Gait Retraining Plan

Subjects:

* Healthy recreational runners
* RFS runners running 15+ miles/week and 3+ runs/week
* Willing to modify running pattern
* Willing to log/track running time/mileage
* Training run pace faster than 9 minutes/mile (approximately 3 m/s)
  + Collect data around 3 m/s

Data Collection:

* Meet at track/HPL for initial assessment and warm up (~ 10 minutes)
  + Make sure runner satisfies all of the above requirements and signs the consent form
  + This can happen either right before initial data collection or on a different day
    - Plan on meeting subject at the track
    - Plan on the same day if the subject is confident they are RFS
    - But warn them that if they are ineligible, we won’t need that much time
  + Calculate natural cadence
  + Confirm strike type (also use video camera)
* Collect initial data (60 – 90 minutes)
  + Kinematics (full body marker motion capture)
    - Can be used to calculate average and standard deviation of joint angles
    - Will obtain for multiple strides even if only hitting the force plate for one stride
  + Kinetics (Force plates)
    - Running overground on force plates
    - Jogging for 5 minutes back and forth across the room
    - Using timing gates
  + Muscle Activity (EMG)
    - Gluteus Maximus, Gluteus Medius, Lateral Hamstrings, Medial Vasti, Lateral Vasti, Rectus Femoris, Tibialis Anterior, Medial Gastrocnemius, Soleus (9 total)
  + Cadence (calculate steps for one foot over 15 seconds, multiply by 4)
    - Calculate natural cadence
    - Calculate while warming up on treadmill (before marker application)
    - Measure both outside on a track and on treadmill
  + Strike type (visually)
    - Use high speed video camera to confirm
    - Calculate while warming up on treadmill (before marker application)
    - Measure both outside on a track and on treadmill
* Initial retraining session (will occur after initial data collection)
  + Randomly assigned increased cadence/FFS
  + Find comfortable running pattern/pace on treadmill
  + While maintaining that speed

1. Listen to metronome – line up one foot to sync with beeps
   1. Inform them that they should change their running pattern however they need to in order to run at the same speed with a faster cadence
2. Try to run on the balls of your feet
   1. Consider novel insoles/socks to provide more objective feedback
   * Run with new technique for 10 minutes (or longer if still not comfortable) with feedback
   * Bring to track to attempt running outside with metronome/landing on the ball of the foot to determine if training outside is an option
     + Supply headphones and metronome if user doesn’t have a smartphone

* Training Plan – start with 6 weeks for pilot study
  + Must meet with me once per week for retraining with feedback on treadmill
    - Initial Retraining: 10 minutes of consistent feedback
    - Week Two: 4 minutes of feedback, 1 minute without (x2)
    - Week Three: 3 minutes of feedback, 2 minutes without (x2)
    - Week Four: 2 minutes of feedback, 3 minutes without (x2)
    - Weeks Five and Six: 1 minute of feedback, 4 minutes without (x2)
  + Will be sent daily emails requesting them to log training runs by time or mileage (this will be done via redcap)
    - Make sure that their training logs can be turned in up to 3 days afterward
    - Get information on when the training logs have been submitted
    - Ask them to note if they were unable to finish a training run for any reason
  + Will collect modified gait every two weeks before retraining session on treadmill
    - Collect data every week for pilot study
  + Must maintain running minimum of 15 miles per week, 3 runs per week
  + Week-by-week training
    - Week One:
      * Run with modified gat pattern for 2 miles (or 16 minutes) per run
      * At least 1 of the miles (8 minutes) at the end of each run
    - Week Two:
      * Run with modified gait pattern for 2 miles (or 16 minutes) per run
      * At least 1 of the miles (8 minutes) at the end of each run
      * Dedicate one short run to retraining (3 miles/24 minutes minimum)
    - Week Three
      * Run with modified gait pattern for 3 miles (or 24 minutes) per run
      * At least 1 of the miles (8 minutes) at the end of each run
      * Dedicate one short run to retraining (3 miles/24 minutes minimum)
    - Week Four
      * Run with modified gait pattern for 3 miles (or 24 minutes) per run
      * At least 1 of the miles (8 minutes) at the end of each run
      * Dedicate one longer run or two short runs to retraining (5 miles/40 minutes total minimum)
    - Week Five and Six
      * Attempt to dedicate all training runs to modified gait pattern
  + Week by week training (if running with greater mileage)
    - Week One:
      * Run with modified gait pattern for 40% of mileage/time of each run
      * At least 20% of mileage/time (included in the 40%) at the end
    - Week Two:
      * Run with modified gait pattern for 40% of each run
      * At least 20% of mileage/time (included in the 40%) at the end
      * Dedicate one short run to retraining (20% of total weekly mileage)
    - Week Three
      * Run with modified gait pattern for 60% of mileage/time of each run
      * At least 20% of mileage/time (included in the 60%) at the end
      * Dedicate one short run to retraining (20% of total weekly mileage)
    - Week Four
      * Run with modified gait pattern for 60% of mileage/time of each run
      * At least 20% of mileage/time (included in the 60%) at the end
      * Dedicate one longer run or two short runs to retraining (33% of total mileage/time total minimum)
    - Week Five and Six
      * Attempt to dedicate all training runs to modified gait pattern