and/or biotherapy [39] and 3.36 in those at a cancer resource center) [23]. The current research, however, studied the effect of OM on anxiety in a much larger, more diverse retrospective sample than extant studies.

Our research achieves valuable scientific insights, yet its limitations must be considered. The observational, retrospective study design revealed only associations between OM and anxiety. Treatment patterns may have been impacted by appointment availability and treatment costs, notwithstanding scholarship availability. It is unknown if the longevity of anxiety response persisted past recorded immediate improvements during a pre-therapy to post-therapy time frame of approximately 45 minutes. The zero to ten anxiety scale used was a global anxiety measure, and future research with validated anxiety measures with more diverse constructs (e.g. Generalized Anxiety Disorder 2 and 7 item measure) [40] are needed. There was no uniform OM experience, as the nature of OM is to individually tailor therapy to patient needs. OM therapists were highly trained and credentialed professionals. Therefore, results may not generalize to settings with massage therapists of different training experiences. Furthermore, OM was provided by multiple therapists, and unknown individual differences across providers and response to each provider may exist. It was also unable to control for potential confounding demographic and medical characteristics (e.g., behavioral health diagnoses (including anxiety) cancer stage, psychotropic (including anxiolytic) medications, patient expectations for anxiety relief, previous experiences with TMB etc.) because these data were not collected during routine OM within the present retrospective dataset. The sample was disproportionately comprised of breast cancer patients, and future studies with larger proportions of other cancer types are needed.

To our knowledge, this is the largest retrospective review of anxiety in a large diverse, outpatient clinical sample undergoing routine oncology massage. The study examined a cohesive, consecutive population of cancer patients in a standard, nonexperimentally manipulated clinical environment. Given that less than 1% of all massages are provided in hospital settings [14], these data are particularly illuminating to the study of OM within routine clinical practice. This real-

world examination of data from routine clinical practice may enhance its generalizability to other clinical settings. Our study advances knowledge about OM's impact on anxiety by providing evidence that OM is associated with anxiety reduction across multiple cancer types in routine, nonexperimentally manipulated clinical practice, although likely in the short-term.

5. Conclusions

Extant research suggests OM is beneficial for reducing anxiety in cancer patients, yet research on the impact of OM on anxiety in a large, diverse, outpatient sample had not been previously explored. Our study described OM therapy usage patterns and anxiety scores by cancer type and examined anxiety response to OM at first visit, across all visits, and longitudinally over time. OM therapy usage patterns were diverse for all characteristics measured. OM was associated with statistically significantly decreased anxiety after the first visit and across all visits, although not associated with decreasing anxiety longitudinally. This research contributes to the study of the impact of massage on anxiety by finding an association between OM and a short-term decrease in anxiety in a diverse, outpatient, nonexperimentally manipulated sample of cancer patients.

Future research should explore the longevity of anxiety response to OM and therapy characteristics (e.g., frequency, total therapy duration) most effective for anxiety. Patients' reasons for not continuing OM should be examined. Exploration of the impact of OM on anxiety among different demographic groups (e.g. cancer stage, length of survivorship) and how it may interact with other anxiety treatments (e.g. cognitive behavioral therapy, anxiolytic medication) would be valuable. Additional research with validated anxiety measures are needed. Randomized controlled trials of OM compared to an appropriate control group in a diverse outpatient cancer sample would also be valuable. Anxiety is a common side effect at all stages of the cancer continuum that evidence suggests is reduced by OM in routine clinical practice. OM may be a helpful intervention for a variety of cancer patients with anxiety. It may also be beneficial during acute anxiety related to cancer treatment and survivorship (e.g. initial chemotherapy or radiation session, awaiting screening or diagnostic results.)

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Author Contributions

Danielle Gentile lead the conceptualization and design of the project, supervised data analysis and results interpretation, drafted and edited all sections of the manuscript, and provided final approval of the submitted manuscript. Danielle Boselli contributed to conceptualization and design of the project, performed data management data analysis, drafted the methodology and results sections, lead interpretation of results, contributed to manuscript editing, and provided final approval of the submitted manuscript. Matthew Flores drafted the background section of the manuscript, contributed to manuscript editing, and provided final approval of the submitted manuscript. Susan Yaguda contributed to conceptualization and design of the project, lead and

supervised data collection, contributed to manuscript writing and editing, and provided final approval of the submitted manuscript. Rebecca Greiner contributed to conceptualization and design of the project, offered clinical insights as Physician Assistant in the Integrative Oncology Section, contributed to manuscript editing, and provided final approval of the submitted manuscript. Paulomi Campbell contributed to the conceptualization and design of the project , offered clinical insights as Psychologist within Supportive Oncology, contributed to manuscript editing, and provided final approval of the submitted manuscript. Chasse Bailey-Dorton contributed to the conceptualization and design of the project, offered clinical insights as Chief of the Integrative Oncology Section, contributed to manuscript editing, and provided final approval of the submitted manuscript.

Competing Interests

We declare that no competing interests exist.

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