PLAS_P1.1 EXCITATORY AND INHIBITORY CORTICOSPINAL RESPONSES IN THE TRAINED AND UNTRAINED LEG FOLLOWING 4 WKS UNILATERAL LEG STRENGTH TRAINING: A TMS STUDY

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INTRODUCTION: Cross education refers to the unilateral training of one limb that results in improvement in strength in the contralateral untrained limb. Evidence of neurophysiological mechanisms underpinning cross education has been shown in upper limb studies, however currently, cross education studies investigating the neurophysiological mechanisms in lower limbs are limited.

AIM: This study investigated corticospinal responses, using transcranial magnetic stimulation (TMS) in both the trained and untrained legs following 4 wks of unilateral leg strength training.

METHODS: Using a between-groups design, 18 participants (18 to 35 years) were randomly allocated into a trained group (7m; 2 f) or control group (7m; 2f). The trained group completed unilateral leg press training, 4 sets of 6-8 repetitions at 85% of their one-repetition maximum (1-RM), 3 times per week for 4 wks. The control group did not undertake any specific training and maintained usual levels of daily activity. Prior to and after 4 wks, all participants were tested for maximum leg extension force, and muscle thickness (imaging ultrasound). TMS measures, motor evoked potential (MEP) and silent period (SP duration), were taken from the contralateral motor cortex projecting to the rectus femoris muscle in both legs.

RESULTS: Maximum leg extension force increased 21.2% ($P<0.01$) and 17.4% ($P<0.01$) in the trained and untrained legs respectively. No change in muscular thickness was observed in the trained group. No changes were observed in MEP amplitude projecting to both legs in both the trained and control groups, however in the trained group SP duration reduced by 17.7 ms in the trained leg ($P<0.01$) and 25.1 ms in the untrained leg ($P<0.01$). No change in SP duration was observed in the control group

CONCLUSION: The results show that heavy load unilateral leg strength training improves strength in the contralateral untrained leg. Although no change in corticospinal excitability was observed, the reduction in SP duration observed in both motor cortices demonstrates a neurophysiological mechanism underpinning strength improvement in both the trained and untrained limbs.