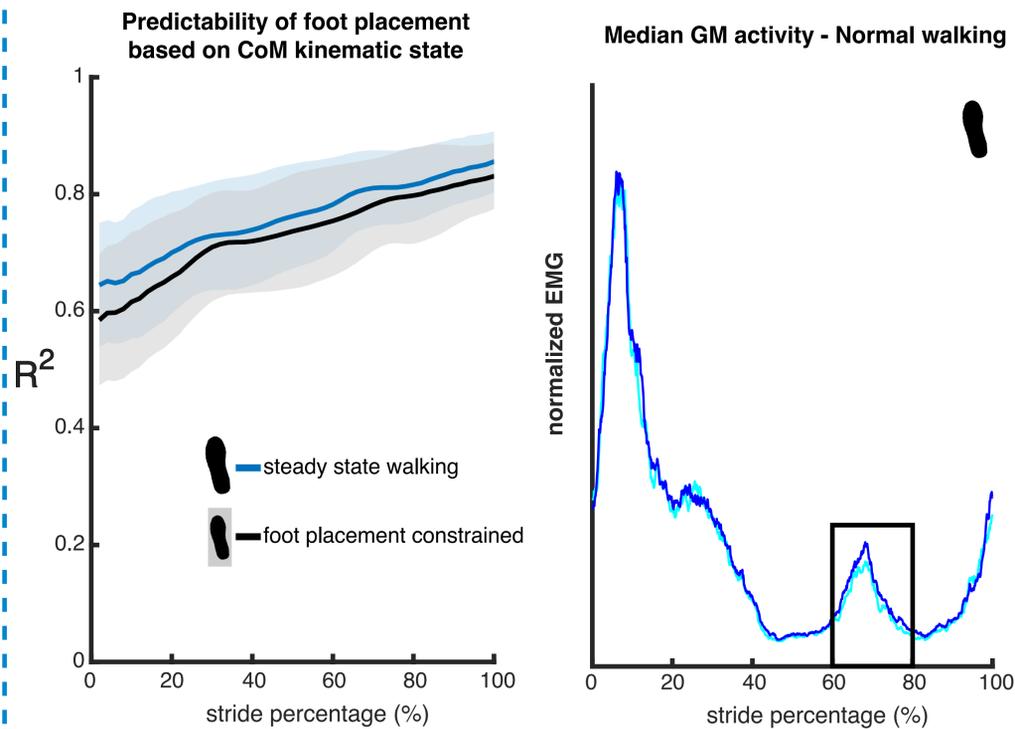


Gait stability through ankle moment control: compensating or steering foot placement?

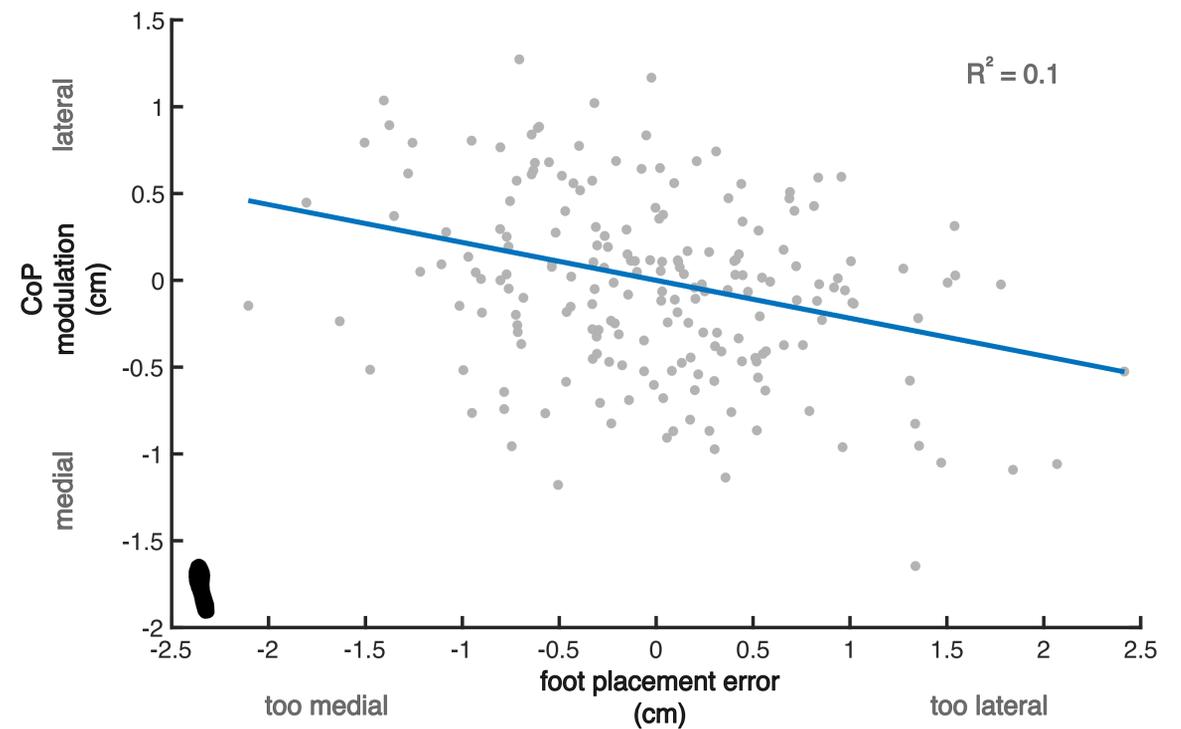
A.M. van Leeuwen, J.H. van Dieen, A. Daffertshofer & S.M. Bruijn

Center of mass (CoM) kinematic state during swing predicts subsequent foot placement (Hurt et al., 2010; Wang & Srinivisan, 2014; Stimpson et al., 2018) and foot placement control is muscle driven (Rankin et al., 2014).

We hypothesized **ankle moment control to compensate for errors in foot placement control**. Furthermore, we expected ankle muscles to drive the resultant mediolateral center of pressure shift.



van Leeuwen et al., 2020



van Leeuwen et al., under review



Yet, a **foot placement error** remains and foot placement constraints (stepping on beams projected on the treadmill at average step width) decrease foot placement accuracy (R^2).

During normal treadmill walking, **ankle moment control compensated for foot placement errors**. Ankle muscle activity was associated with the mediolateral center of pressure shift.

However, **ankle moment control did not compensate for foot placement constraints**. The absolute explained variance remained the same as compared to normal treadmill walking.

Ankle moment control can also assist foot placement control (Zhang et al., 2020; Fettle et al., 2019). This **circular interdependence of foot placement and ankle moment control** may explain why ankle moment control did not compensate for foot placement constraints.

Ankle strategy contribution
stride-averaged explained CoP modulation (cm)

