Strength-Endurance Training Classes: Health Benefits and Injury Rates of an Emerging Cornerstone of Physical Activity

The benefits of a physically active lifestyle are well documented,¹ and physical activity is a cornerstone of treatment plans to manage the growing epidemics of obesity and sedentarism.² Accordingly, interest in programs and classes that promote physical activity and exercise, particularly high-intensity training (HIT), has surged in recent years. In particular, aerobically focused high-intensity interval training (HIIT) has been shown to optimize improvements in cardiovascular fitness³ with less exercise time compared with moderate and low-intensity exercise programs. A simple search of PubMed for the term “high-intensity interval training” reveals a 10-fold increase in the number of publications within the most recent decade (2010–2019) compared with the decade prior (2000–2009).

Since 2014, HIIT has continuously been ranked as a top fitness trend worldwide, receiving the top ranking in 2014 and more recently, 2018.⁴ HIIT has been shown to increase adherence and participation rates in exercise training regimens compared with more traditional exercise programs and gyms, in large part due to greater enjoyment of exercise and shorter time commitment.⁵ In addition to the great interest garnered, HIIT has been shown to improve cardiovascular fitness⁶ and reduce cardiometabolic disease risk factors.⁷

A recent umbrella systematic review showed that HIIT can improve key cardiometabolic disease risk factors including body composition, insulin sensitivity, and blood pressure among adults with normal, overweight, and obesity classifications.⁷ Moreover, HIIT has been suggested to elicit greater benefits compared with moderate- to low-intensity steady-state or interval exercise.³,⁸,⁹ Despite the known health benefits and ranking as the top worldwide fitness trend in 2018,⁴ there is limited research determining injury rates during common HIT programs/classes.

High-intensity functional training (HIFT) represents a large portion of exercise programs/classes under the broad category of HIT. The primary distinction between HIFT and HIIT is the former incorporates functional and multimodal movements including plyometrics and strength training whereas the latter incorporates unimodal exercise (eg, running, rowing, etc).¹⁰ High-profile commercial exercise brands that incorporate HIFT have popularized HIIT/HIFT and generated cult-like followings with some adherents showing a near religious commitment.⁵,¹¹,¹²

In the current issue of Mayo Clinic Proceedings, Batterson et al¹¹ report the effects of HIFT on injury rates, participation rates, and exercise class satisfaction using pre- and post-class surveys with a convenience sample of 100 habitual exercising adults participating in small-group training programs at a wellness facility on Mayo Clinic’s campus in Rochester. Attendance during the 6-week training program was high, with 91% of participants attending four or more of the six classes. On average, participants engaged in 4.5 hours per week of exercise (270 min) which is well above current physical activity recommendations of at least 150 minutes of moderate-intensity or at least 75 minutes of vigorous-intensity exercise per week from the Physical Activity Guidelines Advisory Committee Scientific Report.¹³ Additionally, average satisfaction in the training program was high (89%) and 96% of participants planned to continue performing HIFT after the study.
Despite high levels of adherence in and satisfaction with HIFT, Batterson et al provide novel evidence on the injury rate during HIFT. The reported injury rate (9 injuries per 1000 training hours) is three-fold higher than previously reported and greater than reported injury rates during traditional weight lifting and power lifting training (~3 injuries per 1000 training hours). Of the reported injuries, 37.5% occurred during the HIFT class and 54.2% occurred while exercising outside of the HIFT class. The most common locations of injuries primarily included the lower limbs (knees and hips) and back, and these injuries were most common with non-weighted movements such as plyometrics, calisthenics, burpees, and body weight squats. Notably, a strength of the study by Batterson et al is that it used a prospective design which facilitates more accurate estimation of injury rates than the more common retrospective study design which has greater risk of recall bias. However, it is unclear if participation in the HIFT program contributed to an increased risk of injury during non-HIFT exercise hours.

In context of the demonstrated benefits for cardiovascular fitness and cardiometabolic disease risk factors, both HIIT and HIFT programs are an effective training method. HIIT and HIFT are established approaches to exercise training for the general public and no longer considered fitness fads; appropriate injury mitigation strategies should be developed. Batterson et al and previous studies show that: (1) injuries occur during HIIT and HIFT programs at a higher rate than previously reported; and (2) the proximal lower limb joints (hips and knees) and back are the most frequently injured anatomical locations. The primary injury-inciting movements are reported to be squats, bench presses, and burpees.

Although Batterson et al and earlier work show that HIFT and HIIT programs have high attendance/adherence and satisfaction, there is an emerging need to better understand injury rate. As an analog, recreational running is one of the popular sports worldwide; however, the injury rate among novice runners is high (~17.8 injuries per 1000 training hours). Conversely, after ~12 weeks of training without injury, the injury rates are markedly lower (~7.7 injuries per 1000 training hours). Thus, in HIFT and HIIT programs, it may be that novice participants are the most injury prone, and more experience and/or technique training may lower injury risk.

In the United States and worldwide, obesity and sedentarism are epidemics, and increasing physical activity may be among the most effective methods to combat these growing epidemics. HIFT and HIIT are promising exercise training programs that can optimize cardiovascular benefits, reduce cardiometabolic disease risk factors, and increase satisfaction with exercise training. Effective mitigation of injury rates during high-intensity exercise training programs may further enhance participation and adherence to HIFT and HIIT programs.

Jonathon W. Senefeld, PhD
Michael J. Joyner, MD
Department of Anesthesiology and Perioperative Medicine
Mayo Clinic
Rochester, MN

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Correspondence: Jonathon W. Senefeld, PhD, Department of Anesthesiology and Perioperative Medicine, Mayo Clinic, 200 First Street SW, Rochester, MN 55905 (senefeld.jonathon@mayo.edu; Twitter: @jwsenefeld).

ORCID
Jonathon W. Senefeld: https://orcid.org/0000-0001-8116-3538

REFERENCES