

High-intensity functional training improves physical function and body composition among cancer survivors

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INTRODUCTION

- There are currently over 14 million cancer survivors in the US [1].
- Exercise helps combat physical and psychological effects of cancer treatments [2].
- High-intensity functional training (HIFT) is a promising group-based exercise that emphasize functional movements
- HIFIT utilizes multiple energy pathways by temporally combining aerobic and resistance training exercises, taking significantly less time than moderate intensity exercise [3].
- Potential HIFT benefits include metabolic and physiological adaptations, such as improvements in body composition and daily functioning.
- To date, HIFT has not been tested among cancer survivors.

PURPOSE

We investigated the feasibility and preliminary efficacy of a HIFT exercise program among adult cancer survivors within five years of their last cancer treatment.

METHODS

Design: Single-group pre-test, posttest pilot study

Participants (N=8):

- All participants were white and college educated,
- Age 53.5y (± 5.0), Range=47-60 years, 75% female
- Cancer stages ranged from I-IV, with breast (n=4), tongue (n=1), non-hodgkin lymphoma (n=1), skin squamous/basal cell (n=1), and unknown primary (n=1).
- Treatments included chemotherapy (n=6), radiation (n=3), and surgery/removal (n=3).

Measures

- **Feasibility**
 - Assessed by initiation, adherence, and acceptability
- **Health-Related Quality of Life (HRQOL)**
 - European Organization for Research and Treatment of Cancer (EORTC) core 30-item questionnaire (QLQ-C30)
 - Functional abilities: physical, role, cognitive, emotional and social functioning)
 - Symptoms: fatigue, pain, and nausea/vomiting
 - Global health status/quality of life
- **Body composition:**
 - Height (stadiometer) & Weight (digital scale)
 - Waist and hip circumferences (flexible tape)
 - Dual-energy X-ray absorptiometry scan



METHODS

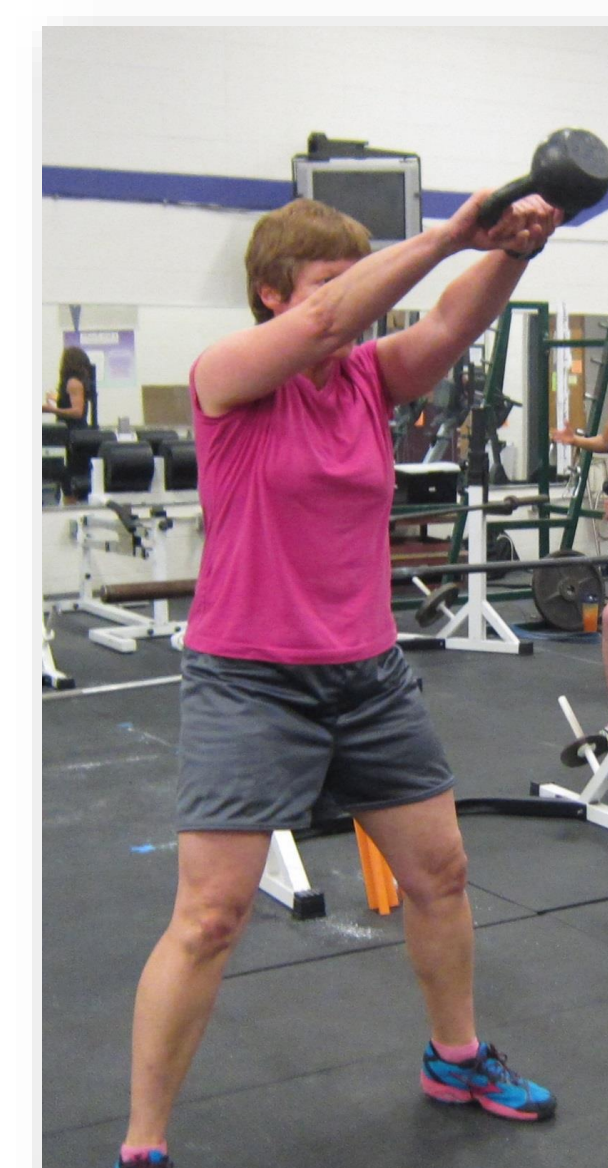
Table 1. Functional Movement Tests

Test Name	Domain Measured
Single-Leg Stance Test	Balance
Sit and Reach	Flexibility
Prone Timed Up & Go	Mobility, strength, balance and agility
Lift and Carry Test	Coordination, strength and agility
Chair Stand Test	Lower body strength and power
Repetitive Shelf	Upper body endurance and strength
Stair Climb	Power and balance
6 minute walk test	Cardiovascular endurance

Intervention

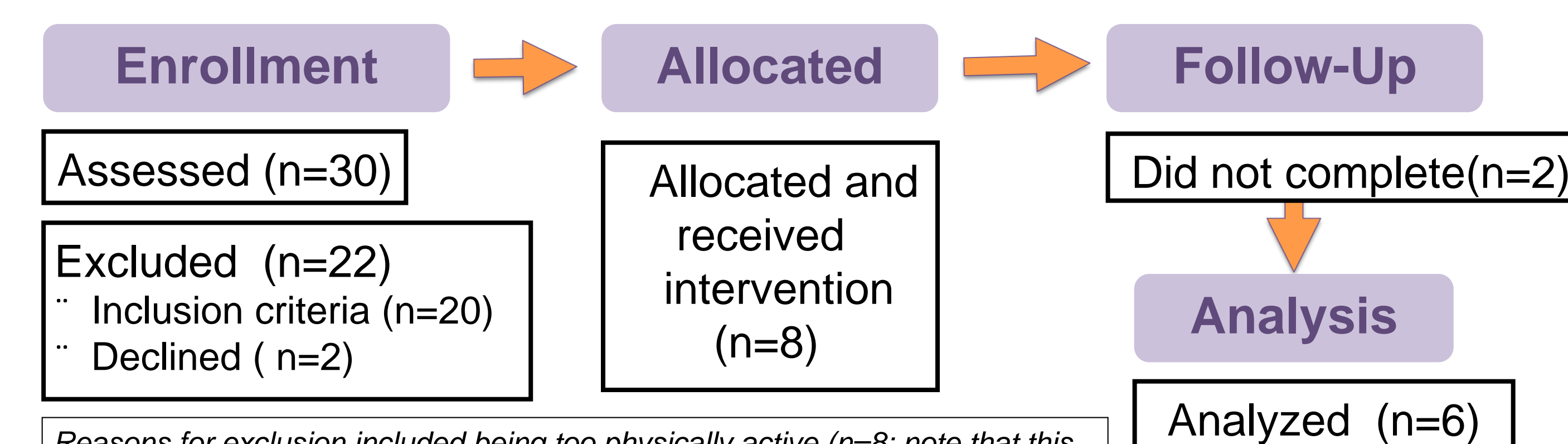
Duration: 5-weeks, 3 days/week for 60 minutes

- 4 testing sessions (functional movement tests)
- 12 group workouts with mobility and stretching exercises
 - Based on CrossFit™ training template
 - Led by CrossFit™ certified coaches
 - Constantly varied to include cardiovascular, body weight, and weight lifting exercises
 - Individually scaled



RESULTS

Feasibility: Recruitment rate: 80% ; Adherence rate: 75%.



Reasons for exclusion included being too physically active (n=8; note that this exclusion criteria was removed halfway through recruitment), age (n=3), cancer metastasis (n=3), last cancer treatment >5 years (n=2), current receiving cancer treatment (n=2), (n=2), more than one type of cancer (n=1), and taking beta blockers (n=1).

RESULTS

HRQOL:

- Significant improvement in emotional functioning ($6.9 \pm 6.3\%$ $p < 0.05$).
- Baseline: highest reported symptom was fatigue ($M = 18.5$, $SD = 13.5$)
- Posttest: fatigue and global health status remained consistent, non-significant increases in pain ($11.1 \pm 13.6\%$), insomnia ($11.1 \pm 17.2\%$), and constipation ($5.6 \pm 13.6\%$).

Body Composition:

- BMI and waist-to-hip ratio did not significantly change.
- Participants significantly increased lean mass $+3.8 \pm 2.1\text{kg}$ ($t = 4.32$, $p = 0.008$), and significantly decreased fat mass $-3.3 \pm 1.0\text{kg}$ ($t = 7.91$, $p = 0.001$) and body fat percentage by $-4.7 \pm 1.2\%$ ($t = 9.39$, $p < 0.001$).

Functional Performance (Table 2):

- Participants significantly improved 5 of 7 Functional Movement Tests.

Table 2. Changes in Functional Movement (n = 6)

Measure	Pre-test M (SD)	Post-test M (SD)	Percent Change	p-value
Single-Leg Stance Test (sec)	87.5 (59.5)	120.3 (62.1)	+50.2	0.032
Difficulty Rating	5.7 (2.3)	5.5 (2.4)	+5.3	0.856
Sit and Reach (cm)	27.1 (7.5)	28.8 (6.2)	+9.2	0.148
Difficulty Rating	4.3 (1.9)	3.3 (2.1)	-28.8	0.012
Prone Timed Up and Go (sec)	8.9 (1.3)	7.8 (0.8)	-10.9	0.071
Difficulty Rating	3.2 (1.5)	2.8 (1.9)	-10.0	0.638
Lift and Carry Test (sec)	11.8 (0.6)	9.5 (0.9)	-19.2	0.004
Difficulty Rating	2.3 (1.2)	2.2 (1.6)	-4.2	0.771
^a Chair Stand Test (#)	14.2 (2.2)	18.2 (3.6)	+27.9	0.009
^a Difficulty Rating	4.2 (2.3)	4.6 (3.1)	+4.2	0.477
^a Repeated Stair Climb Test (sec)	31.0 (2.0)	27.0 (2.0)	-15.1	0.002
^a Difficulty Rating	3.2 (2.2)	3.6 (1.5)	+23.8	0.374
^a 6-Minute Walk Test (m)	638.3 (41.2)	733.8 (19.1)	+15.6	0.039
^a Difficulty Rating	5.5 (1.9)	5.8 (1.5)	+12.5	0.638

^an=5

CONCLUSIONS

Five weeks of HIFT training was well-received, feasible, and effective for most cancer survivors, and, with movement screening can be offered as an option in exercise interventions.

Further work is needed to compare the efficacy of HIFT to moderate exercise among a larger sample.



References

1. American Cancer Society. (2014). *Cancer treatment and survivorship facts & figures 2014-2015*. Atlanta, GA: American Cancer Society.
2. Speck RM, Courneya KS, Masse LC, Duval S, Schmitz KH. An update of controlled physical activity trials in cancer survivors: a systematic review and meta-analysis. *J Cancer Surviv*. 2010;4:87–100.
3. Heinrich KM, Patel PM, O'Neal JL, Heinrich BS. High-intensity compared to moderate-intensity training for exercise initiation, enjoyment, adherence, and intentions: an intervention study. *BMC Public Health*. 2014;14:789. .