# High-intensity interval training: a potential novel method for improving bone mass


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## BACKGROUND

While the metabolic adaptations to High-intensity Interval Training (HIIT) have been well described (1,2), a search of the scientific literature revealed no published research examining the effect of HIIT on bone mass.

As part of a 6-week study to examine the effects of HIIT on body composition (3) a sub-group of 18 participants undertook additional measures to examine the effect of a HIIT programme on bone mass.

This study aimed to examine the effects of a 6-week HIIT programme, both independent of and in combination with creatine supplemetation, on bone mineral content, density and area at the Lumbar Spine and Proximal Femur.

## METHODS

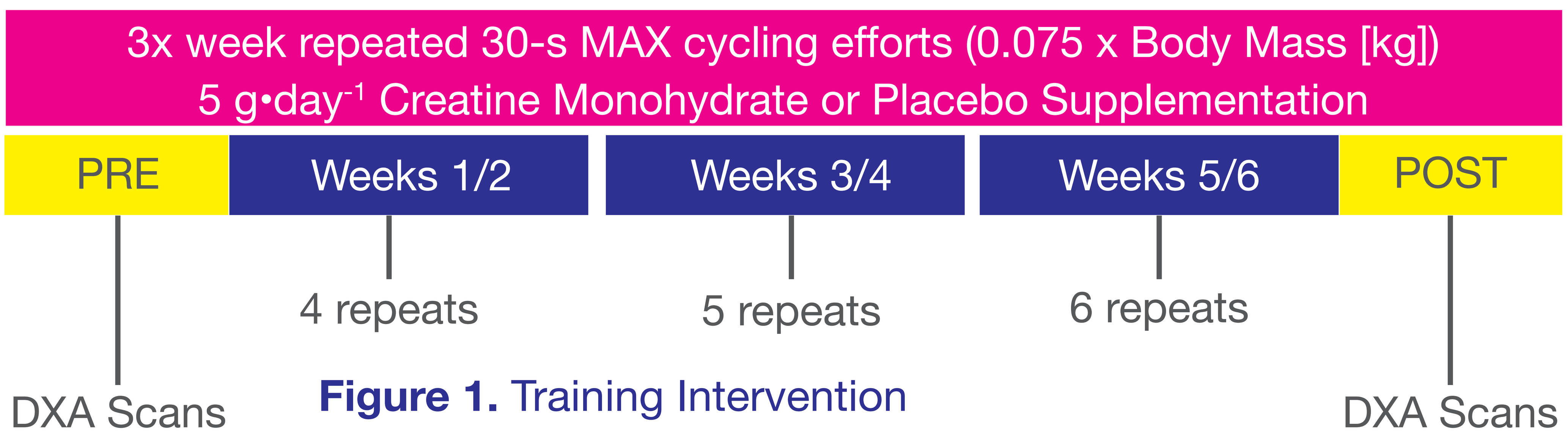


**Figure 1.** Training Intervention

Eighteen male participants (24.4 ± 6.7 yr; 1.77 ± 0.09 m; 79.0 ± 14.5 kg; 25.0 ± 2.8 kg·m$^{-2}$) undertook both a lumbar spine and proximal femur DXA (Hologic Discovery A, Bedford MA) scan pre and post a 6-week HIIT and/or supplementation intervention (Figure 1).

Participants were randomly assigned in a double blind manner using a block method to 1 of 4 conditions HIIT & Creatine or Placebo; and Control & Creatine or Placebo. Data were analysed using a factorial ANCOVA, with the baseline value used as a covariate.

Percentage change was caluclated as ((Pre-Post)/Pre) x 100 (4). Where no interactions between HIIT and supplement were observed, data were collated into exercise and/or supplementation.

## RESULTS & DISCUSSION

HIIT led to near significant increases in BMD at the femoral neck (1.75% PRE: 1.03 ± 0.21 -v- 1.05 ± 0.19 g•cm$^{-2}$, p=0.059), total hip area (4.81%; 44.16 ± 6.47 -v- 46.17 ± 6.25 cm$^{-2}$, p=0.083), and total hip BMC (5.79%; 51.84 ± 15.13 -v- 54.35 ± 14.25 g, p=0.059, Figure 2), compared with non-exercising controls (-1.52, 0.36 & 0.05%). There were no other changes in Lumbar Spine bone density, content or area (Figure 3).

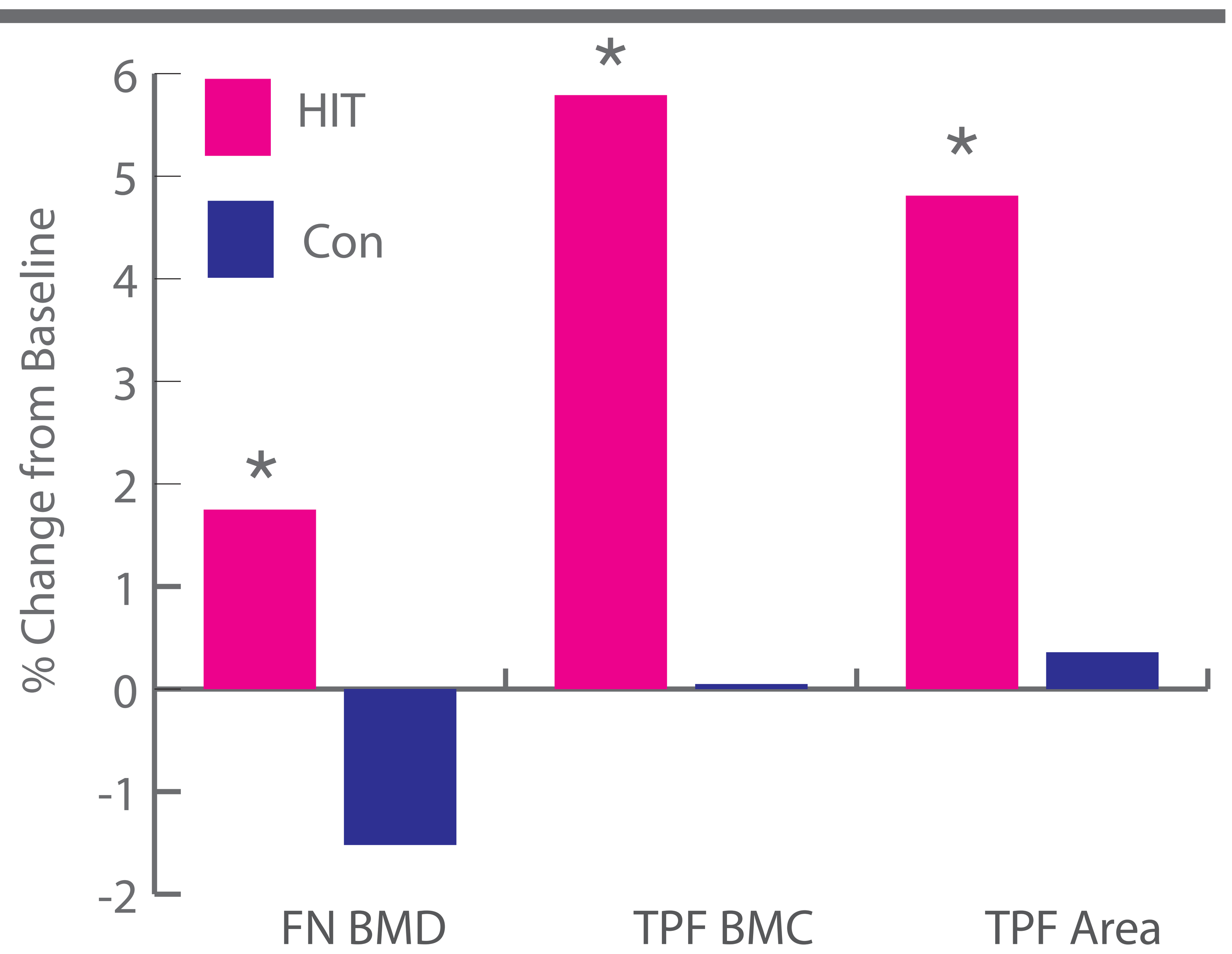


**Figure 2.** Effect of 6-weeks of HIIT or no training (Con) on total proximal femur measurements. *denotes trend towards difference from control condition (p<0.1). FN; Femoral Neck, TPF; Total Proximal Femur

Although these findings fall short of reaching statistical significance. The magnitude and direction of the observed changes suggest that HIIT may potentially induce changes in bone. This is because of the high strain nature of the activity, and the site specific nature of the cycling style intervention utilised in this study.

The associated changes in body composition in this study (3) showed no changes in lean mass, with reduction in s fat mass seen following HIIT. This suggests that this form of exercise may be of sufficient strain to potentially induce changes in bone mass, although futher studies are required.

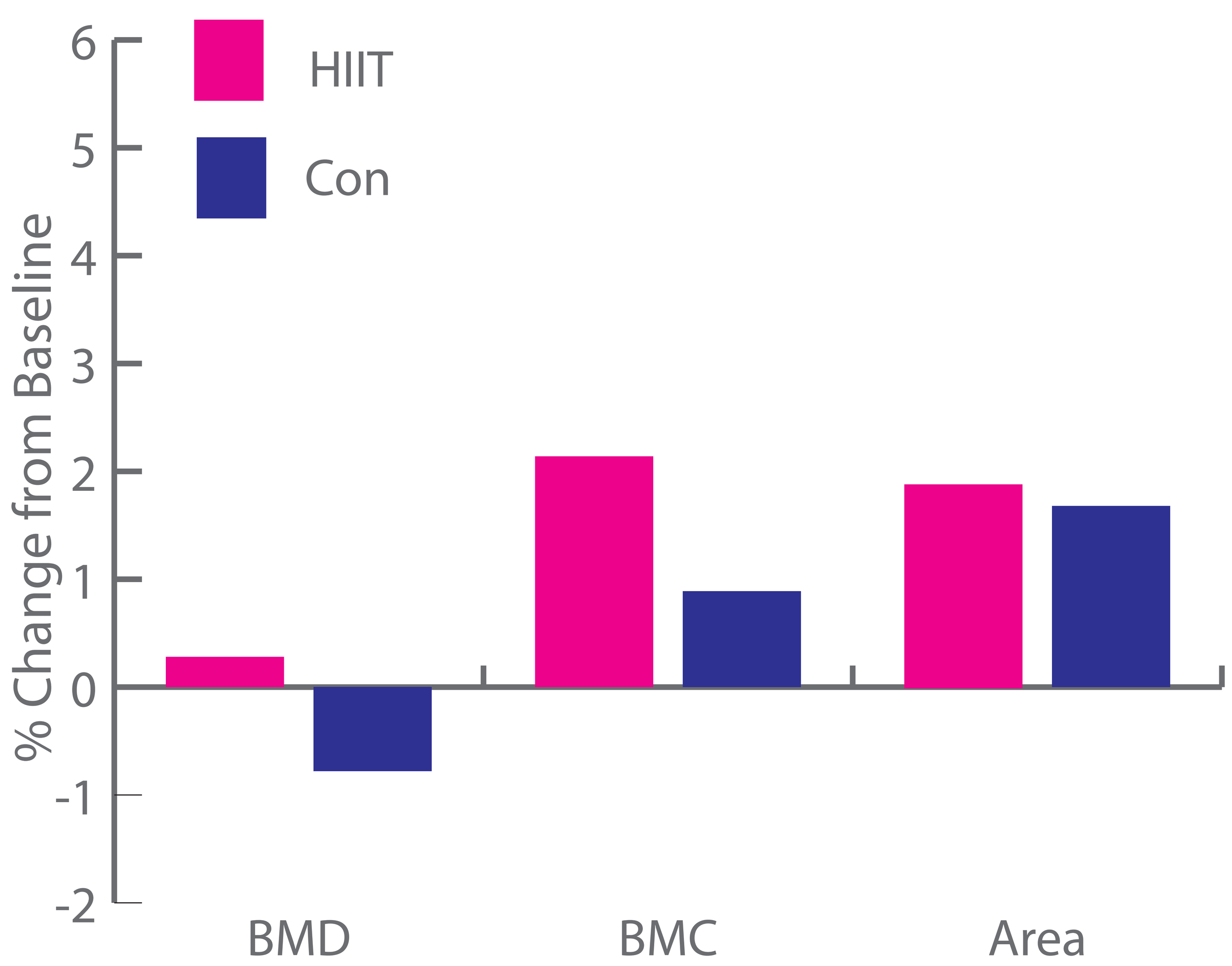


**Figure 3.** Effect of 6-weeks of HIIT of HIIT or no training (Con) on Total Lumbar Spine measures.

## REFERENCES


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## ACKNOWLEDGEMENTS


The authors would like to thank Joanna Worthington for providing assistance with the supervision of HIIT sessions during this study.