A Comparison of Adherence to Activity Trackers and Physical Activity Levels among Adolescent and Young Adult Cancer Patients and Healthy Controls: A Prospective, Longitudinal Study

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1. Introduction

- Activity trackers (e.g. Fitbit®) are popular among adolescent and young adults (AYA, aged 15-39) for tracking physical fitness.
- It is unknown whether they are useful to evaluate physical activity levels in cancer patients undergoing treatment.
- This study compares the adherence to wearing Fitbit® trackers and Fitbit®-derived physical activity (PA) measures between AYA cancer patients and healthy controls.

2. Methods

- This is an ongoing prospective, longitudinal study (ClinicalTrials.gov Identifier: NCT03476070).

Table 1: Study criteria

Inclusion criteria
For both arms:
✓ 15-39 years old
For patients diagnosed with cancer:
✓ No prior history of chemotherapy and/or radiotherapy
✓ Newly diagnosed with breast cancer, lymphoma, or germ cell tumour and scheduled for curative treatment
Exclusion criteria
X Incapable of providing consent
X Evidence of psychosis or underlying neuropsychiatric illness
X Having immediate family member who is enrolled in other arm

- Eligible AYA participants were offered Fitbit® charge 2 to be worn at all times excluding wet activities (1 year for cancer patients; 6 months for healthy controls).
- Data from Fitbit® were synced to Fitbit® application once a week and extracted from FitnessSyncer database.

Data analysis

- Weeks with at least 4 days of non-zero step count were included in the data analysis for rates of adherence and PA measures (daily step count, weekly time spent in light/moderate/vigorous activity, daily energy expenditure).
- All PA measures were compared between groups using independent t-tests.

3. Results and Discussions

Table 2: Baseline characteristics and demographics

	Cancer Patients (n=17)	Healthy Controls (n=10)
Age (years, mean ± SD)	33 ± 5	28 ± 5
Gender, n (%)		
Female	9 (52.9)	6 (60)
Race & Ethnicity, n (%)		
Chinese	14 (82.4)	7 (70)
Others	3 (17.7)	3 (30)
Cancer Type, n (%)		
Nasopharyngeal	6 (35.3)	
Breast, ovarian	5 (29.4)	
Cervical	2 (11.8)	
Lymphoma	2 (11.8)	
Others	2 (11.8)	
Stage, n (%)		
I-III	13 (76.4)	
IV	3 (17.6)	
Treatment, n (%)		
Surgery	6 (35.3)	
Radiation	9 (52.9)	
Chemotherapy	16 (94.1)	
Hormonal therapy	2 (11.8)

Table 3: Feasibility and PA assessment of cancer patients and healthy controls (Note: *p<0.05)

	Cancer Patients (n = 17)	Healthy Controls (n = 10)	p-value
1. Feasibility assessment	47.2 %	92.6 %	-
2. Physical activity assessment			
Daily Step Count			
Mean ± SD	5638 ± 3155	12831 ± 5896	0.004 *
Weekly time spent in different activity intensities (min/week)			
Light activity (mean ± SD)	747.6 ± 430.6	1404.8 ± 753.6	0.008*
Moderate activity (mean ± SD)	55.4 ± 35.6	180.8 ± 200.2	0.08
Vigorous activity (mean ± SD)	46.2 ± 39.0	163.1 ± 185.1	0.08
Daily energy expenditure (kcal/day)			
Mean ± SD	492.4 ± 190.9	958.4 ± 391.1	0.004*

- Fitbit® trackers wear duration: Cancer patients (2-37 weeks), healthy controls (2-22 weeks).
- Compared to the healthy controls (92.6%), cancer patients (47.2%) are less adhere to wearing Fitbit® trackers.
- The mean (±SD) daily step count, mean (±SD) weekly total time spent in light-activity and mean (±SD) daily total energy expenditure were significantly higher in the healthy controls compared to the cancer patients (12831±5896 steps vs. 5638±3155 steps, p<0.004; 1404.8±753.6 mins vs. 747.6±430.6 mins, p<0.008; 958.4±391.1 kcal vs. 492.4±190.9 kcal, p<0.004, respectively).
- Overall, cancer patients had lower PA than the healthy controls.

4. Conclusions

- Comparing to healthy controls, AYA cancer patients are less adhered to wearing Fitbit® trackers and less engaged to PA.
- Correlation analysis between Fitbit-derived PA measures and treatment-related outcomes will be conducted in future studies.

5. Acknowledgement

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