The Science and Application of HIIT Training

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LESMILLS

GLOBAL HEALTH IS SUFFERING DUE TO LACK OF ACTIVITY AND OPTIMAL EXERCISE PRESCRIPTIONS

PHYSICAL ACTIVITY AND FITNESS CAN REDUCE THE RISK OF DISEASE AND IMPROVE SATISFACTION WITH DAILY LIFE

AMERICAN COLLEGE OF SPORTS MEDICINE EXERCISE GUIDELINES

Moderate

DURATION	FREQUENCY
30 - 50 MIN	3 - 4 DAYS/WEEK

EXERCISES	FREQUENCY
8 - 10	2 DAYS/WEEK

DURATION	FREQUENCY
60 MIN	1 DAY/WEEK

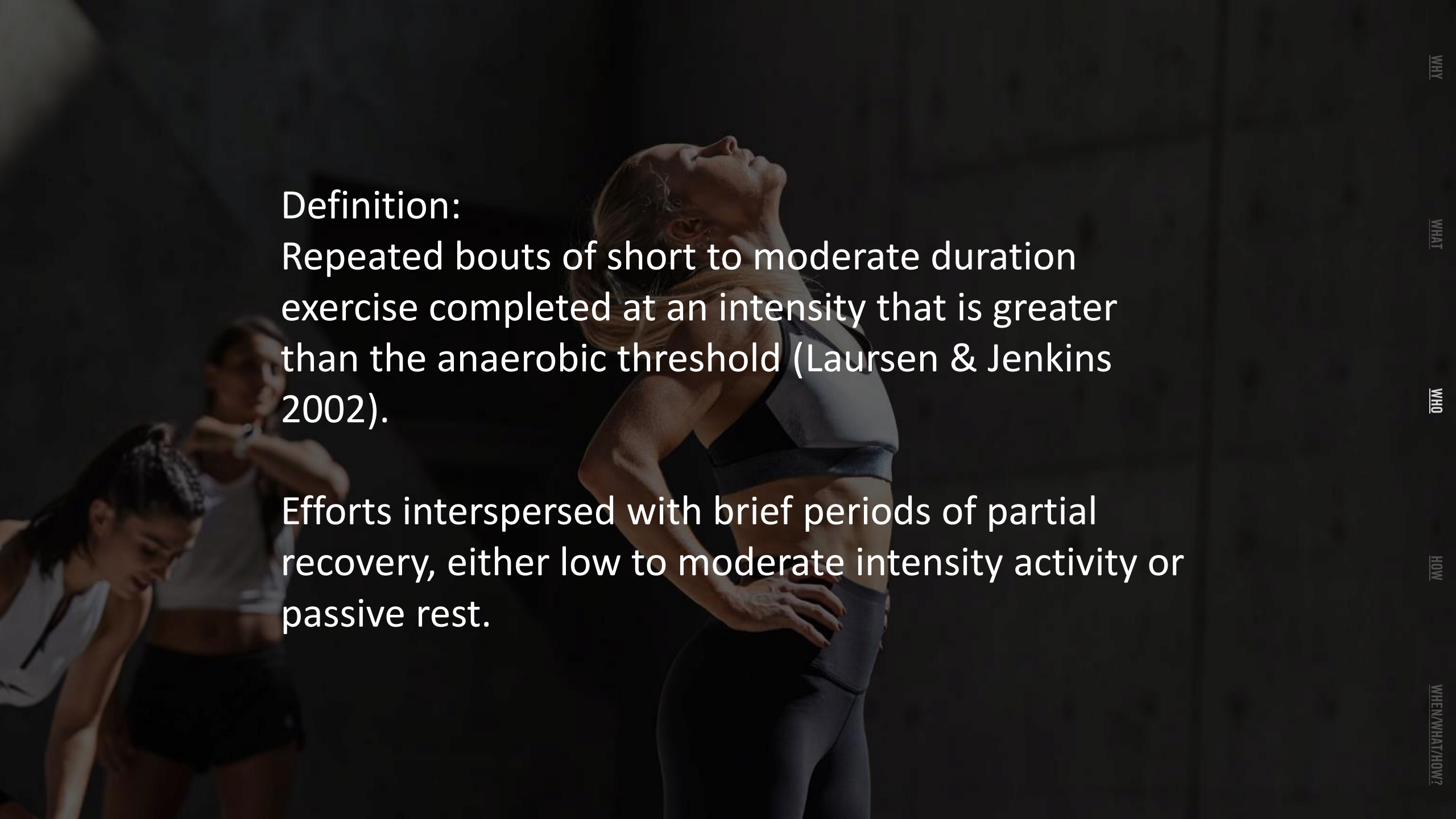
OR

Vigorous

DURATION	FREQUENCY
20 - 60 MIN	3 DAYS/WEEK

THERE IS AN OBVIOUS GAP IN THE CURRENT LITERATURE WITH RESPECT TO INTENSITY IN REDUCING DISEASE AND ENHANCING FITNESS

WHAT



Definition:
Repeated bouts of short to moderate duration exercise completed at an intensity that is greater than the anaerobic threshold (Laursen & Jenkins 2002).

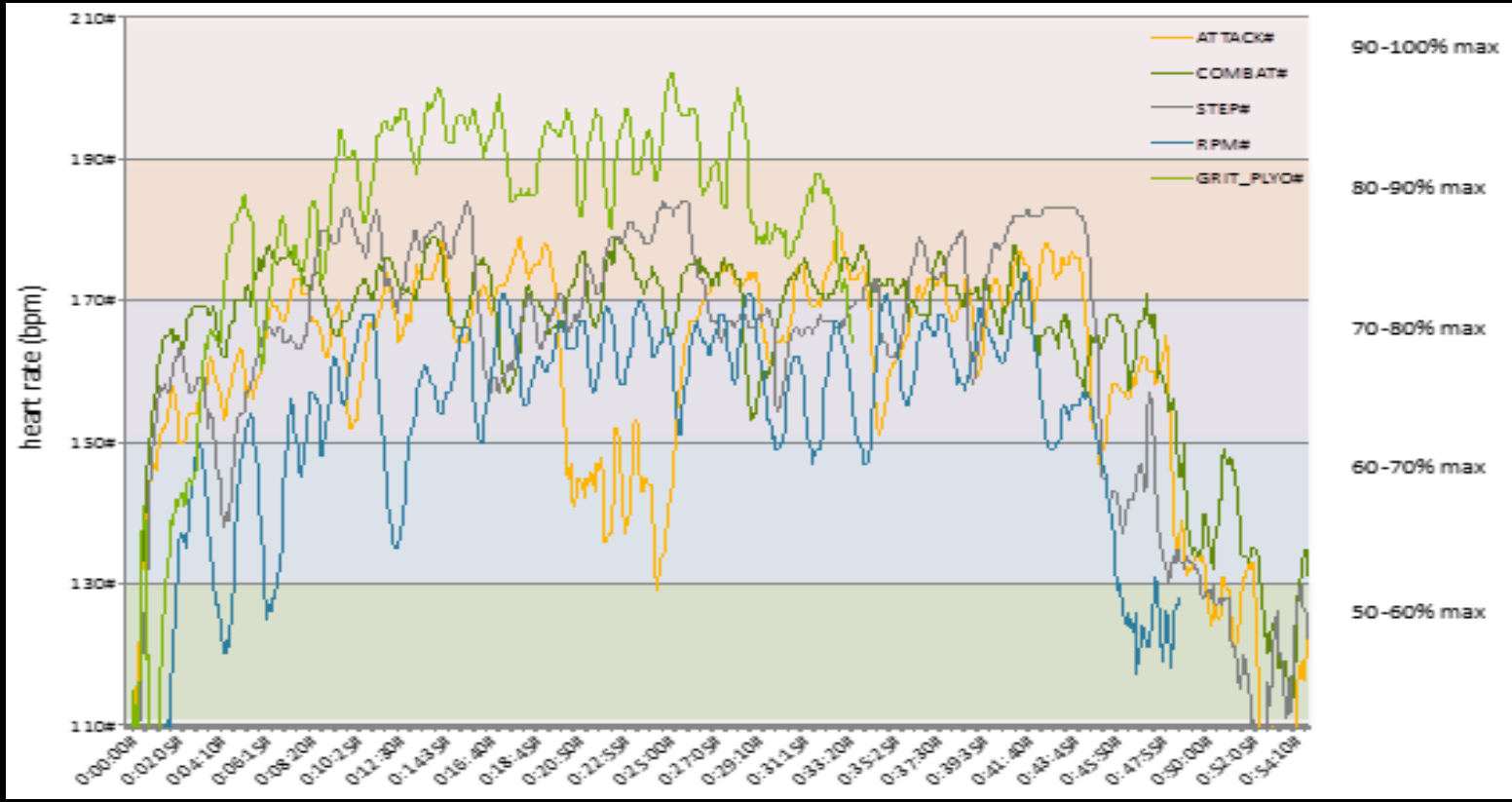
Efforts interspersed with brief periods of partial recovery, either low to moderate intensity activity or passive rest.

Purpose:
To perform significantly more total exercise time at a higher intensity than can be achieved using a continuous, steady state exercise (SSE) protocol.

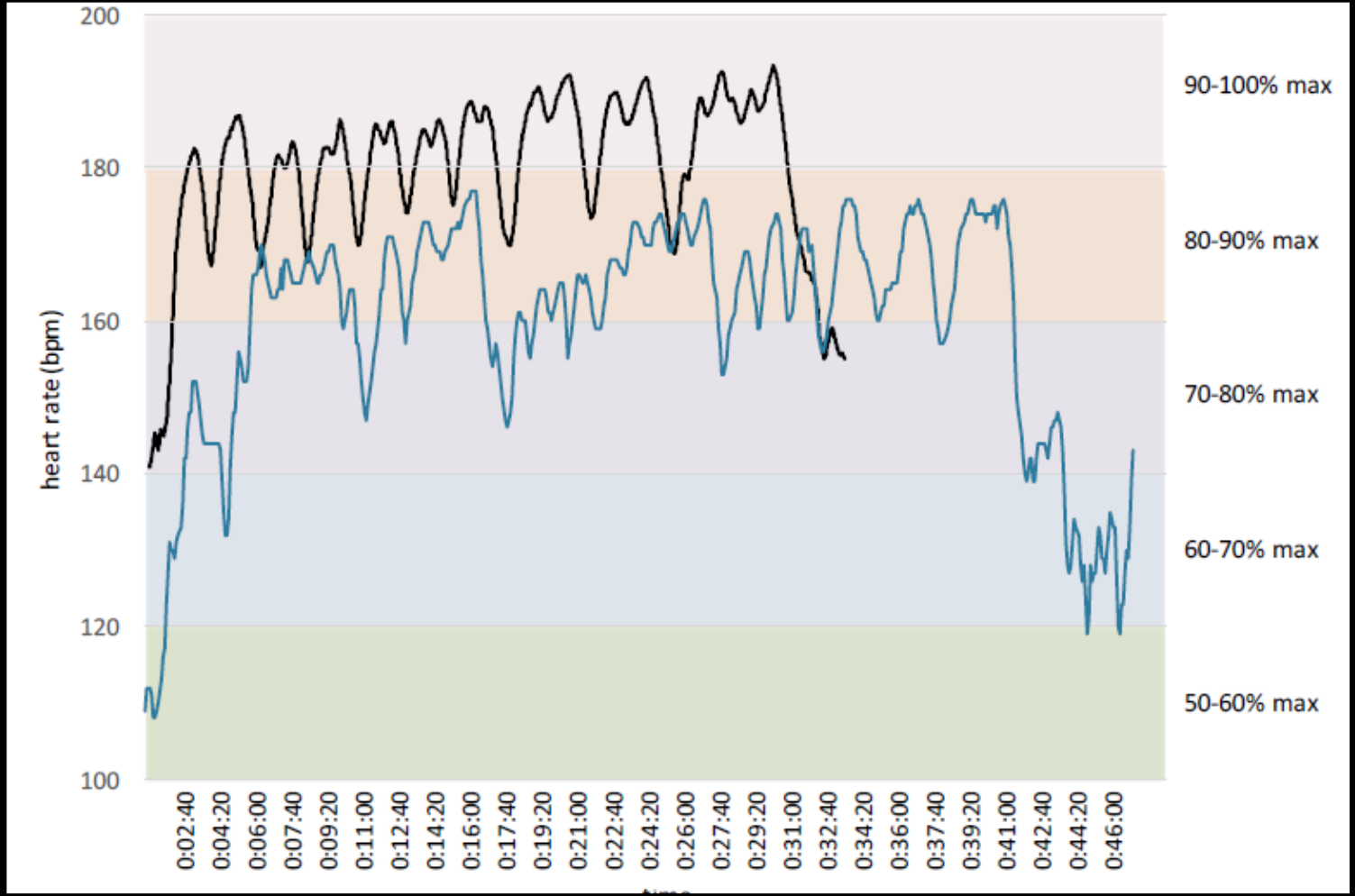
Therefore, HIIE is considered a time-efficient training strategy to induce rapid adaptations in skeletal muscle and exercise performance that are comparable to traditional continuous endurance training (Gibala et al. 2006)

LES MILLS vs LES MILLS GRIT PLYO

BODYATTACK | BODYCOMBAT | BODYSTEP | RPM | LES MILLS GRIT PLYO



RPM & SPRINT


200
180
160
140
120
100
heart rate (bpm)
90-100% max
80-90% max
70-80% max
60-70% max
50-60% max
0:02:40
0:04:20
0:06:00
0:07:40
0:09:20
0:11:00
0:12:40
0:14:20
0:16:00
0:17:40
0:19:20
0:21:00
0:22:40
0:24:20
0:26:00
0:27:40
0:29:20
0:31:00
0:32:40
0:34:20
0:36:00
0:37:40
0:39:20
0:41:00
0:42:40
0:44:20
0:46:00

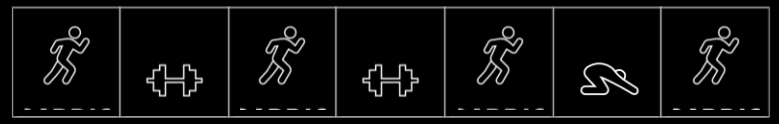
LesMills GRIT

GET FIT WITH HIIT

PROTOCOL

RESULTS

ADHERENCE



INJURY

Gottschall, et al. 2014

PROTOCOL

GROUP

FIT

CONTROL (N=42)



3 2 1

GROUP

HIIT

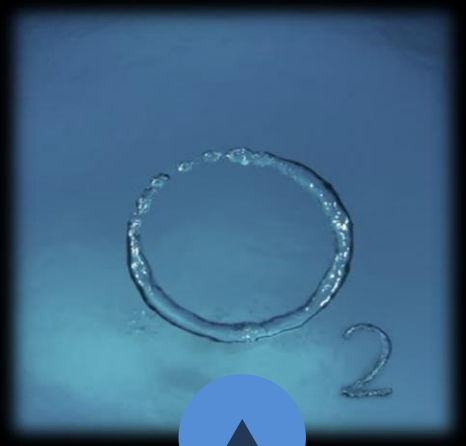
EXPERIEMENT (N=42)




2 2 2 1

LesMills GRIT

RESULTS

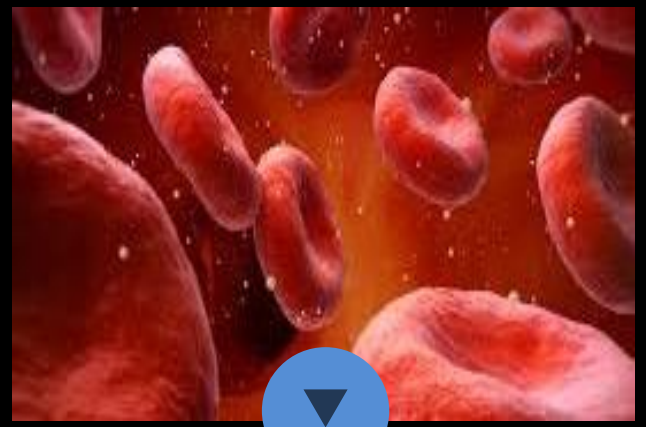


VO2

6.4%

BODY FAT

2.0%



TRIGLYCERIDE

16.9%

LesMills GRIT

blood sample

	HDL (mg/dL)	TRI (mg/dL)
FIT	0.3	-3.3
GRIT	2.3	-16.9
difference	2.0	-13.6

LesMills GRIT

body composition

	mass (kg)	body fat %
FIT	-0.4	-0.7
GRIT	-1.3	-2.0
difference	-0.8	-1.3

LesMills GRIT

strength

	leg (kg)	back (kg)
FIT	4.5	6.5
GRIT	12.1	16.3
difference	7.6	9.8

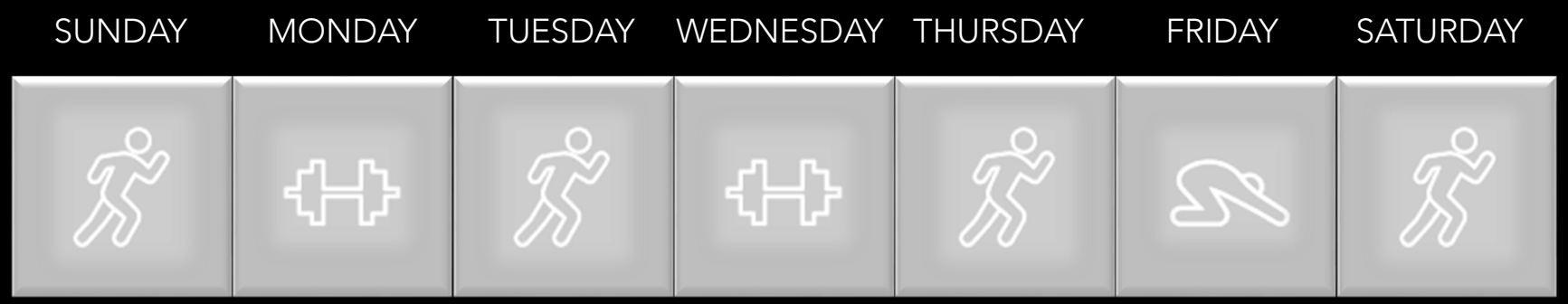
LesMills GRIT

fitness

	VO_2 (ml/kg/min)
FIT	0.7
GRIT	6.4
difference	5.7

INJURY

ADHERENCE



compliance rate was **97.7%**

less than 30 workouts missed for the 84 participants in 2772 sessions

PARTICIPANTS RATED THE TRAINING SESSIONS AS A POSTIVE EXPERIENCE

SATISFACTION WITH CHALLENGING INTENSITY

fitness

	VO_2 (ml/kg/min)
FIT	0.5
SPRINT	4.1
difference	3.6

fitness

	leg (kg)
FIT	0.3
SPRINT	9.1
difference	8.8

WHEN

AMERICAN COLLEGE OF SPORTS MEDICINE EXERCISE GUIDELINES

Moderate

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OR

Vigorous

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maximum 90-100%

While these minimum guidelines are clearly described, there are currently no maximum guidelines, particularly with respect to high-intensity time and frequency, for the prevention of overtraining or functional overreaching.

mins = OR

??? per wk

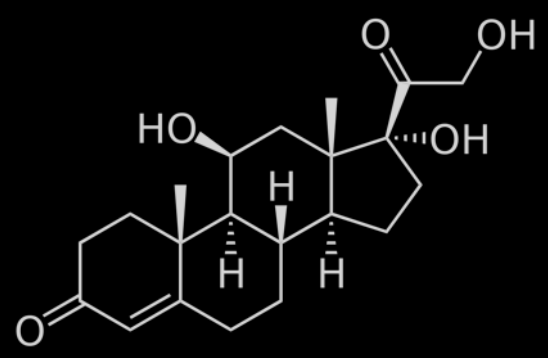
BACKGROUND

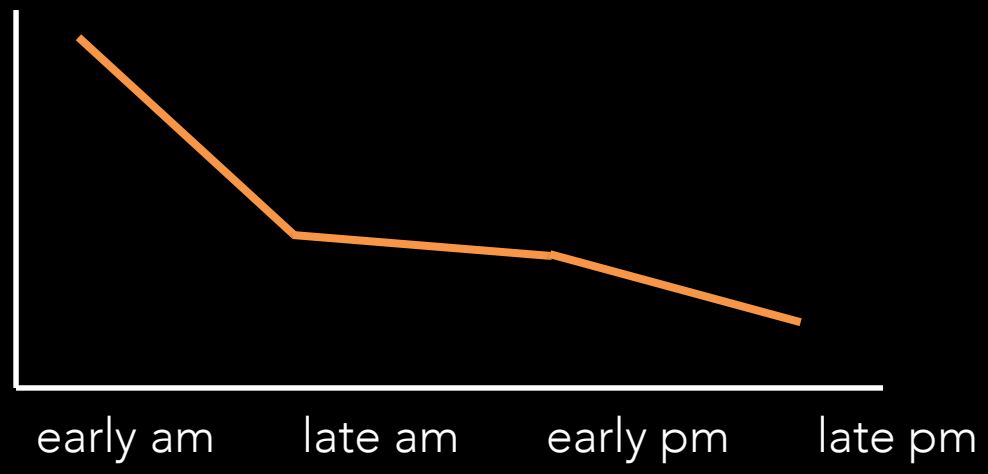
Overtraining syndrome (OTS) and functional overreaching (OR) are results of a combination between excessive load and inadequate recovery, which lead to symptoms related to stress and decrements in performance.

Insufficient evidence is available to determine whether a dose-response relationship exists between the quantity of high intensity interval training and functional overreaching for active adults.

Cadegiani and Kater, 2017; PAG Advisory Committee, 2018

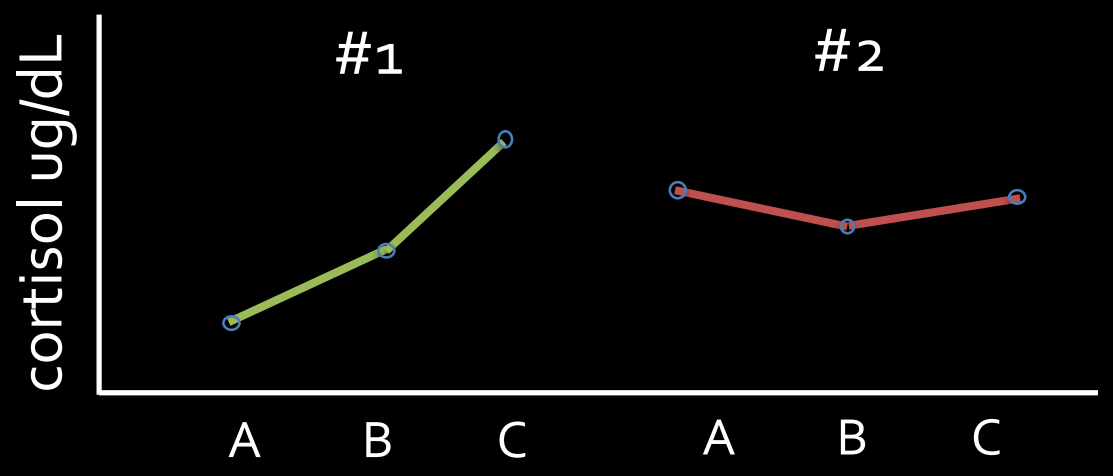
BACKGROUND: Cortisol is a stress hormone produced in the adrenal gland (above kidney). It can help control blood sugar levels, regulate metabolism, reduce inflammation, and assist with memory formulation.





Short term elevation of cortisol with high intensity exercise can be beneficial to help the body repair, adapt, and grow stronger.

Long term elevation of cortisol with too much high intensity exercise can cause fatigue, joint pain, and mood disturbance.



#1 Healthy response to a high intensity protocol with cortisol measured before exercise, after exercise, and after recovery.

#2 Unhealthy response with elevated resting cortisol and reduced elevation after exercise indicating greater lifestyle stress or overtraining.

HYPOTHESIS

There is an optimal time per week of high intensity (90-100% maximum heart rate) training that will lead to greater variation in the production of stress hormones and reduced self-reporting of stress related feelings.

maximum 90-100%

+ mins =

??? per wk

OR

METHODS: participant characteristics

years

35.19 ± 9.52

35

28

7

kg

68.64 ± 12.84

hours

9.01 ± 2.52

meter

1.68 ± 0.09

METHODS: Three weeks of typical training

Polar A370, H10

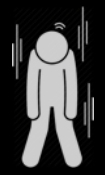
maximum	90-100%
hard	80-90%
moderate	70-80%
light	60-70%

kcal
macro

MyFitnessPal

total
mood

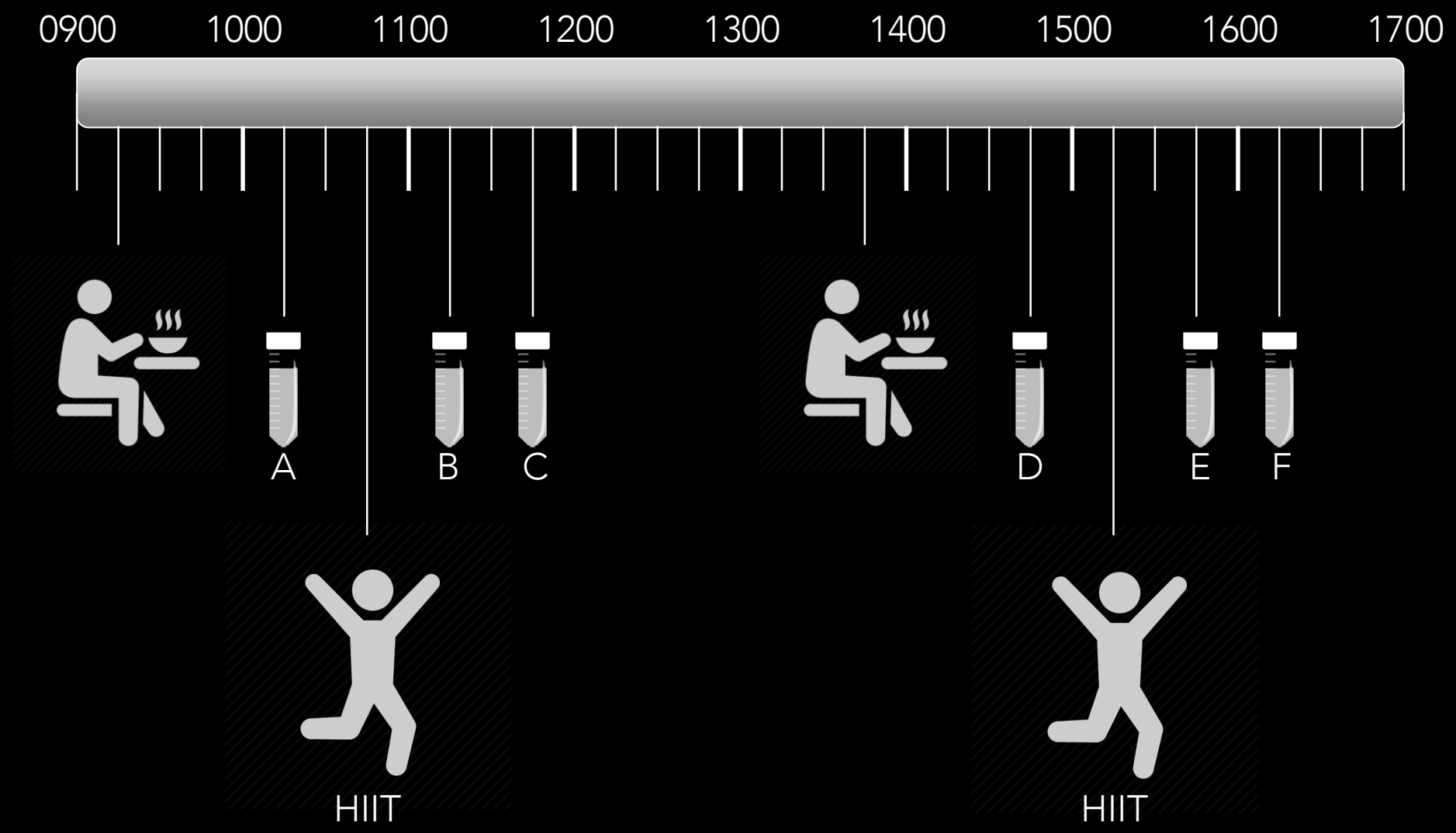
POMS 40



time
quality

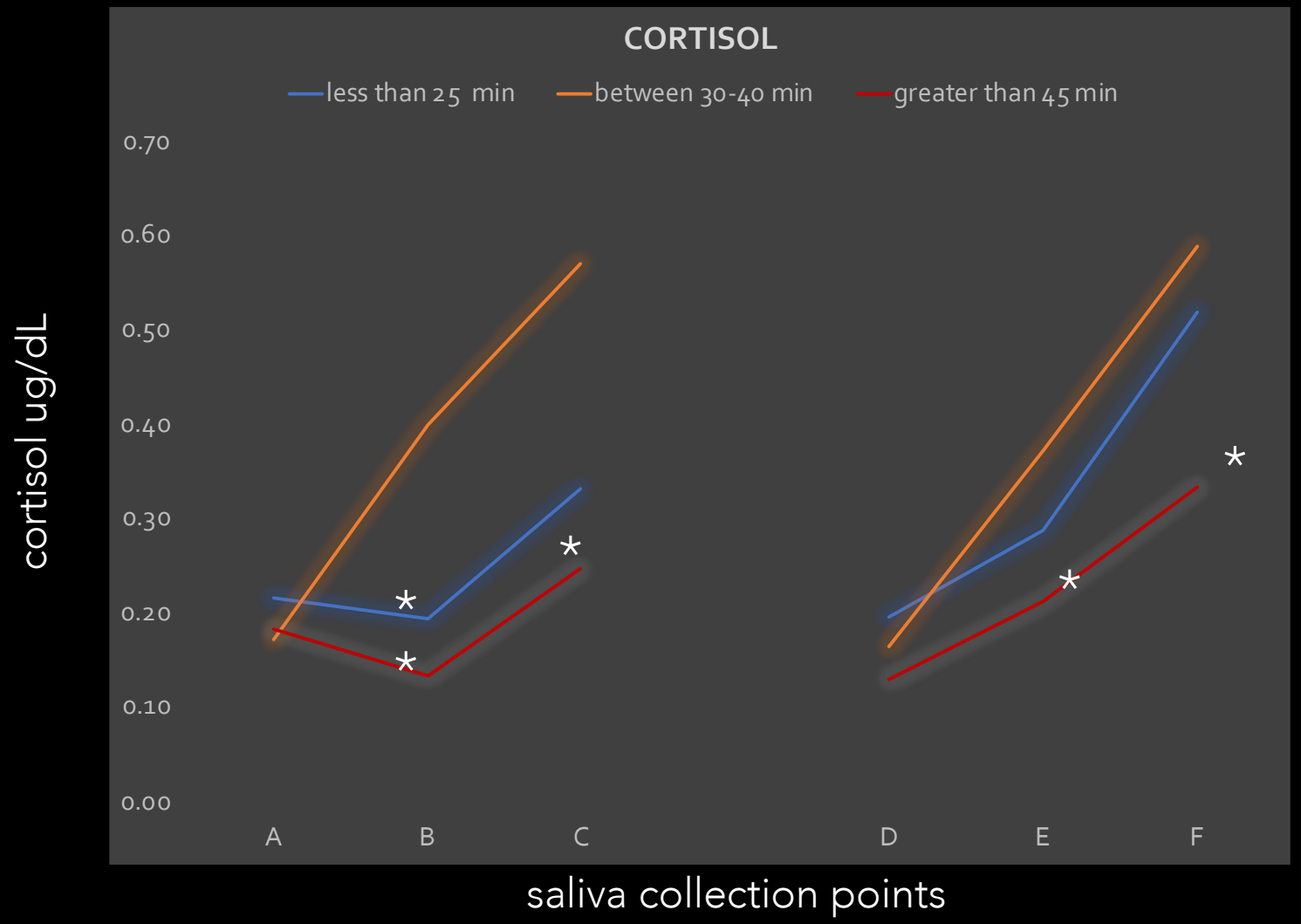
Polar A370

METHODS: Two-bout, high intensity protocol with saliva collections



RESULTS: The greatest hormonal response was measured in the participants who completed 30-40 minutes of high intensity training per week.

* indicates a significant difference from 30-40 min above 90%; $p < 0.05$



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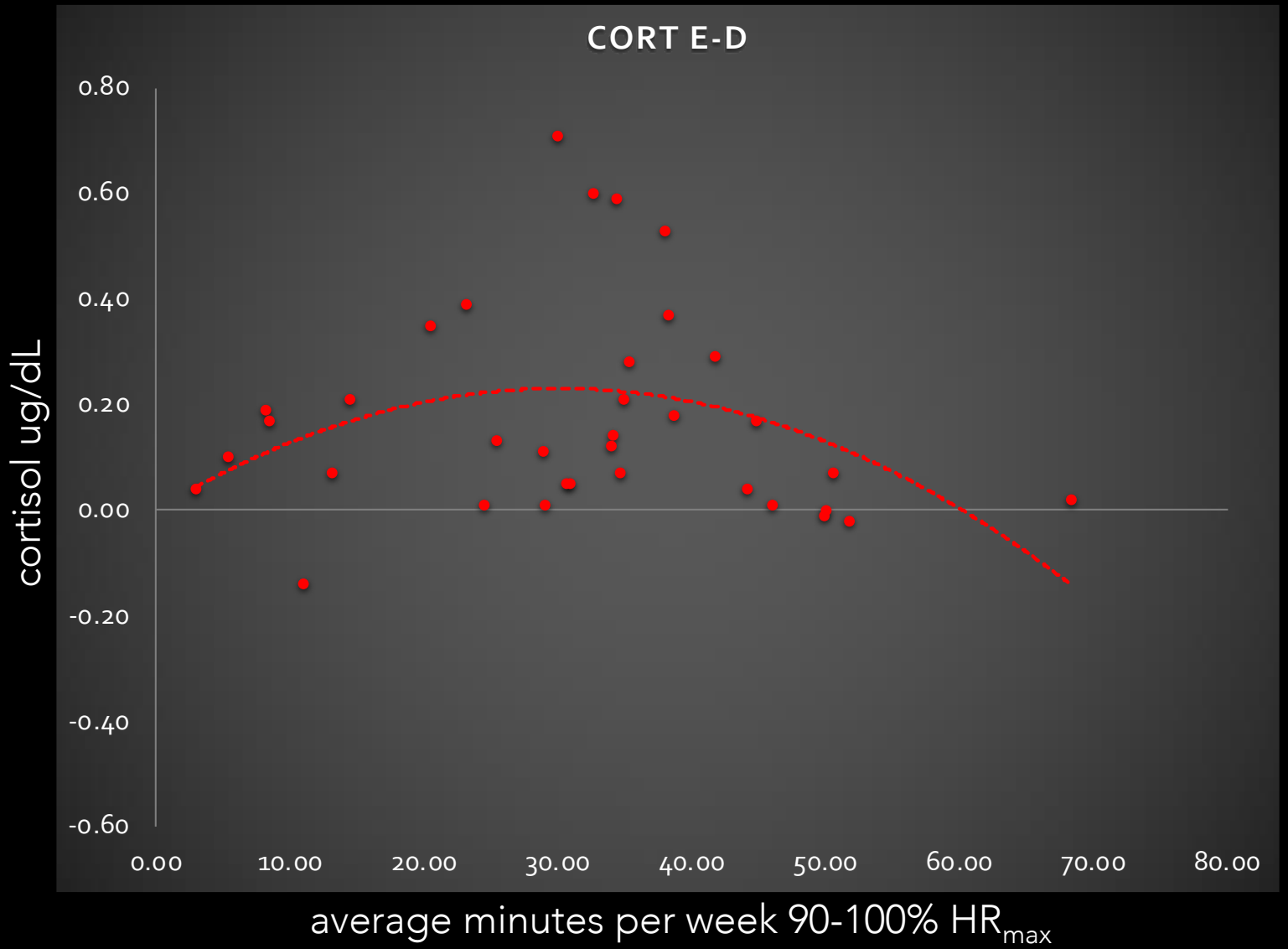
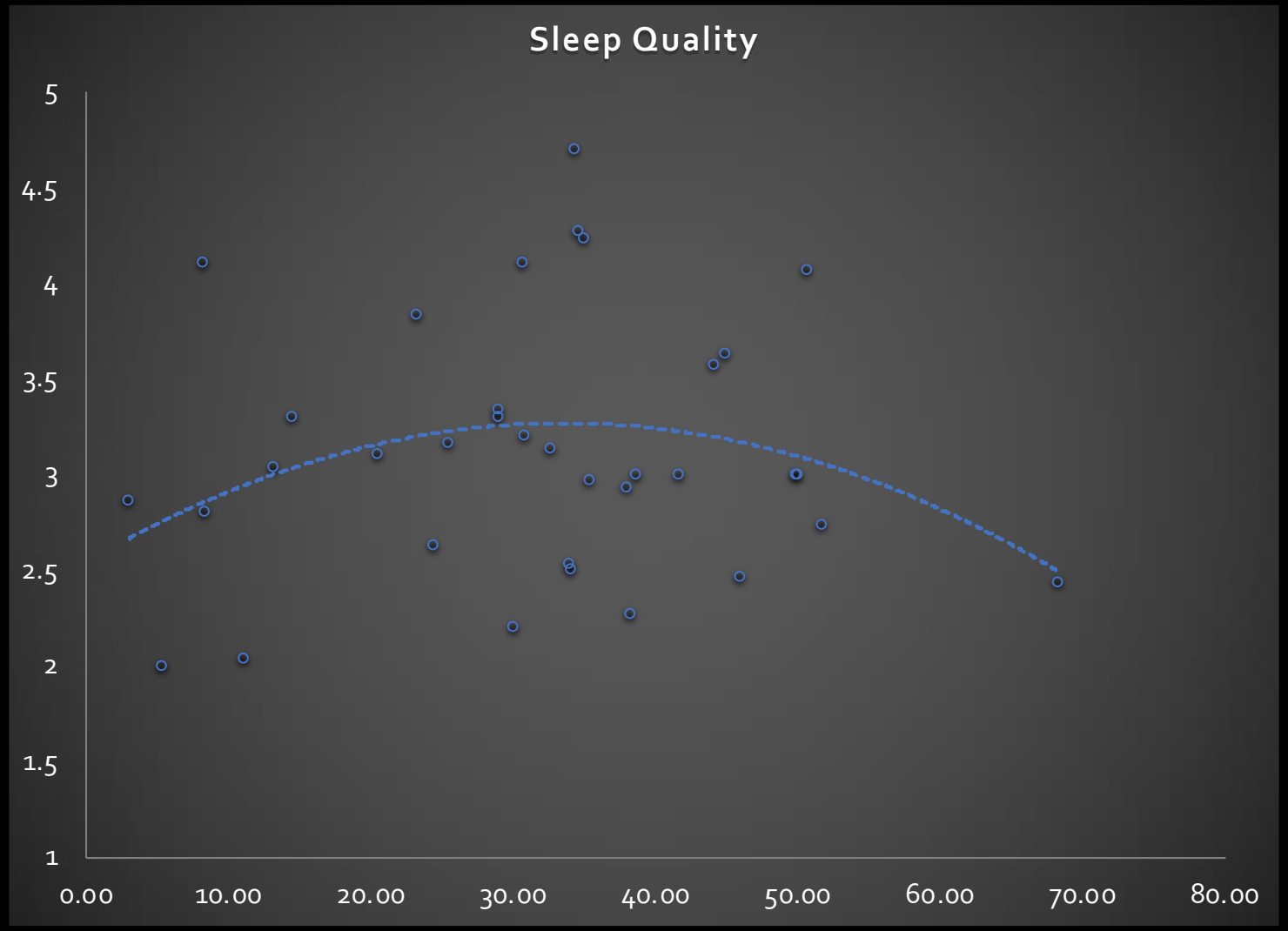
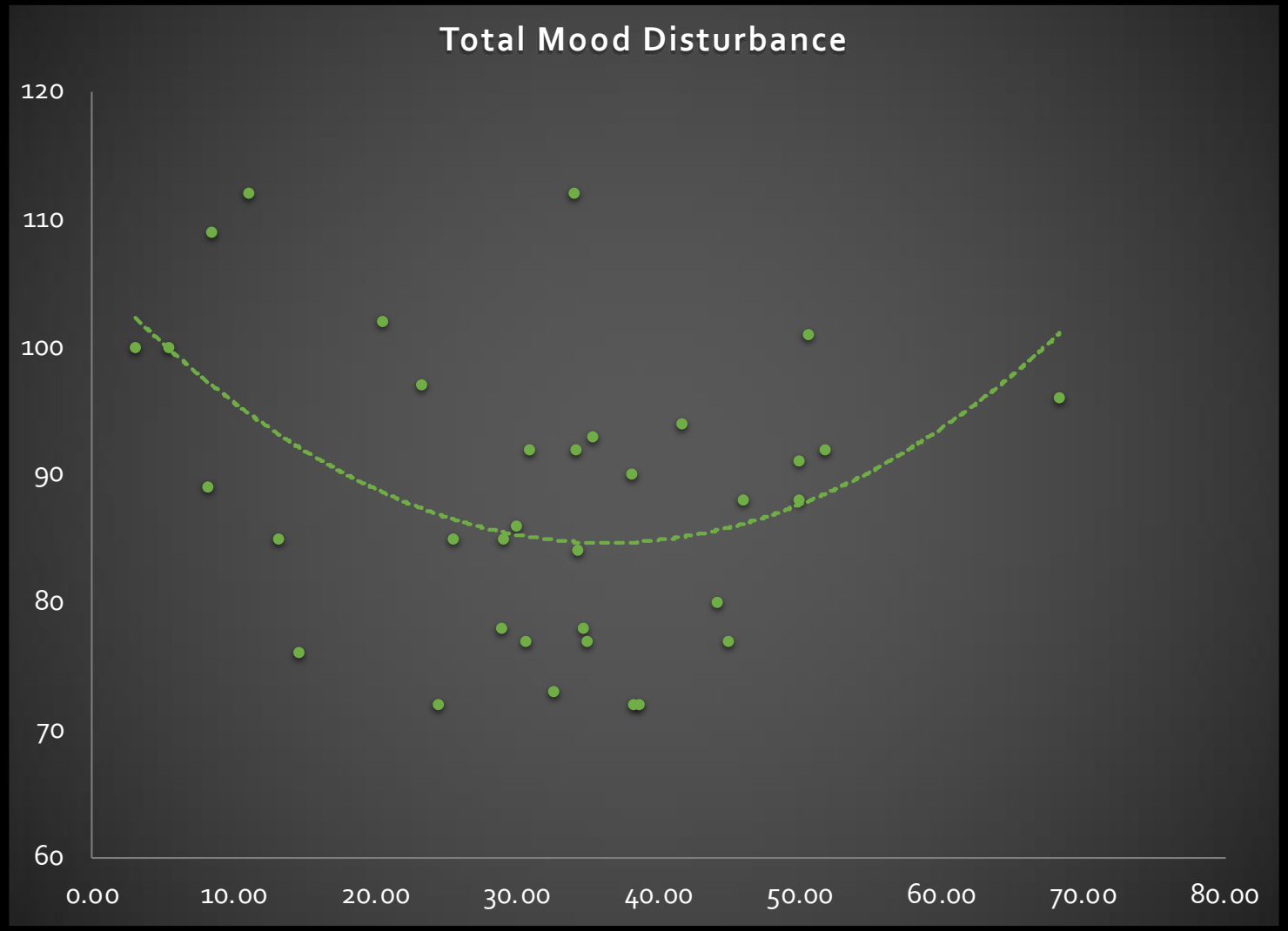


RESULTS: Sleep quality was greatest for the participants who completed 30-40 minutes of high intensity training per week.



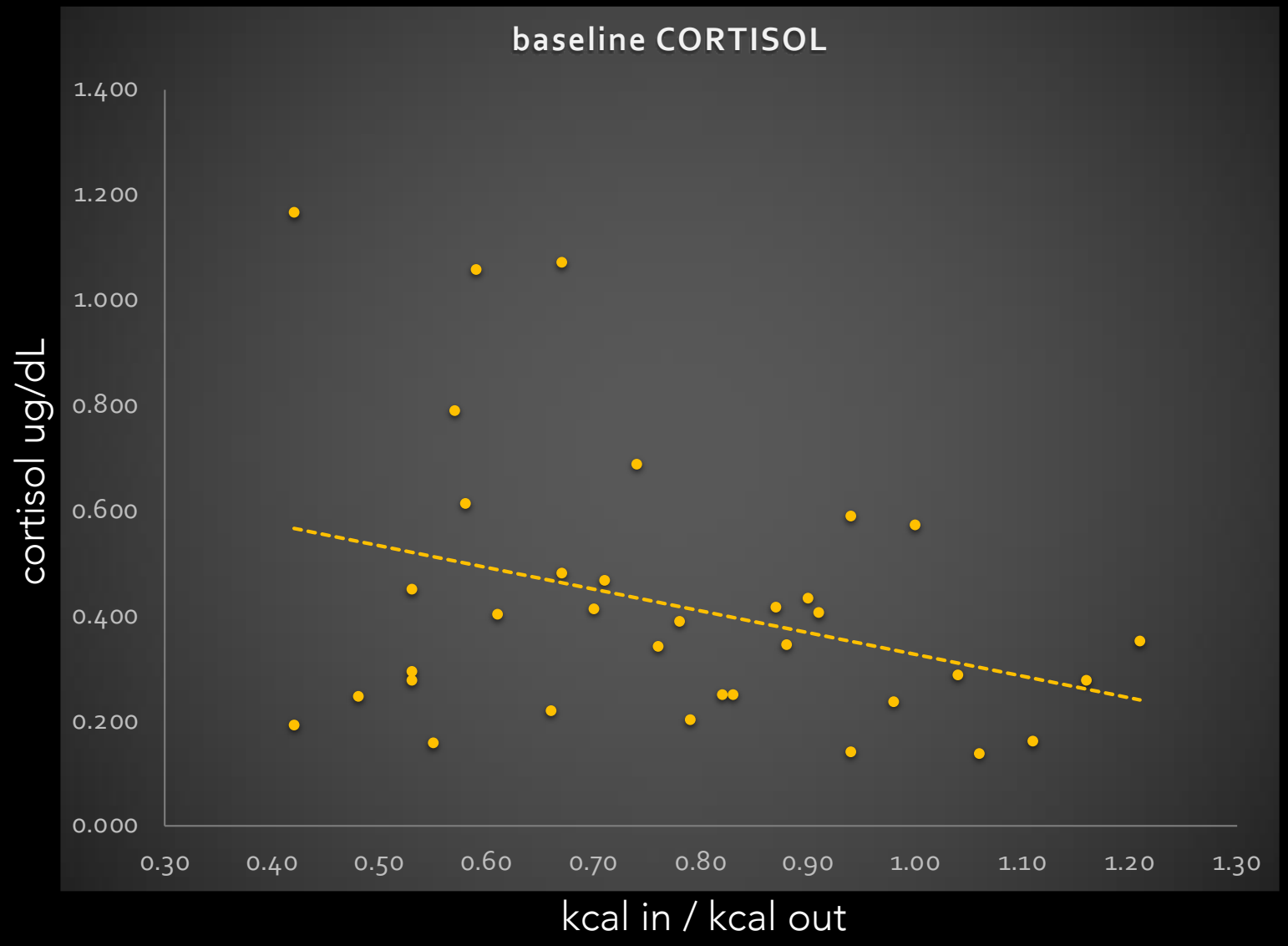
average minutes per week 90-100% HR_{max}

RESULTS: Total Mood Disturbance was minimal in the participants who completed 30-40 minutes of high intensity training per week.



average minutes per week 90-100% HR_{max}

RESULTS: Moderate negative correlation ($R = -0.404$, $p < 0.05$) between baseline cortisol and kilocalorie balance; greater cortisol when in energy deficit.



CONCLUSION

Our data demonstrate that 30-40 minutes of high-intensity (90-100% maximum heart rate) training per week is a suggested range of cumulative time in order to prevent symptoms related to overreaching.

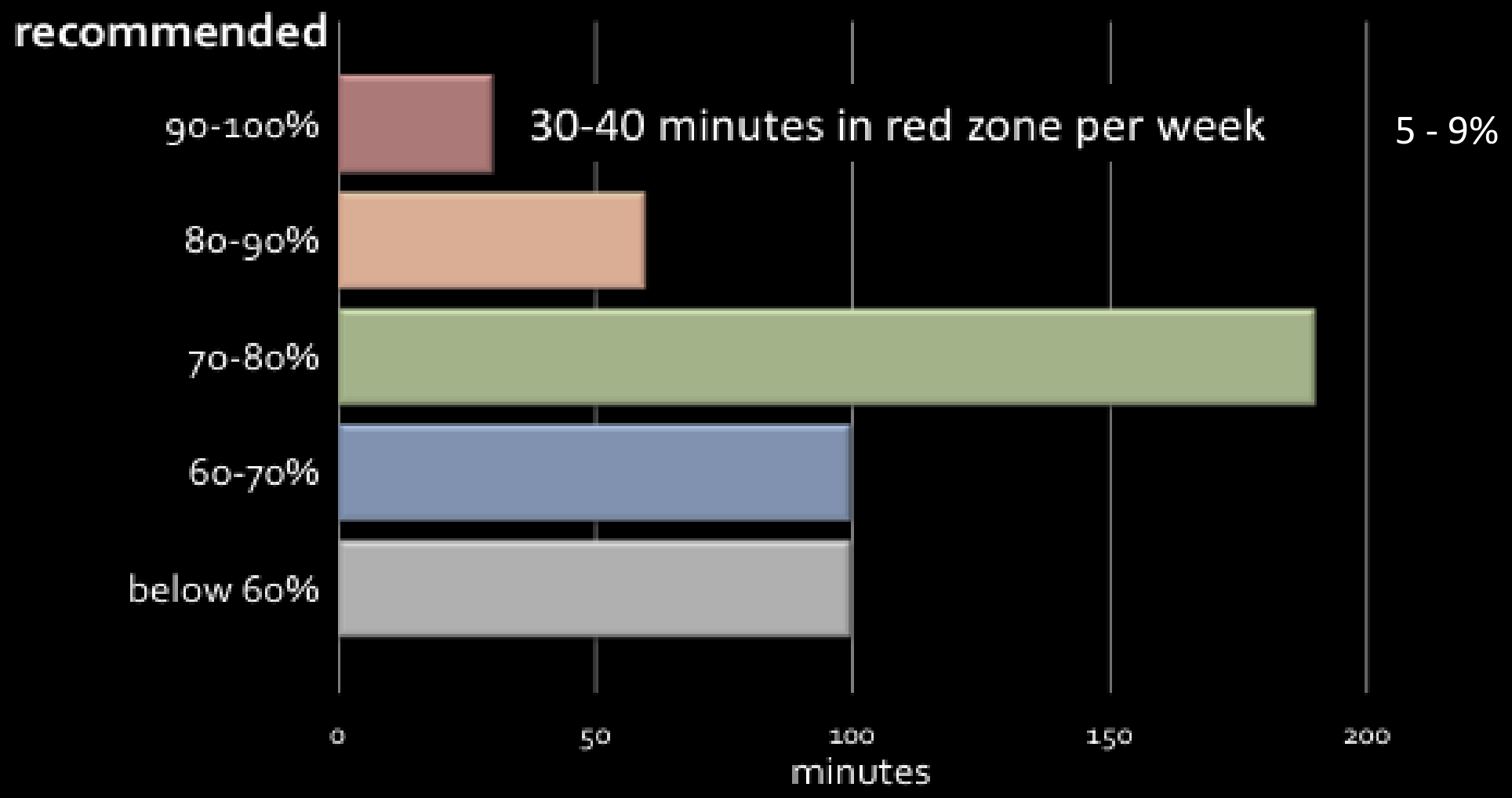
maximum 90-100%

+ mins =

30-40 per wk

maximum fitness & wellness

INTENSITY AWARENESS



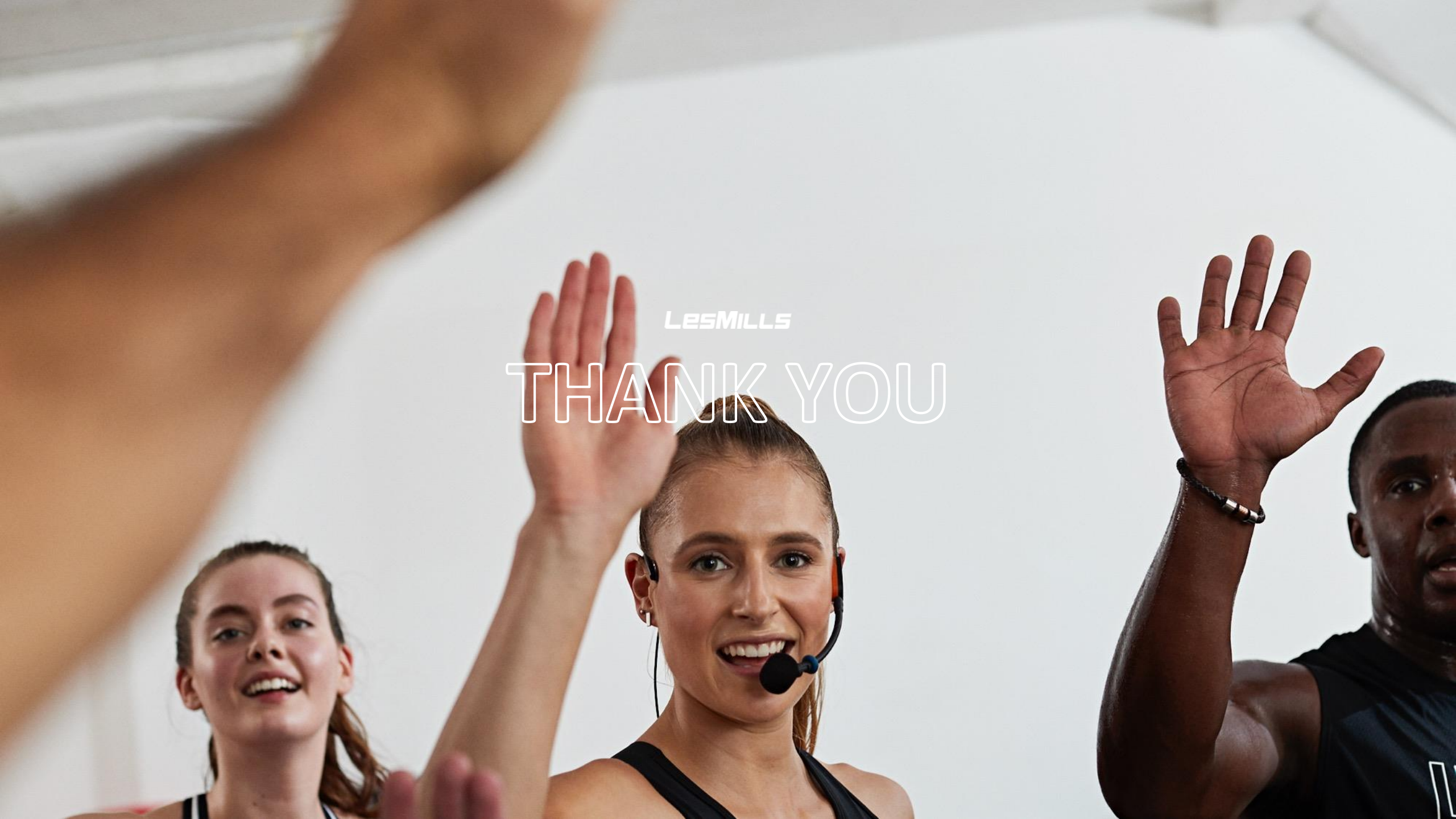
EXERCISE PRESCRIPTION

2

2-3

2-3

1


LesMills
THANK YOU