

ARE OBESE CHILDREN ABLE TO EXERCISE WITH HIGH TRAINING INTENSITY?

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Introduction

- Childhood obesity is a serious and increasing western world problem with a potential ensuing risk of adulthood obesity and cardiovascular diseases including hypertension and hyperlipidaemia (1)
- Physical activity is an important treatment strategy
- High intensity training can increase the desired weight-loss effects of physical activity (2), but many obese children do not participate in moderate to high intensity sports or plays
- It remains unknown if high-intensity physical activity protocols results in higher cardiovascular load in obese children than a standard training protocol

Aim and hypothesis

- To compare the effect of 12-week high-intensity versus moderate-intensity training protocols on the activity level and heart rate during physical training in obese children

Methods – procedure

- 27 children (8-18 years, Body Mass Index >30 (IsoBMI))
- Randomly allocated to high- (HIT) or moderate intensity (MOD) training, as provided in the vicinity of their residence
- Two weekly one hour training sessions in 12 weeks were conducted with trained physiotherapy students
- Baseline VO₂-max test was measured by a standardized ECG electrode based Oxycon™ test system
- Heart rate and physical activity during training was measured by a Polar™ team heart rate band based system

Methods - analysis

- Activity score for each child was calculated from time spent in 5 heart rate zones (1. below 60 and 2.-5. above 60, 70, 80 and 90 % of maximal heart rate). Mean and peak heart rate across training sessions were extracted for the two groups and compared between the groups by unpaired t-tests

Results

The HIT compared with the MOD training group showed higher mean (Fig.1.A, P<0.001) and peak (Fig. 1.B, P<0.01) heart rate. Although the HIT group in average spent 11.2% of the training time in zone 5 against 1.5% in the MOD group, 6 of 14 HIT participants spent less than 5% of the time during the training sessions in this highest intensity zone. (Fig.2.).



Fig. 1., Mean and peak heart rate zones

A. Mean and B. Peak heart rate (+ SEM, N=14 HIT and 13 MOD participants, *=P<0.05) zones during exercise sessions.

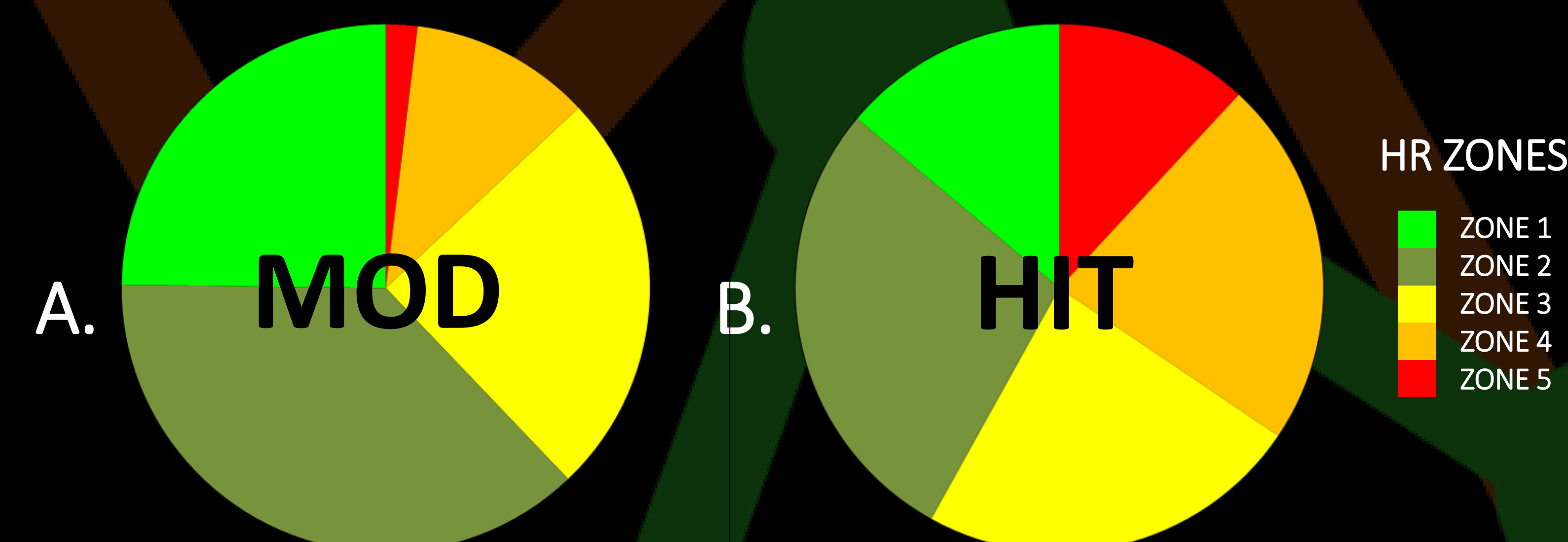


Fig. 2., Heart rate Zone distribution

Mean time spent in the heart rate zones across exercise sessions in A. The MOD and B. the HIT group (N=14 HIT and 13 MOD participants).

The HIT compared with the MOD training group showed higher mean activity scores (Fig. 3., P<0.001).

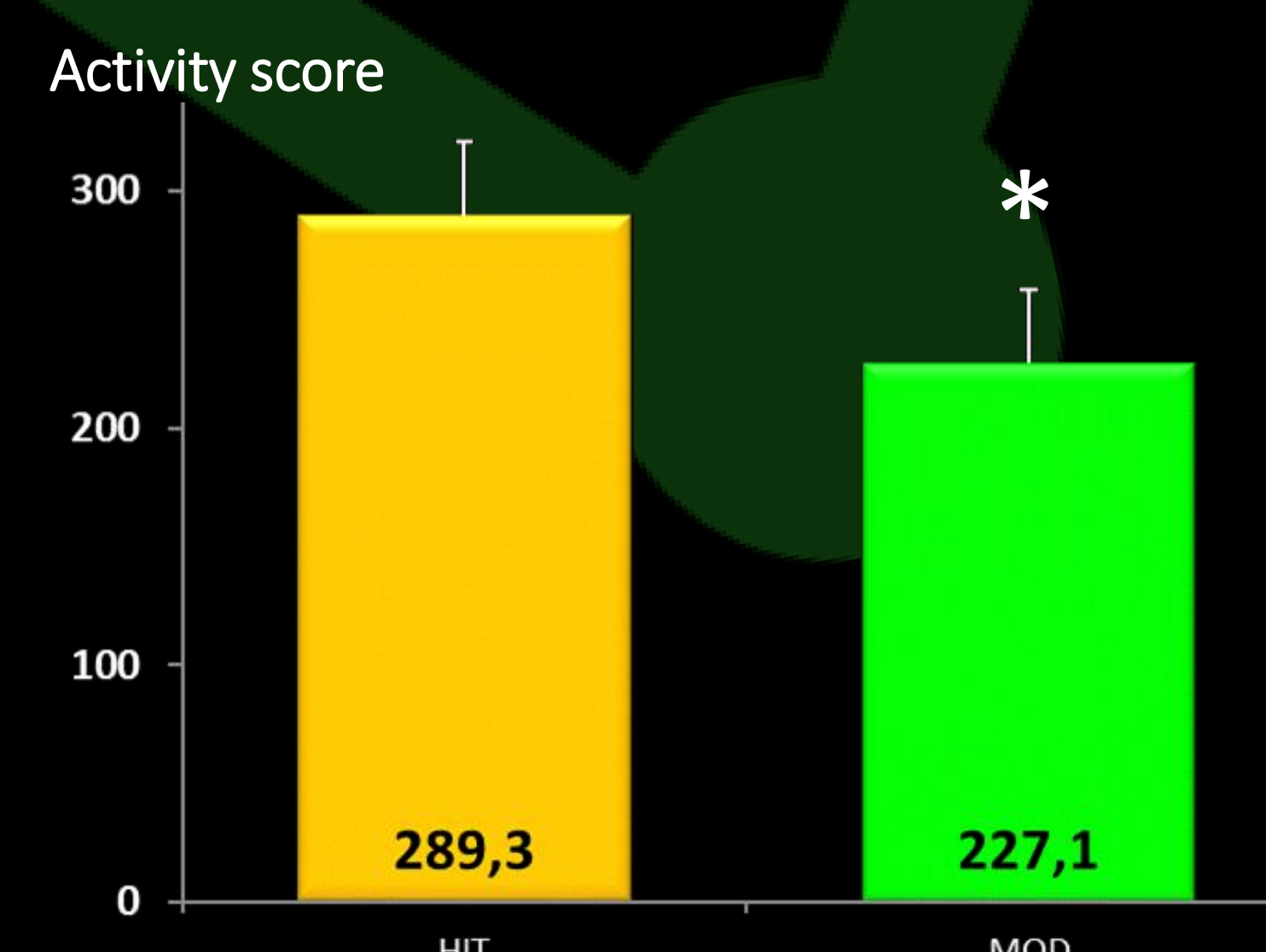


Fig. 3., Activity score

Mean (+ SEM, N=14 HIT and 13 MOD participants, *=P<0.05) activity scores across participants in the HIT and MOD group.

Results – supplementary

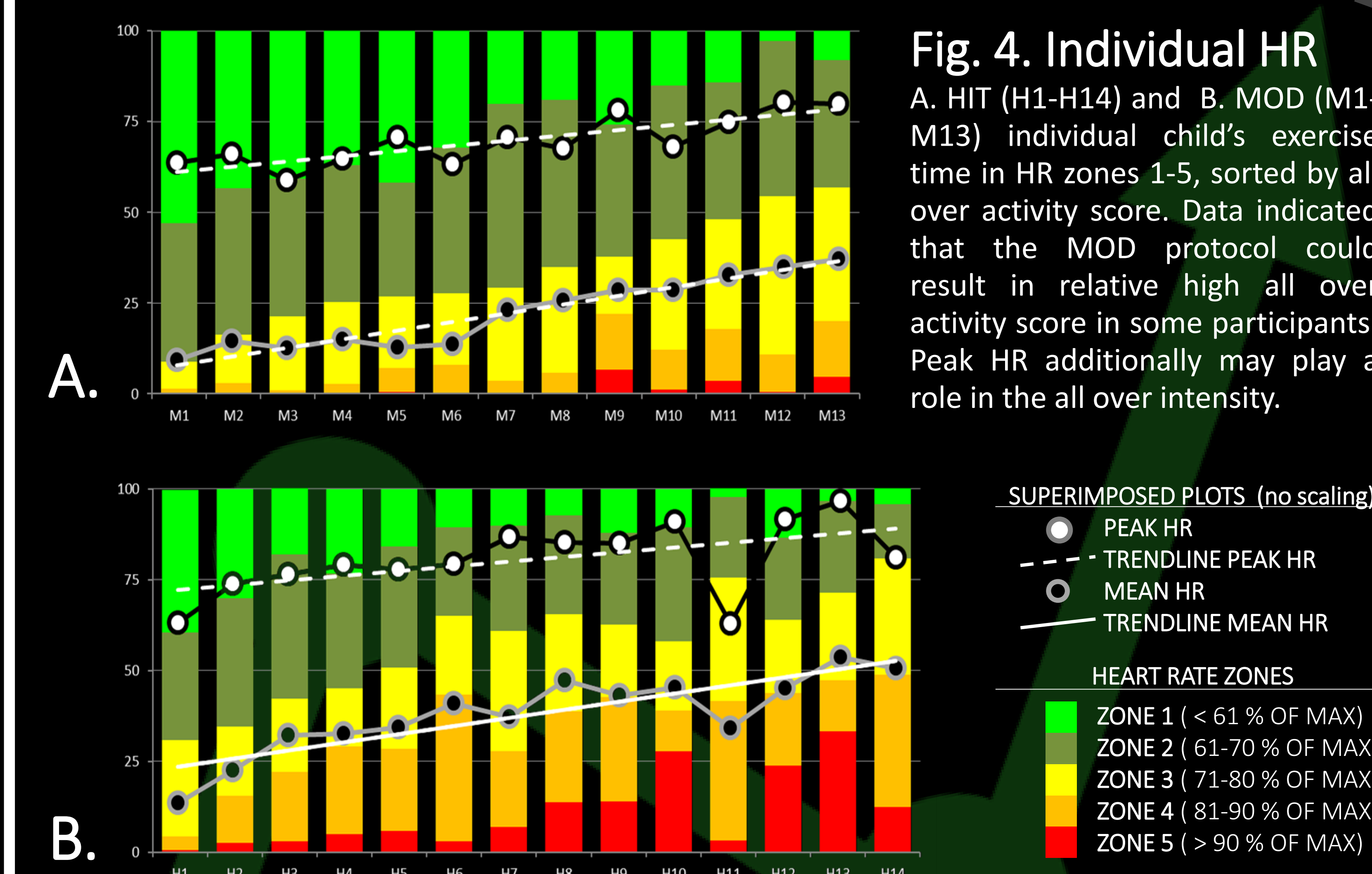


Fig. 4. Individual HR

A. HIT (H1-H14) and B. MOD (M1-M13) individual child's exercise time in HR zones 1-5, sorted by all over activity score. Data indicated that the MOD protocol could result in relative high all over activity score in some participants. Peak HR additionally may play a role in the all over intensity.

Conclusion

Physical activity targeting high intensity exercising in obese children effectively resulted in high-intensity cardiovascular load. The long-term effect on obesity and general activity level remains unknown. Prospective studies should explore these factors and the potential effect of exercising at different heart rate levels.

Discussion

High-intensity training in moderate to severe obese children increases the cardiovascular load. This may be a more effective intervention strategy in comparison to moderate-intensity training. Future studies, however, is required to explore the long-term impact on weight-loss and explore the role of time spent in different heart rate zones.

Furthermore, the role of the instructors on the individual child's activity level and motivation to work at higher cardiovascular intensity is needed. Prospective studies additionally should focus on factors to support a generally higher level of activity and the individual child's constraints in relation to high intensity activity.