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Study finds running with soft footfalls reduces injury

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Credit: Hong Kong Polytechnic University

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As the popularity of distance running grows, there is an increase in running-related injuries. To address this, Dr. Roy Cheung, Associate Professor of the Department of Rehabilitation Sciences at PolyU, conducted the gait retraining programme on injury prevention, which is the first randomized controlled trial to prove that running posture can be modified by systemic training and it is an effective way to prevent running injury.

The research team compared the year-long results of 320 novice runners who are 18 to 50 years old, have less than two years of running experience and run regularly more than 8 km per week.

Among those runners, 166 received two weeks visual biofeedback training (the gait retraining group) in the lab during eight treadmill-training sessions. When running on a laboratory treadmill at a self-selected speed, they were reminded by the signal on the monitor in front to "run softer". Another 154 participants (the control group) also ran eight times on the laboratory treadmill, but received no feedback. They continued running normal-stride as they always had.

While it is difficult for runners to detect if they are landing softly or otherwise, visual biofeedback training with signal alert can effectively enable runners to change the gait after receiving such signals.

Less landing force after retraining

Before the gait retraining programme began, researchers had measured the landing forces, i.e., vertical average loading rate (VALR) and vertical instantaneous loading rate (VILR), of both groups at slow (8 km/h) and

fast (12km/h) paces. VALR and VILR are mean and maximum rate of loading during impact and they are known as biomechanical markers related to injury.

In the gait retraining group, both VALR and VILR were significantly lower after the retraining, reducing from 65.9 BW/s to 54.8 BW/s and 90.7 BW/s to 75.0 BW/s at slow pace; and from 81.3 BW/s to 66.6 BW/s and 111.9 BW/s to 94.8 BW/s at fast pace. In the control group, no significant difference was found in VALR at slow pace after training, but VALR at fast pace and VILR at both testing speeds were slightly increased.

For comparisons between-groups, VALR and VILR in the gait retraining group were significantly lower than in the control group at both testing speeds after training. (For details, please refer to Figure 1 in the appendix)

"Many runners are unaware of their own gait in running. To prevent injuries, runners should land on midfoot; shorten stride length or increase step frequency; and slightly lean the body forward," said Dr. Roy Cheung.

Fewer injury cases for soft-stride runners

All participants were reassessed and were asked to report their weekly mileage, training and injuries in the following 12 months. The gait retraining group runs for 7.4 km per week while the control group for 7.1 km. Soft-stride runners reported 28 injuries, accounting for 16 percent in this group, much fewer than the 61 injuries, accounting for 38 percent of normal-stride runners. Statistical test showed a 62 percent lower injury occurrence in soft-stride runners compared with the control group.

The types of injuries reported are different in the two groups. Soft-stride runners had 10 cases of Achilles tendinitis and calf strain, while the control runners had none. On the other hand, the control group reported 23 cases of plantar fasciitis and 18 cases of knee pain while soft-stride runners only have two and four cases respectively. (For details, please refer to Figure 2 in the appendix)

"The gait retraining group had a higher incidence of calf injury because there is a greater strain on the ankle plantar flexors when the participants attempted to soften their footfalls by using forefoot strike. Runners should use a midfoot strike pattern to avoid calf injury," said Dr. Roy Cheung.

Provided by Hong Kong Polytechnic University

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