

PUTTING MINI- TRAMPOLINES TO THE TEST

By Paige Burandt, B.S., John P. Porcari, Ph.D.,
Maria L. Cress, M.S., Scott Doberstein, M.S.,
and Carl Foster, Ph.D., with Daniel J. Green

For most of us, the thought of trampolines conjures memories of backyard barbecues, with the kids (and some of the more playful adults) jumping and challenging each other to attempt backflips. Others may think of trampolining, the high-energy sport that is often listed alongside race walking and the cross-country skiing/rifle shooting biathlon as among the more unusual Olympic events.

In fact, trampoline-based exercise has a colorful history as a recreational activity, sport and training modality. During World War II, trampolines were used to help increase the spatial awareness and balance abilities of fighter pilots (Esposito and Esposito, 2009). NASA even studied trampoline training for their astronauts and found it to be as effective as running as a form of aerobic training (Bhattacharya et al., 1978). Many years later, McGlone, Kravitz and

Janot (2002) reinforced these findings in a study that found no significant differences in maximal heart rate (HRmax), maximal oxygen uptake ($\dot{V}O_2\text{max}$) or energy expenditure when exercising on a mini-trampoline in comparison to treadmill running.

Other research (Edin et al., 1990; Gerberich et al., 1990) did not substantiate the results of those studies however, calling into question the true effectiveness exercising on a mini-trampoline. In fact, there is little data supporting the efficacy of exercising on a mini-trampoline in terms of improving cardiorespiratory endurance and body composition.

To help fill this research gap, ACE enlisted the help of John Porcari, Ph.D., and his team of researchers in the Department of Exercise and Sport Science at the University of Wisconsin–La Crosse to determine the intensity of an individual mini-trampoline exercise routine and compare it to the established guidelines for cardiorespiratory endurance and caloric expenditure.

THE STUDY

The subjects for this study were 24 apparently healthy college students who were recreationally active, exercising at least three times per week for the past six months. Each participant completed an incremental exercise test on a treadmill prior to beginning the study to determine his or her HRmax and $\dot{V}O_2\text{max}$ (a common measure of physical fitness). Ratings of perceived exertion (RPE) were also collected during this preliminary test (Table 1).

After learning common movements and getting comfortable on the mini-trampoline, the participants completed a monitored trampoline exercise session while following a routine designed by JumpSport (www.jumpsport.com). The 19-minute JumpSport exercise video featured motivational music and incorporated a variety of choreography and movements to create a full-body workout. Heart rates and $\dot{V}O_2\text{max}$ were collected every minute and caloric expenditure was calculated from the $\dot{V}O_2$ data. RPE was also assessed every five minutes.

THE RESULTS

The subjects' responses to the JumpSport mini-trampoline workout are presented in Table 2.

Relative heart-rate responses (%HRmax) of subjects during each minute of the workout are presented in Figure 1, while relative oxygen uptake (% $\dot{V}O_2\text{max}$) responses are presented in Figure 2. The boxed region in each figure indicates the current American College of Sports Medicine (ACSM) guidelines for improving cardiorespiratory fitness. ACSM (2014) recommends exercising at 64 to 94 percent of

HRmax or 40 to 85 percent of $\dot{V}O_2\text{max}$ five days/week for 30 to 60 minutes per day.

Remember, the purpose of this study was to determine if performing the mini-trampoline routine from JumpSport met ACSM guidelines for improving cardiorespiratory fitness.

Stated simply...yes, it does. During the workout portion of the routine (which eliminates data collected during the warm-up and cool-down), the average heart rate was 79 percent of HRmax and the average $\dot{V}O_2$ as 59 percent of $\dot{V}O_2\text{max}$. Both of these values fall within the ranges stipulated by ACSM.

THE BOTTOM LINE

It is clear that the JumpSport workout offered sufficient intensity to improve cardiorespiratory fitness over time. Of course, as with all exercise modalities, adherence over the long haul is the key to improving fitness and body composition. Exercising on the mini-trampoline seems to lend itself to ongoing participation for a couple of key reasons.

According to Dr. Porcari, the exercise intensities seen during this research are on the cusp of moderate to vigorous intensity. "We would expect participants to report ratings of perceived exertion of about 13 at this intensity level," he reports, "but the subjects averaged an RPE of 11.7, or a light to moderate intensity." This tells us that the mini-

Table 1 Descriptive Characteristics of the Subjects		
	Males (n=12)	Females (n=12)
Age (years)	20.8 ± 2.09	20.7 ± 1.30
Height (in)	69.9 ± 2.76	65.6 ± 2.05
Weight (lb)	184.0 ± 30.70	142.0 ± 13.06
HRmax (bpm)	182 ± 11.5	185 ± 7.1
$\dot{V}O_2\text{max}$ (mL/kg/min)	52.6 ± 8.53	48.2 ± 5.63

Table 2 Average Responses during the JumpSport Workout, Excluding the Warm-up and Cool-down			
	Males	Females	Overall
HR (bpm)	141 ± 14.9	149 ± 14.1	145 ± 14.8
%HRmax	77 ± 6.3	80 ± 7.3	79 ± 6.9
$\dot{V}O_2$ (mL/kg/min)	29.7 ± 1.69	29.1 ± 2.33	29.4 ± 2.01
% $\dot{V}O_2\text{max}$	58 ± 8.4	61 ± 6.7	59 ± 7.6
Kcal/min	12.4 ± 1.60*	9.4 ± 0.90	0.9 ± 1.99
RPE [†]	11.8 ± 1.05	11.6 ± 1.65	11.7 ± 1.36

Values represent mean ± standard deviation

*significantly different than females (p < .05).

[†] 6 to 20 scale

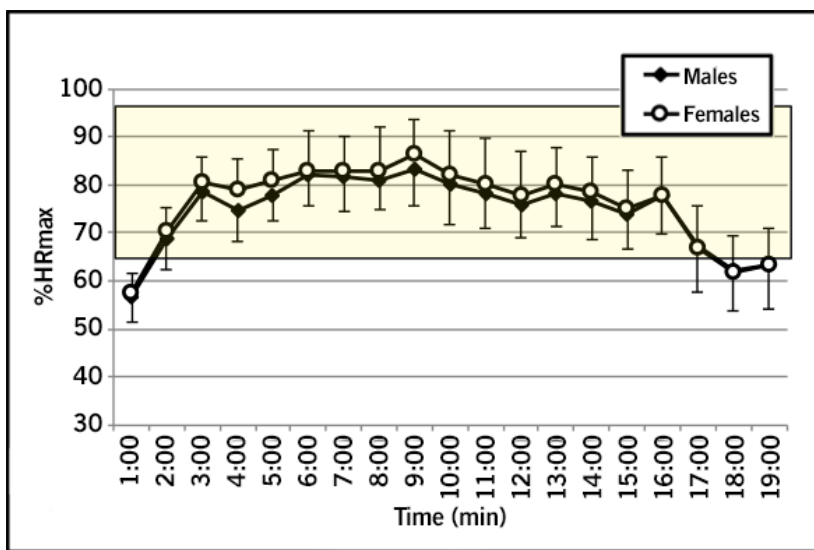


Figure 1
%HRmax of males and females over the course of the workout

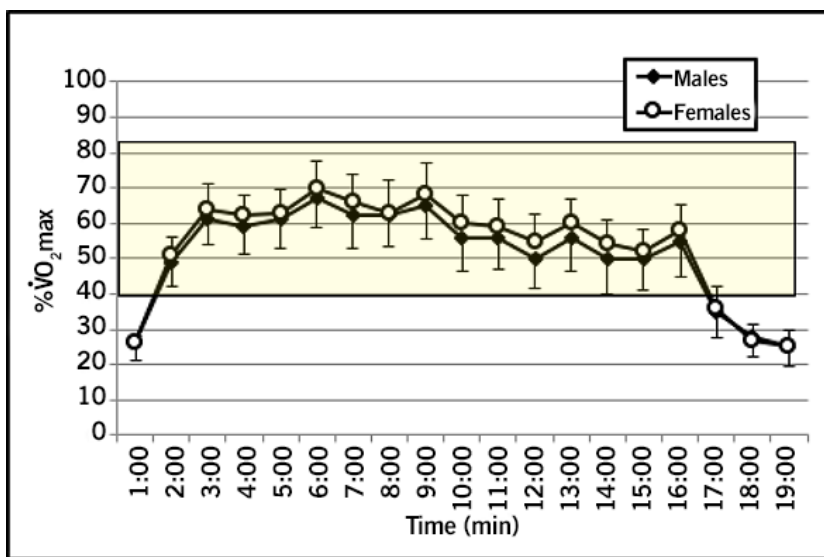


Figure 2
%VO₂max of males and females over the course of the workout

trampoline workout did not feel as intense as it really was. “This may be because, while the muscles are working hard, the trampoline makes the activity less jarring,” says Dr. Porcari. “The enjoyment factor may make things easier, as well.”

Other benefits of exercising on the trampoline may include balance training and spatial awareness—remember that early research with fighter pilots and astronauts? For now, the evidence for this is purely anecdotal. That said, working out on the trampoline requires you to react to an unstable surface while performing a wide variety of movements. This all makes sense, according to Dr. Porcari, but there is a lack of research in this area.

Of course, for most group fitness participants and other gym-goers, caloric expenditure is a key consideration when choosing an exercise modality. ACSM (2011) recommends burning 200 to 300 calories during each 30-minute workout in order to lose or manage weight. This

equates to 6.7 to 10.0 calories/minute. During the workout portion of the JumpSport routine, men burned an average of 12.4 calories/minute, while women burned 9.4 calories/minute. Including the warm-up and cool-down in this calculation brings these numbers down to 11.0 and 8.3, respectively, both of which are still well within the range offered by ACSM. This level of energy expenditure is approximately equivalent to running 6 miles per hour on flat ground, biking at 14 miles per hour or playing football, basketball or ultimate Frisbee.

The participants in this study reported that exercising on the mini-trampoline was a lot of fun and that the JumpSport choreography was easy to learn. So why not add this enjoyable and effective workout to your training repertoire or group fitness schedule? ●

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- Daniel J. Green** is an editorial consultant and freelance writer based in Asheville, N.C. In addition to his consulting work with organizations including the American Council on Exercise, International Association of Fire Fighters and Agriculture Future of America, Daniel has written feature articles for local publications in Western North Carolina (WNC), including *WNC Parent* and *WNC Magazine*.