

Research Bites, September 2022, by Mary Yoke, PhD, FACSM, MA, MM

Let's Consider Nordic Walking!

Full disclaimer: I have been a Nordic walker (also called a trekker or an exerstrider) for over 20 years. I became interested in Nordic walking after my orthopedist told me I should never run or jump again, due to an almost total loss of cartilage in both of my knees. I am trying to forestall or avoid knee replacements, yet still stay as active as possible!

Perhaps you have wondered about the efficacy of Nordic walking, or you may have been tempted to joke “where’s the snow?” when encountering someone with trekking poles (I’ve been asked this question hundreds of times, as people either want to make conversation or think they’re being funny).

Recently, new research has been published on some of the outcomes of Nordic walking, including a study by Cokorilo et al (1). In this randomized, controlled trial, 166 adult women (age: 50-69 yrs) were divided into three groups: a control group, a Nordic-walking group, and a recreational walking group. The Nordic-walking group and the recreational walking group both exercised on a track for 35-45 minutes, three times per week, for 12 weeks. Intensity was maintained at 60-65% of %HRmax during the first month, at 65-70% during the second month, and at 75-80% during the third and final month. Before and after the intervention, all participants underwent the following assessments: BMI, the UKK walking test, HR measurement during and after the test, and a prediction of VO₂ max based on measures obtained from the UKK test. The authors wanted to explore whether there were any differences in the scores on these pre- and post-assessments between the three groups.

What were the findings? In the posttest analysis, significant differences were found between the three groups in all measures, with the Nordic walking group showing greater benefits than the recreational walking group, which in turn had significantly better outcomes than the control group.

Cokorilo et al chose older adult women, aged 50-69, as the population of interest. This population, of course, is generally starting to experience signs of aging, including loss of muscle mass, muscle strength, and flexibility, and may be looking for lower impact options for moderate-to-vigorous physical activity. While both the Nordic walking group and the

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recreational walking group had positive outcomes, the Nordic walking group had slightly better results than either group. Notably, other research literature has shown that Nordic walking has a higher caloric expenditure than recreational walking, and produces a reduced load on the spine and lower body joints to boot (2). And in another recent randomized controlled trial with coronary artery disease patients (3), it was found that Nordic walking, in comparison to those who participated in high-intensity interval training (HIIT) or moderate-to-vigorous intensity continuous training (MICT), had superior results in terms of increased functional capacity.

The take-home message: Nordic walking is a safe, pleasant, low-impact activity with multiple health and fitness benefits. Try it!

Does Strength Training Impact Run Performance and Biomechanics?

Researchers Trowell et al, in a 2022 study (4), wondered whether concurrent strength and endurance training improved running performance more than endurance training alone. To find out, they conducted a randomized controlled trial where 30 moderately trained distance runners were assigned to either a 10-week concurrent strength and endurance training program or to a control group which performed only endurance training. Prior to the study, all participants had been running ≥ 30 km per week for at least a year, and none had experience with strength training. Trowell et al wanted to see how a concurrent training program affected the runners' 2-km (1.24 miles) run time after 10 weeks. Additionally, the researchers were interested to see whether the concurrent program resulted in favorable changes in lower limb biomechanics, thus potentially improving running economy and VO₂ max; changes in body composition were also evaluated.

Pre- and post-testing involved a treadmill run test, an overground run test, body composition assessment, 3-D motion analysis, and surface electromyography (EMG) measures. During the intervention, all runners were asked to continue their previous training program; total training time was matched between the two groups. However, the experimental group also performed strength training exercises 2 days/week for the 10-week trial. Strength exercises included the back squat, single-leg deadlift, front plank, and glute bridge, in addition to high-

velocity, high-intensity plyometric moves such as hurdle jumps, high-knee drills, split squat jumps, and drop jumps (these latter moves involved progressively adding external weights).

Results? The concurrent strength and endurance training group improved their 2-km running performance more than the control group, with 79% of the intervention group versus 29% of the control group improving their 2-km times by $\geq 2\%$. Time to exhaustion during the VO₂max test was also significantly increased by 12.5% in the intervention group. There were no statistically significant differences between the two groups in VO₂max or running economy (both groups showed improvement). The concurrent strength and endurance group reduced more total body fat, although total body mass and lean body mass remained the same. Biomechanically, the only significant difference found was a greater angular velocity in hip flexion during the early swing phase of running in the intervention group.

The bottom line is that a concurrent strength and endurance training program, as practiced in this study, appears to help improve running performance. Squats, glute bridges, and plyometric moves, anyone?

CrossFit and Injuries

CrossFit continues to be one of the most popular exercise programs of our time, practiced by hundreds of thousands of people every day (5). In a retrospective, cross-sectional study published in 2020 (6), researchers Alekseyev et al hoped to obtain more information about musculoskeletal injuries experienced by CrossFit athletes. Therefore, a 33-question survey was developed and published on a secure online website, and then distributed to numerous CrossFit gyms nationally and internationally; both online and in-person surveys were available to exercisers for a 6-month period.

A total of 885 individuals responded from 40 U.S. states, Puerto Rico, and 13 other countries. Participants were 66.6% male and 33.4% female, with an average age of 29 years. Participants were asked to identify their CrossFit experience level, resulting in self-reports from 27.1% beginner, 60.7% intermediate, and 12.2% advanced exercisers.

Of the 885 participants, 33.3% (n = 295) reported injuries. What kinds of injuries? Back, shoulder, and knee injuries were most common, making up 32.2%, 20.7%, and 10% of injuries experienced, respectively. Specific exercises were apparently responsible for the high injury rate. The most problematic exercises: the squat (22% of the injuries), deadlift (18%), and clean and jerk/press (10%). Injury prevalence was significantly higher among those who rated themselves as advanced (59.3%), followed by intermediates (35.6%), and then by beginners (16.7%). The authors write that injury prevalence steadily increased with years of weightlifting experience and number of hours per week spent on CrossFit training.

It is surmised that the fast pace and high intensity encouraged in many CrossFit gyms (boxes) can lead to poor form and poor spinal alignment, resulting in inappropriate stress to the thoracic and lumbar spine and increasing the risk of injury. In other words, exercisers need to be educated and intent on the maintenance of a neutral spine, which involves consistent and appropriate thoracic and lumbar curves. Regarding the shoulder, the low squat snatch position is considered to be especially risky, as exercisers may be rapidly moving into positions of weighted shoulder hyperflexion, internal rotation, and abduction.

One of the findings by Alekseyev et al was that advanced-level athletes were 2.63 times more likely to be injured than the intermediate-level athletes, and 7.27 times more likely to be injured than beginners. Why is this? The survey included questions about possible reasons for any sustained injuries, and 33.3% of the injured, advanced-level participants responded “training beyond capacity”, while 28.5% responded “negligence”. This suggests that advanced-level participants are exercising at very high intensities with fewer rest intervals.

Like all studies, this one has some important limitations. For example, the self-reported survey allowed participants to recall previous CrossFit-related injuries, as well as those they were presently experiencing. It’s entirely possible that participants remembered certain facts incorrectly. Also, the study may have inadvertently attracted more participants who were interested in reporting their injuries (selection bias), whereas uninjured exercisers may have been less concerned and therefore decided not to participate. Even so, the Alekseyev et al research provides some important insights, adding to the literature on exercise injury incidence and possible causes of injury among athletes participating in CrossFit programs.

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