

26th October 2020

To the Australian Cystic Fibrosis Research Trust,

Final report
Sponsor/Scheme: ACFRT Top-Up Scholarship 2017
Title: *Does high intensity interval training improve fitness in people with cystic fibrosis?*

I would like to provide a final report and list of outcomes for the aforementioned research and associated studies for which we received a Top-Up Scholarship in 2017.

The main study questions were:

1. In people with cystic fibrosis (CF), what is the effect of an eight-week low-volume HIIT program, compared with weekly contact and no formal exercise training, on exercise capacity (primary outcome), HRQoL, exercise self-efficacy, feelings of anxiety and depression, and exercise enjoyment (secondary outcomes)?
2. In participants allocated to the experimental group (HIIT), (i) what proportion develop post-exercise muscle soreness each week during the eight-week HIIT program, and how severe is this symptom? (ii) how well do the participants tolerate the program? (iii) what are the participants' reflections on the 'facilitators' and 'barriers' following the program? and (iv) which behaviour change techniques are organically employed to optimise participation in the HIIT intervention?

The main findings of this program of research indicate that 30 min of HIIT per week for eight weeks was superior to usual care for improving exercise capacity and self-reported physical function in a small group of people with CF. The improvement in the primary outcome of exercise endurance was approximately three times the projected minimal clinically important difference in people with chronic respiratory conditions. Additionally, the HIIT program was well tolerated and accepted by participants.

This program of research was completed in 2020. The results have been published in peer reviewed journals and presented at numerous local, interstate and international meetings.

I would like to sincerely thank the Australian Cystic Fibrosis Research Trust for their generous support of this program of research. We believe that this work will make a real difference to how people with CF exercise in the future and reduce some of the substantial treatment burden associated with this disease.

Yours sincerely,



Abbey Sawyer

PhD Candidate (Curtin University)

List of outcomes:

Papers (published):

- Sawyer A, Cavalheri V, Jenkins S, Wood J, Cecins N, Bear N, Singh B, Gucciardi D, Hill K. High-Intensity Interval Training Is Effective at Increasing Exercise Endurance Capacity and Is Well Tolerated by Adults with Cystic Fibrosis. *J Clin Med*. 2020 Sep 25;9(10):E3098.doi:10.3390/jcm9103098. PMID: 32992871.
- Sawyer A, Cavalheri V, Jenkins S, Wood J, Singh B, Hill K. Endurance cycle ergometry tests performed at a sub-maximal work rate elicit peak physiological and symptom responses in adults with cystic fibrosis. Accepted by *Intern Med J* in September 2020.
- Sawyer A, Cavalheri V, Hill K. Effects of high intensity interval training on exercise capacity in people with chronic pulmonary disease: a narrative review. *BMC Sports Sci Med Rehabil*. 2020;30(12):22. doi:10.1186/s13102-020-00167-y.
- Sawyer A, Cavalheri V, Wood J, Hill K. Exercise testing and exercise training within cystic fibrosis centres across Australia and New Zealand: what is considered important and what is current practice? *Intern Med J*. 2019; [Epub ahead of print]. doi:10.1111/imj.14443.
- Sawyer A, Lewthwaite H, Gucciardi D, Hill K, Jenkins S, Cavalheri V. Behaviour change techniques to optimise participation in physical activity or exercise in adolescents and young adults with chronic cardiorespiratory conditions: a systematic review. *Intern Med J*. 2019;49(10):1209-1220. doi:10.1111/imj.14141.
- Sawyer A, Cavalheri V, Jenkins S, Wood J, Cecins N, Singh B, Hill K. Effects of high intensity interval training on exercise capacity in people with cystic fibrosis: study protocol for a randomised controlled trial. *BMC Sports Sci Med Rehabil*. 2018;6(10):19. doi:10.1186/s13102-018-0108-2.

Conference Abstracts and Presentations:

2020:

Poster presentations

- Sawyer A, Cavalheri V, Hill K. A review of the effects of high intensity interval-based training on exercise capacity in adults with a chronic respiratory condition: where are we now and what is next? Thoracic Society of Australia and New Zealand – Annual Scientific Meeting, 2020. Cancelled due to COVID-19.
- Sawyer A, Cavalheri V, Jenkins S, Wood J, Cecins N, Singh B, Hill K. Low-volume high intensity interval training improves exercise endurance capacity and is well tolerated in people with cystic fibrosis: a randomised controlled trial. American Thoracic Society – Annual Scientific Meeting, 2020. Cancelled due to COVID-19.

Oral presentations

- Sawyer A, Cavalheri V, Jenkins S, Wood J, Cecins N, Singh B, Hill K. Low-volume high intensity interval training improves exercise endurance capacity and is well tolerated in people with cystic fibrosis: a randomised controlled trial. Thoracic Society of Australia and New Zealand – Annual Scientific Meeting, 2020. Cancelled due to COVID-19.

2019:

Poster presentations

- Sawyer A, Cavalheri V, Wood J, Hill K. Exercise testing and training practices in Australian and New Zealand CF centres. Proceedings of Research Week at Sir Charles Gairdner Hospital, 2019. p.1.
- Sawyer A, Cavalheri V, Hill K, Jenkins S, Wood W, Cecins N, Singh B, Gucciardi D. "Short and sweet... I really enjoyed it!" Tolerance and experiences of a high intensity interval training program in people with cystic fibrosis. Program Booklet of the Australasian Cystic Fibrosis Conference, 2019 (EP115) and Proceedings of Research Week at Sir Charles Gairdner Hospital, 2019. p.1.
- Sawyer A, Cavalheri V, Jenkins S, Wood J, Cecins N, Singh B, Hill K. Adults with cystic fibrosis display similar cardiorespiratory and symptomatic responses during maximal ramp and constant work rate cycle ergometry tests. Program Booklet of the Thoracic Society of Australia and New Zealand – Annual Scientific Meeting, 2019. p.76 (Abstract Number TP065).
- Sawyer A, Cavalheri V, Jenkins S, Wood J, Cecins N, Singh B, Hill K. Heart rate recovery following maximal and submaximal exercise is impaired in adults with cystic fibrosis. Program Booklet of the Thoracic Society of Australia and New Zealand – Annual Scientific Meeting, 2019. p.76 (Abstract Number TP066).

Oral presentations

- Sawyer A, Cavalheri V, Hill K. Effects of high intensity interval training on exercise capacity in chronic respiratory disease: a review. Curtin School of Physiotherapy and Exercise Science Community Thank You Event, 2019 (invited presentation).
- Sawyer A, Cavalheri V, Wood J, Hill K. Exercise testing and training practices in Australian and New Zealand CF centres. Australasian Cystic Fibrosis Conference, 2019 (O116).

2018:

Poster presentations

- Sawyer A, Lewthwaite H, Gucciardi D, Jenkins S, Hill K, Cavalheri V. Behaviour change techniques to optimise daily physical activity or participation in exercise in adolescents and adults with chronic cardiorespiratory conditions: a systematic review. Program Booklet of the Western Australia branch of the Thoracic Society of Australia and New Zealand – Annual Scientific Meeting, 2018. p.23.
- Sawyer A, Lewthwaite H, Gucciardi D, Jenkins S, Hill K, Cavalheri V. Behaviour change techniques to optimise daily physical activity or participation in exercise in adolescents and adults with chronic cardiorespiratory conditions: a systematic review. Proceedings of Research Week at Sir Charles Gairdner Hospital, 2018. p.1.

Oral presentations

- Sawyer A, Cavalheri V, Jenkins S, Wood J, Cecins N, Singh B, Hill K. Fit in 10 minutes. Proceedings of the 3-Minute Thesis Competition, Curtin University, 2018 (Finalist).
- Sawyer A, Lewthwaite H, Gucciardi D, Jenkins S, Hill K, Cavalheri V. Behaviour change techniques to optimise daily physical activity or participation in exercise in adolescents and adults with chronic cardiorespiratory conditions: a systematic review. Proceedings of Mark Liveris Student Research Conference, 2018. p.2 (Awarded 2nd place).
- Sawyer A, Lewthwaite H, Gucciardi D, Jenkins S, Hill K, Cavalheri V. Behaviour change techniques to optimise daily physical activity or participation in exercise in

adolescents and adults with chronic cardiorespiratory conditions: a systematic review. Proceedings of Research Week at Sir Charles Gairdner Hospital, 2018. p.1 (Awarded the Allied Health New Investigator of the Year Award).

Awards and Grants:

- Thoracic Society of Australia and New Zealand Annual Scientific Meeting – Travel Award (2020) – Cancelled due to COVID-19
- Higher Degree by Research Mobility Award (to attend the American Thoracic Society Annual Scientific Meeting in Philadelphia, USA, and the McMaster University in Hamilton, Canada) – Curtin University (2019) – Cancelled due to COVID-1D
- Thoracic Society of Australia and New Zealand Annual Scientific Meeting – Travel Award (2019)
- Allied Health New Investigator of the Year Award – Sir Charles Gairdner Hospital (2018)
- Mark Liveris Conference (Awarded 2nd place prize for the oral presentation section) – Curtin University (2018)
- 3 Minute Thesis® Competition (Finalist, oral presentation) – Curtin University (2018)
- Research Advisory Committee Grant – Sir Charles Gairdner Hospital (2017/18)
- PhD Top-up Scholarship – Australian Cystic Fibrosis Research Trust (2017)
- Institute for Respiratory Health – Conquer Cystic Fibrosis Research Scholarship (2016)