**Fig. S1** Surgical protocol for TMR in trans-tibial traumatic amputation. **a** The mixed amputated nerves were dissected through the wound in a single incision approach, then excised to healthy nerve fascicules. The motor nerves innervating the nearby muscles that had been rendered functionless by the amputation were identified using a nerve stimulator; these nerves were intended to serve as potential recipients. The amputated nerve (donor's nerve) was then sutured in an end-to-end manner to the surgically divided distal segment of the motor nerve (recipient's nerve). **b-d** In this case, the tibial nerve (white arrow) was transferred to a motor branch of the tibialis posterior muscle (**b**), the deep fibular nerve (white arrow) was transferred to a motor branch of the tibialis anterior muscle (**c**), the superficial fibular nerve (white arrow) was transferred to a motor branch of the fibular muscles (**d**). Conversely, TMR was not applied to pure sensory nerves. The sural nerve was addressed by an end-to-side suture to the nearby mixed donor nerve, and the saphenous nerve was treated using traction neurectomy
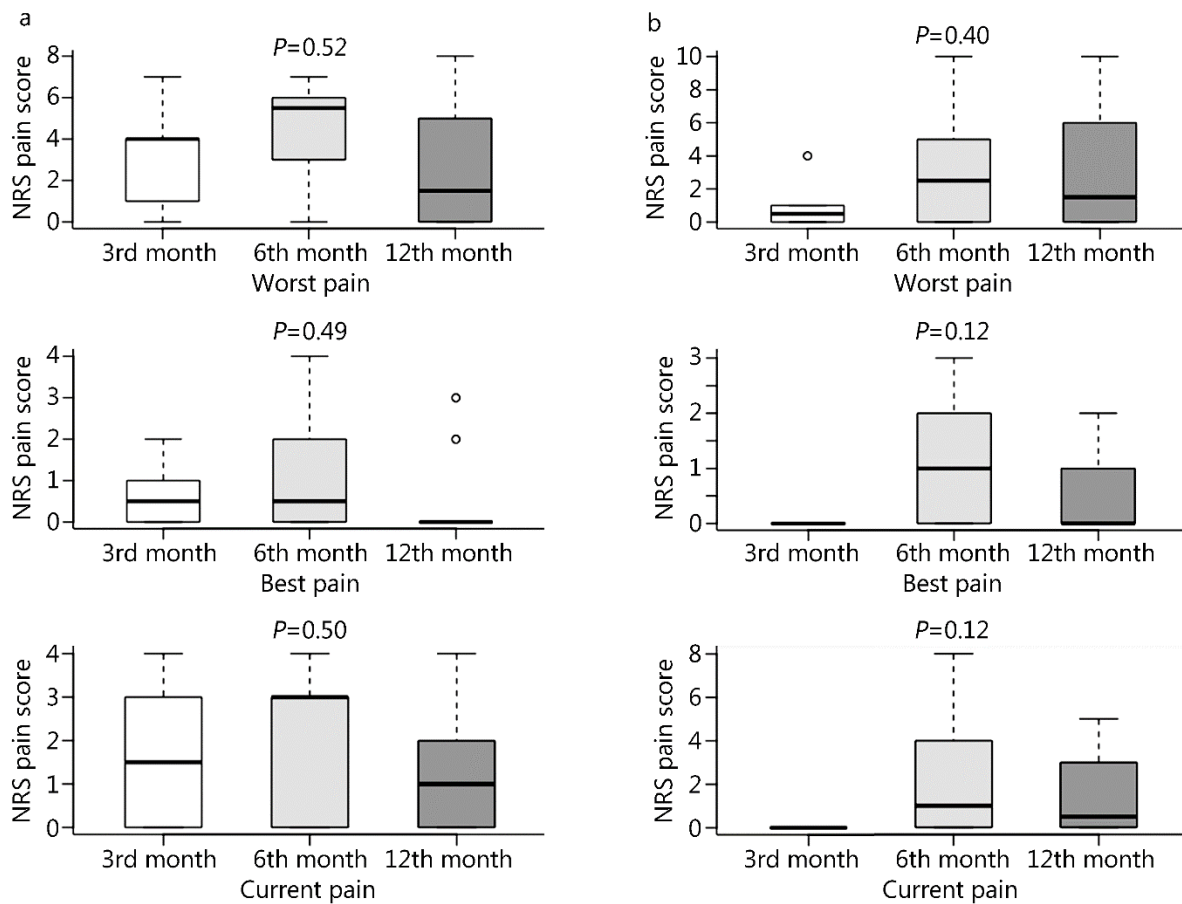
Fig. S2 NRS scores evolution in the first year following TMR. **a** NRS scores of residual limb pain (RLP). **b** NRS scores of phantom limb pain (PLP). A non-parametric Friedman test was used for repeated measures. Values of *P* less than 0.05 were considered statistically significant. No significant differences were recorded over time for either RLP or PLP. NRS numerical rating scale, TMR targeted muscle reinnervation
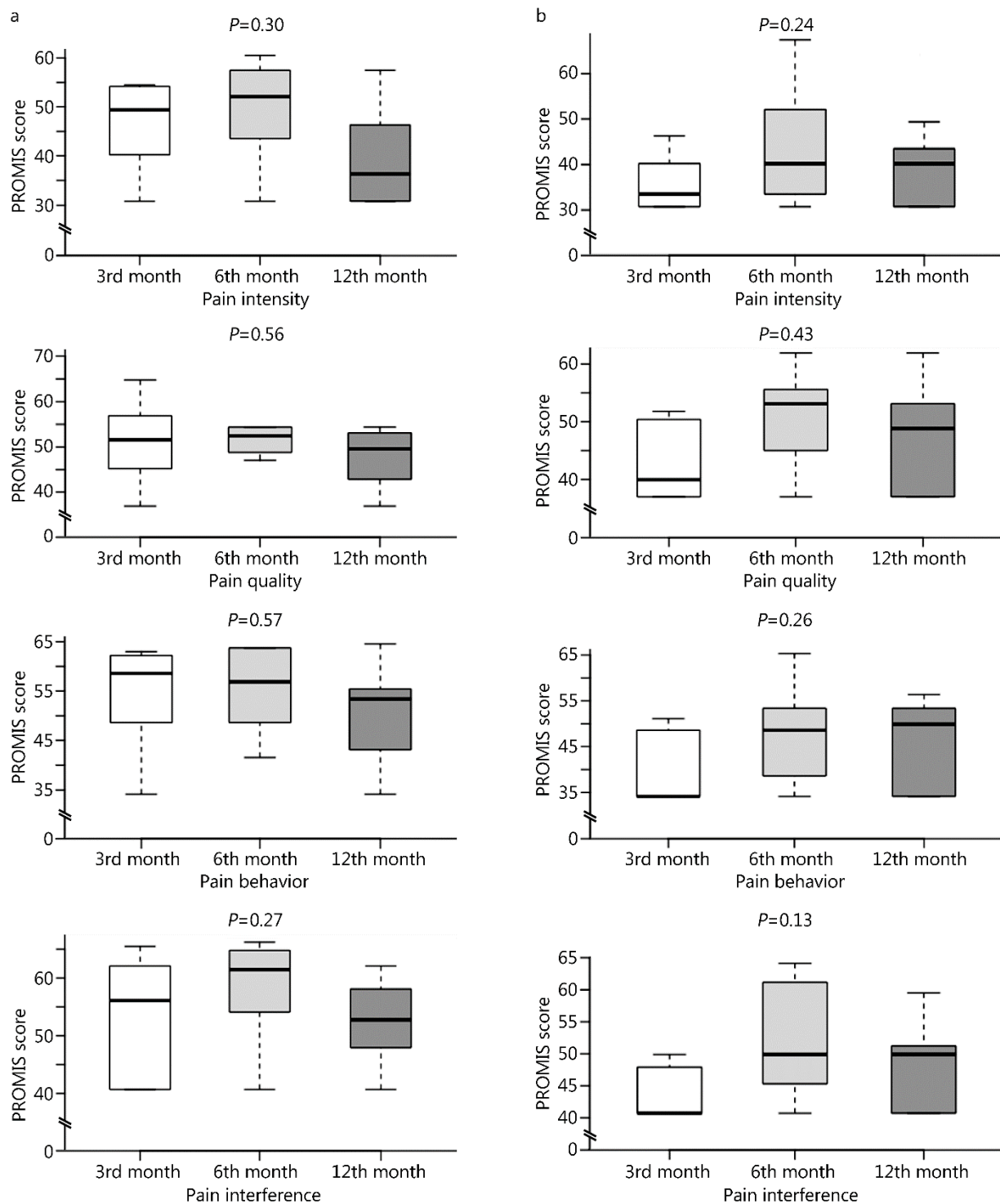
Fig. S3 PROMIS scores evolution in the first year following TMR. **a** NRS scores of residual limb pain (RLP). **b** NRS scores of phantom limb pain (PLP). A non-parametric Friedman test was used for repeated measures. Values of *P* less than 0.05 were considered statistically significant. No significant differences were recorded over time for either RLP or PLP. PROMIS patient-reported outcomes measurement information system, TMR targeted muscle reinnervation