The feasibility of a multi-phasic, multi-modal exercise-based intervention utilising the Health Action Process Approach, dyadic coping and wearable technology in women before and after surgery for breast cancer

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INTRODUCTION

In 2022, female breast cancer was the second most common cancer worldwide, accounting for an estimated 2.3 million new cases (11.6% of all cancer diagnoses) and the fourth leading cause of cancer-related deaths (Bray et al., 2024). Although mortality rates have steadily declined since 1989, breast cancer incidence increased by 0.5% annually between 2010 and 2019, primarily due to a rise in localized and hormone receptor-positive cases (Giaquinto et al., 2022). Resulting in more women living with the long-term effects of treatments such as surgery, radiotherapy, and chemotherapy, which can lead to both short- and long-term impairments in physical function and quality of life (QoL) (Heidary et al., 2023).

Randomized controlled trials demonstrate that exercise interventions effectively reduce treatment-related side effects during adjuvant breast cancer therapy (Furmaniak et al., 2016), and improve functional outcomes, fitness, and health-related quality of life (HRQoL) both after surgery (Loughney et al., 2018) and following adjuvant therapy (Lahart et al., 2018). Despite this, exercise-based prehabilitation remains understudied in cancer care, with particularly limited research focused on prehabilitation for breast cancer patients. This may, in part, be due to the limited 'window of opportunity' between diagnosis and treatment initiation, which poses substantial challenges for prehabilitation interventions. In the UK, current guidelines aim to keep the waiting time between treatment decision and start to no more than 31 days (NHS, 2023).

Given these constraints, the widespread adoption of web-conferencing systems, largely as a consequence of the COVID pandemic, may offer a practical alternative to traditional hospital-based prehabilitation and rehabilitation programs. Although research on remote exercise interventions for breast cancer remains limited, Phillips et al. (2017) found that 80% of breast cancer survivors expressed interest in remote exercise programs, with over 66% believing that app- or website-based interventions could be effective (Phillips et al., 2017).

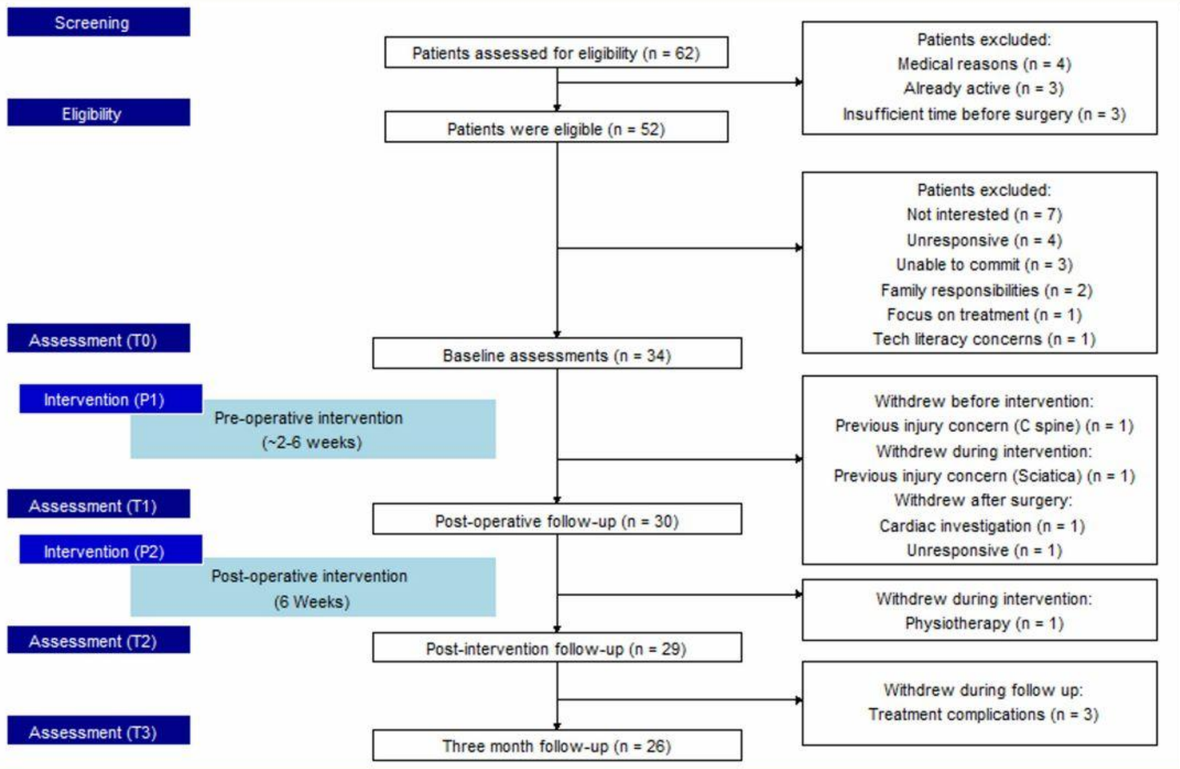
METHODOLOGY

Eligible participants were females aged ≥18 years with biopsy-confirmed invasive breast cancer or DCIS, scheduled for elective lumpectomy or mastectomy. Inclusion required at least two weeks until surgery, surgeon approval, willingness to engage in supervised and home-based exercise, and access to a computer or smart device. Exclusion criteria included metastatic disease, contraindications to exercise (e.g., severe cardiac or renal conditions), non-fluency in English, physical activity >150 min/week, or symptoms of long-COVID.

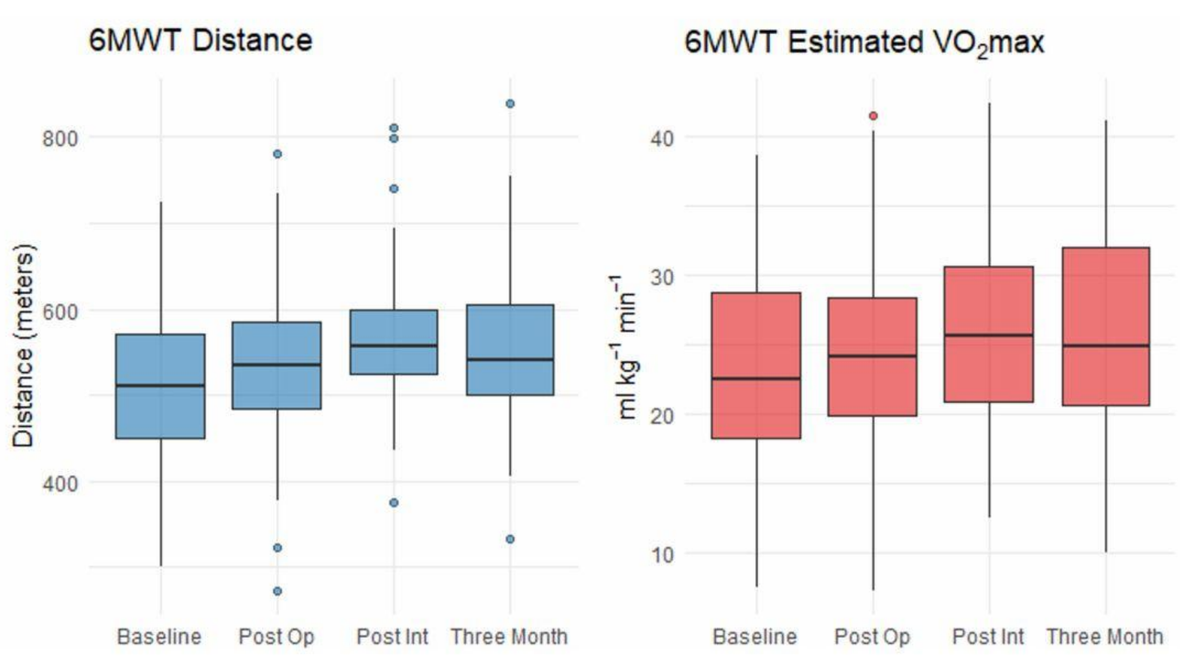
Participants completed two supervised and one unsupervised session weekly until two days before surgery. Supervised sessions (60 min) included warm-up, ~35 min of aerobic training, 20 min of resistance/targeted exercises, and a cool-down. Aerobic sessions involved jogging, dynamic stretching, and bodyweight intervals. Resistance exercises used elastic bands (10–30 lbs) and targeted major muscle groups. Participants also walked unsupervised for 20 min weekly.

Beginning two weeks post-surgery, participants completed one supervised session weekly and progressed from two to four unsupervised sessions over six weeks. Aerobic exercise intensity was gradually increased, and targeted therapy advanced from assisted shoulder mobility to full preoperative resistance training.

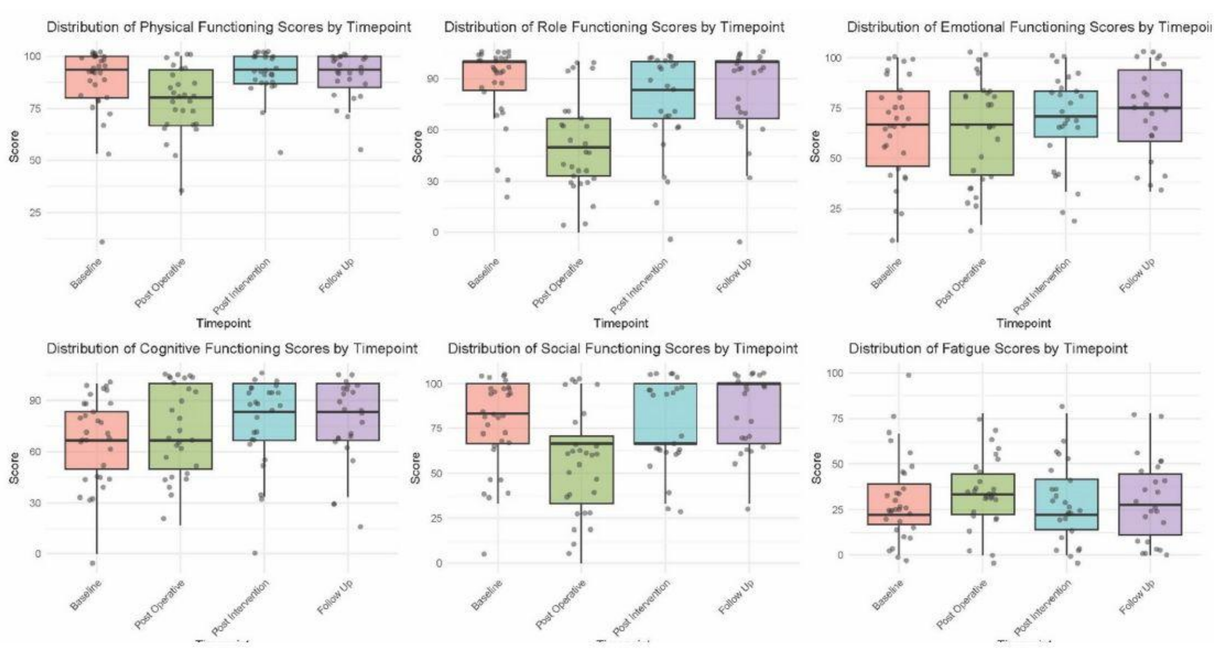
FEASIBILITY



PHYSICAL FUNCTION



PATIENT REPORTED



SUMMARY

A remotely supervised, multi-modal, multi-phasic exercise intervention is feasible and well-accepted among individuals with breast cancer. However, these preliminary findings require confirmation through adequately powered multicentre phase III randomised controlled trials.

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PROTOCOL FEASIBILITY FUNCTION PROMS