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General

The effectiveness of Dragon Boat racing on body image and traumatic symptoms of breast cancer patients

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Objective

The present study investigated the effectiveness of a Dragon Boat training program in women with breast cancer body image and traumatic distress processing.

Methods

29 breast cancer patients (M(SD) age= 51 (7.41)) voluntarily participated in a physical activity program. Seventeen (Intervention Group) enrolled in a Dragon Boat racing program, while 12 (the Control Group) individually performed alternative physical activities. Before and after the intervention, patients completed the Body Image Scale (BIS) and the Impact of Event Scale – Revised (IES-R).

Results

The Intervention Group reported a decrease in Body Image negative perception (*Pillai's trace* = .352, $F(1,27) = 14.111$, $p = .001$; *partial* $\eta 2 = .951$) and in traumatic symptoms (*Pillai's trace* = .283, $F(1,27) = 10.682$, $p = .003$; *partial* $\eta 2 = .883$).

Conclusions

Authors discuss the role of Dragon Boat racing in improving positive body image after the experience of breast cancer.

INTRODUCTION

The effects of physical activity on the psychological and somatic wellbeing of breast cancer patients are well-documented in scientific literature. A recent meta-analysis study highlighted the benefits of physical activity in preventing breast cancer, reducing the rate of recurrence, and increasing both the time and rate of survival in patients undergoing active therapies.[1] From a somatic perspective, scholars have hypothesized two main influences of physical activity on breast cancer: on one hand, frequent and robust training leads to a reduction in sex hormones associated with the disease and decreases oxidative stress, while on the other hand, it stimulates immune function.[2]

Furthermore, positive effects have been reported on the risk and rate of secondary lymphedema, which is one of the most severe physical consequences of breast cancer interventions such as quadrantectomy or mastectomy.[3] Physical activity is increasingly considered a complementary intervention in the breast cancer care pathway, with the goal of improving both the physiological and psychological factors that impact a patient's survival and quality of life.[4]

A number of psychological factors related to physical activity in cancer patients have also been studied. Pinto and colleagues[5] found that physical exercise had a positive impact on fatigue and the quality of life in women experiencing breast cancer. In a more recent review, other scholars described a decrease in depression and anxiety symptoms as well as overall distress after a physical activity intervention.[6] Mehnert and colleagues[7] successfully tested the effectiveness of an exercise program including gymnastics, movement games, walking, jogging and relaxation techniques in reducing anxiety, depression, improving body image, and enhancing health-related quality of life.

In the last two decades, a water sport known as Dragon Boat racing, based on group activity, has gained popularity among women with breast cancer. This particularly intense sport originated in Asia approximately 2000 years ago and typically involves 20/22 people with different roles: 20 paddlers, a drummer seated at the bow of the boat, and a steersperson in the stern. The Dragon Boat takes its name from a dragon head positioned at its front and is usually 13.5 meters long.

The earliest studies in the literature concerning Dragon Boat racing interventions with cancer patients are rela-

tively recent and began in Canada and the United States.[8] However, this social movement has since expanded to other countries and across five continents.[9] Several studies have investigated the role of Dragon Boat racing in enhancing the physical and psychological well-being of women with breast cancer, employing both qualitative and quantitative research methods.

Considering the positive effects on the body, Stefani and colleagues[10] reported positive outcomes in myocardial functions of breast cancer survivors undergoing Dragon Boat training. Similarly, Tresoldi and others[11] examined the role of this sport in improving immunological functions and found a positive effect on cytokine levels and oxidative stress. Other research highlighted the connection between participating in Dragon Boat racing and a reduced incidence of lymphedema[12] as well as improved arm volume and circumference after surgery.[13]

Numerous studies have delved into the role of Dragon Boat racing in improving psychological variables. Specifically, Harris[14] reviewed quantitative and qualitative studies in 2012, finding an enhancement in quality of life, increased social participation,[15] and reported positive psychological growth. Psychological distress symptoms and social support have also been explored through phenomenological-interpretative analysis of patients' narratives.[16] Similarly, qualitative studies have considered the potential for posttraumatic growth associated with being part of a Dragon Boat team.[16,17] However, there is currently no literature reporting on the assessment of symptoms related to traumatic experiences.

The characteristics of Dragon Boat racing as a sport raise the hypothesis of significant benefits in terms of body image development for cancer patients. Given its focus on the upper body and the central role of the torso and breast in managing movement and enhancing performance, it is conceivable that Dragon Boat racing may have a positive impact on body image. Nevertheless, only one study has explored this crucial variable in relation to the effects of Dragon Boat intervention. It involved a study of 10 patients without the support of a control group and found a significant improvement in body image.[18]

Building upon these assumptions, the present study aims to investigate the effectiveness of a Dragon Boat training program in a sample of women with breast cancer, focusing on body image and the processing of traumatic distress due to the disease experience. Specifically, the authors aim to test the following goals related to specific hypotheses:

a) To investigate the role of Dragon Boat racing, in comparison to other physical activities, in improving patients' body image. Given the scientific literature's emphasis on the psychological and physical distress associated with breast and upper-body interventions, the need to develop a new feminine and sexual identity, and the potential for arm impairments after mastectomy,[19,20] the authors hypothesize that Dragon Boat racing will have a deeper and more positive effect on the body image of breast cancer patients than other physical activities that do not directly involve the breast as the primary organ responsible for sport performance.

b) To assess the impact of participating in a Dragon Boat training program on the potential trauma experienced by cancer patients. In this case, the authors hypothesize that engagement in a structured activity directly linked to physical exercise and social interaction with other women who share the same disease will reduce traumatic symptoms associated with breast cancer. Additionally, given the scientific literature's reports on Dragon Boat racing as a tool to improve arm recovery after surgery and prevent significant side effects of the disease,[11] the authors hypothesize a lower emotional impact of the disease after the intervention in patients involved in Dragon Boat racing.

METHODS

ETHICAL CONSIDERATONS

The Ethical Committee of the University of Salerno (Protocol Number: 1/2022) approved the rationale, the methodological design and the whole research project. After an informative meeting reporting specifical information on study goals and procedures, participants were asked to complete a written informed consent form. The study was conducted in accordance with the Helsinki Declaration for research involving human participants.

PARTICIPANTS

A total of 29 women diagnosed with breast cancer participated in the present study, with a mean age of 51 (Standard Deviation: 7.41) years. These participants had received their breast cancer diagnosis between 2014 and 2021. Among them, 51.7% had undergone a quadrantectomy as part of their treatment, while 48.3% had experienced a mastectomy. Of the total participants, 23 (79.3%) had undergone breast reconstruction through prosthesis implantation. Three participants reported that they were not engaged in physical activity before their cancer diagnosis, while the remaining 26 engaged in physical and motorial activities, with an average frequency of twice a week (65.5%) or three/four times a week (24.1%).

Participants were recruited with the assistance of the Lega Italiana Lotta Tumori Association (LILT), who invited them to voluntarily participate in a physical activity program. Seventeen of the participants (the Intervention Group) enrolled in a Dragon Boat racing program with the support of Circolo Posillipo Nautic Club, Italy. The remaining 12 participants (the Control Group) individually performed alternative physical activities such as running, pilates, or yoga training.

Table 1 presents descriptive statistics for both groups and reports the results of the chi-squared test and Student's t-test conducted to assess group homogeneity.

PROCEDURES

In October 2022, following approval by the Ethical Committee of the University of Salerno (Protocol Number: 1/2022),

Table 1. descriptive statistics for intervention and control groups and results of sample homogeneity tests

Variable	Intervention Group	Control Group	Statistical difference
Mean (SD) Age	51.11(7.36)	50.83(7.40)	$t(1,27)=.1$; p=ns
Year of diagnosis	2014-2021	2014-2021	$\chi^2=13.68$, p=ns
Mastectomy N(%)	10 (58.8%)	4 (33.3%)	$\chi^2=1.83$; p=ns
Prosthesis N(%)	16 (94.1%)	7 (58.3%)	$\chi^2=5.49$; p=ns
Physical Activity before diagnosis N(%)	16 (94.1%)	10 (83.3%)	$\chi^2=.898$; p=ns

a meeting was organized at the Circolo Nautico Posillipo in Naples, Italy. The meeting included representatives from the LILT association to introduce the Dragon Boat intervention project. Women who were members of LILT Associations and were coping with breast cancer were invited to participate in the project. The discussion emphasized the importance of physical activity during the breast cancer experience, then the Dragon Boat project was introduced. Subsequently, all patients had the voluntary choice of participating in Dragon Boat racing.

At the conclusion of the meeting, patients who expressed interest in joining the project were asked to complete informed consent forms.

Participants also selected a personal, anonymous codes, which were necessary for anonymously pairing the data collected during test-retest assessments. They were also encouraged to complete an online questionnaire (t0), providing information on socio-demographics, their diagnosis details, and their clinical history, including the year of diagnosis, type of surgery (mastectomy or quadrantectomy), presence of prostheses, prior experiences with physical activities, and their frequency. Similarly, other breast cancer patients who did not applicated to the specific Dragon Boat intervention and decided to undergo individually other physical activities were involved in the project as Control Group and completed the survey. Researchers explain patients that ai the end of the study, in every moment they would be welcome to join the Dragon Boat racing team.

Following this, participants were presented with two questionnaires regarding body image perception and the impact of the disease: the Body Image Scale – BIS,[21] validated in Italian for cancer patients by Cheli and colleagues,[22] and the Impact of Event Scale Revised – IES-R,[23] also validated in Italian by Giannantonio.[24]

The BIS is a 10-item tool that employs a 5-point Likert Scale to assess changes in body image among cancer patients. It was specifically validated for women with breast cancer who have undergone surgery. Patients were asked to indicate their level of agreement with statements related to their negative feelings and thoughts about their bodies. Higher scores reveal difficulties in perceiving and elaborating an own body image. In our study, Cronbach's alpha value was calculated to ensure good internal consistency, and a very high degree of consistency (.922) was found.

The Impact of Event Scale Revised (IES-R) is a self-report measure designed to evaluate the symptomatic response to specific traumatic stressors, such as a significant illness. It consists of 22 items that encompass three factors related to cognitive, affective, and behavioral reactions to trauma: Avoidance, Intrusivity, and Hyper-arousal. Higher scores are related to traumatic symptoms due to the specific event are asked to answer to. In our study, all three factors exhibited a high degree of consistency (Cronbach's Alpha for Avoidance = .735; for Intrusivity = .883; for Hyper-arousal = .828). The data collection process took an average of 25 minutes.

One week after the initial assessment, the intervention commenced and continued for six months, starting from November 2022 and concluding at the end of April 2023.

In the week leading up to the conclusion of the intervention, participants of both groups were contacted by researchers to complete an online survey (t1) consisting of the same questionnaires (BIS and IES-R) administered at t0.

Two researchers matched the t0 and t1 data using the personal codes provided in the surveys, and Repeated Measures ANOVAs were conducted to examine potential differences in changes in Body Image and Impact of Disease between the Intervention and Control groups.

INTERVENTION

The sporting activity intervention relating to the Dragon Boat training program was carried out at the Circolo of Posillipo Nautic Club, Italy. The intervention commenced and continued for six months, starting from November 2022 and concluding at the end of April 2023. The intervention involved two training sessions lasting 60 minutes per week. The training was carried out entirely in water, in a Dragon Boat, with a gradual progression of intensity in the initial phase (first 7-8 minutes) until a moderate/intense pace was reached. After 30 minutes there was a short recovery break (5 minutes) with a change of rowing side, in order to guarantee balanced training of the upper limbs and of all the muscle-tendon and joint components of the two sides involved in paddling. In the final phase of the training (last 7-8 minutes), an active cool-down was conducted with a gradual reduction in intensity, paddling rhythm, and combined recovery breathing exercises.

In the same six months of intervention, breast cancer patients members of the Control Group performed individual physical activities in different disciplines related with personal preferences and attitudes. At t1 data collection, women reported to have undergone physical training twice

Table 2. Body Image and Impact of Disease scores at t0 and t1 for Intervention and Control groups

	t0		t1	
	Intervention Group M(SD)	Control Group M(SD)	Intervention Group M(SD)	Control Group M(SD)
BIS - Body Image	25.25(8.65)	20.16(7.75)	17.35(4.48)	24.5(6.51)
IES-R - Avoidance	11.05(6.46)	9(2.69)	7(4.62)	11.83(7.89)
IES-R - Intrusivity	12.82(7.53)	13.33(5.44)	7.17(6.78)	14.33(4.39)
IES-R - Iper-Arousal	8.41(5.75)	6.16(3.48)	3.88(4.74)	8.05(3.06)
IES-R - Total	32.29(18.42)	28.5(7.25)	18.05(15.76)	34.66(9.97)

a week or more in the following activities: running/footing (N=6), Pilates(N=4) and Yoga (N=2).

RESULTS

As first, a Univariate ANOVA was performed to investigate difference at t0 in dependent variables between the two groups. Both the total IES-R (F(1,27)=1.019; p=ns) and the Body Image scores (F(1,27)=1.299; p=ns) didn't show significant differences between Intervention and Control groups at first data collection.

Table 2 shows descriptive statistics of dependent variables in both groups before and after the intervention.

A Repeated Measures ANOVA has been then run to test the group effect on potential changes in Body Image perception and Impact of the disease event in patients' lives.

Results showed a significant task *group interaction effect (*Pillai's trace* = .283, $F(1,27) = 10.682$, $p = .003$; *partial* $\eta 2 = .883$). The significant task*group effect has been found also for all the three IES factor, Avoidance (*Pillai's trace* = .244, $F(1,27) = 8.703$, $p = .006$; *partial* $\eta 2 = .812$), Intrusivity (*Pillai's trace* = .239, $F(1,27) = 8.495$, $p = .007$; *partial* $\eta 2 = .802$) and Iper-Arousal (*Pillai's trace* = .280, $F(1,27) = 10.513$, $p = .003$; *partial* $\eta 2 = .878$). Overall, patients of the involved in the Dragon Boat racing reported a decrease of traumatic symptoms after the intervention compared with the Control Group. The Iper-Arousal factor registered the higher effect of decrease among the three symptomatic sub-scales in the Intervention Group.

Looking at Body Image, a significant task *group interaction effect (*Pillai's trace* = .352, $F(1,27) = 14.111$, $p = .001$; *partial* $\eta 2 = .951$): the Intervention Group reported a decrease in Body Image negative perception while members of the Control Group reported an increase of Body Image scores.

DISCUSSION

The present intervention study aimed to evaluate the effectiveness of a Dragon Boat racing intervention in improving the body image and reducing traumatic symptoms in breast cancer patients. As outlined in the introduction, our hypotheses were based on the idea that physical activities like Dragon Boat racing, which emphasize the role of the chest and upper body on patients' physical performance, could empower a positive body image and aid in emotional coping with the impact of a cancer diagnosis.

Results of our study show that Dragon Boat training promote positive changes in breast cancer patients' Body Image.

Breast cancer often presents a significant psychological challenge, as it necessitates coping with identity changes, particularly in relation to a body part as significant as the breast.[25-27] Additionally, our study's sample had an average age of 51 years, a life stage marked by identity reevaluation, which can greatly affect a patient's quality of life. Research by Cimprich and colleagues[28] underscores that the quality of life of middle-aged women (ages 45-65) dealing with breast cancer is particularly influenced by personal factors like marital status, employment, and physical activities.

In this context, a sport like Dragon Boat racing, when practiced during this life stage, could serve not only to enhance positive changes in body image and psychological coping with the disease but also as an opportunity to be part of a team and foster social connections post-diagnosis.

The intervention we proposed centered on a structured activity that encouraged patients to meet twice a week and engage in healthy and enjoyable activities together. Conversely, members of the Control Group in this study reported participating in individual activities like running, Pilates, or yoga twice a week or more. Our interpretation is that Dragon Boat racing, as a structured physical activity, has the added benefit of promoting social interaction among patients and fostering a shared experience that imbues the breast and the body with positive meaning.

Moreover, the results also indicate a significant decrease in traumatic symptoms related to the cancer diagnosis in patients involved in Dragon Boat training. These patients reported feeling less avoidant of thoughts and emotions associated with their health condition after the intervention. They also experienced fewer intrusive thoughts and maintained a more balanced psychological state. These findings align with two studies in the scientific literature that explored Post-Traumatic Growth following Dragon Boat training using qualitative data.[29,30] Future studies should delve deeper into the personal growth that arises from the traumatic experience of a cancer diagnosis and the potential role of physical activity in promoting it.

Despite the promising results regarding the effectiveness of Dragon Boat racing in improving patients' body image and reducing traumatic symptoms, this study has sev-

eral limitations. Firstly, the sample size is relatively small, which limits our ability to investigate potential predictive or moderating effects in enhancing positive body image and coping with the disease. Although our sample size is comparable to or larger than other intervention studies with clinical samples assessing Dragon Boat effectiveness,[12,14] future studies could expand the number of participants to incorporate additional variables into data analysis, such as the type of breast intervention, the impact of prostheses on potential changes in body image, age, and socio-demographic factors.

Secondly, this study's strength lies in its comparison of the intervention with a Control Group. However, the patients in our Control Group did not engage in structured physical activities different from Dragon Boat; they instead chose individual activities based on personal preferences or attitudes. Future studies could compare Dragon Boat training with other structured, group-based physical activities that do not directly involve the upper body and the breast as the core focus of the workout.

Finally, assessing the effectiveness of an intervention in clinical samples necessitates a thorough understanding of the changes produced, not only quantitatively but also qualitatively. Our future plans involve the implementation of mixed-methods to collect more information about the psychological processes underlying the elaboration of body image and traumatic symptoms through patients' narratives.

To conclude, the results of the present study provide evidence on two fundamental aspects of the breast cancer experience that had not been previously studied in their interaction with physical activity interventions. As seen, in fact, the only study that had examined body image did not have a control group and was limited to the analysis of qualitative data. Similarly, the impact of the disease in terms of traumatic symptoms had not been studied following a dragon boat intervention. The results indicate that Dragon Boat racing can bring significant benefits to patients, especially in those aspects strongly affected by the disease, such as body image or distress related to traumatic symptoms. It is important to continue research in the field of mind-body integration due to the promising results regarding the effectiveness of physical activity on breast cancer patients' mental health.

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DISCLOSURE STATEMENT

The author reports there are no competing interests to declare

ETHICAL APPROVAL

The present study has been approved by DISUFF Ethical Committee of University of Salerno (protocol N. 1/2022)

DATA AVAILABILITY STATEMENT

Data available on request

AUTHOR CONTRIBUTION

CF and RV concived the study and supervised the study; CF, SC and RV defines the metholodogical design; CF, SC. SB and RV collected data; CF carried out the analysis; CF and SC wrote the first draft. All authors contributed to the final draft.

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