Krank It

Can the latest exercise machine from the inventor of Spinning live up to the hype? Exclusive ACE-sponsored research examines the effectiveness of the Krankcycle and Kranking.

By Blake Boyer, M.S., John Porcari, Ph.D., and Carl Foster, Ph.D., with Mark Anders

When it comes to group fitness classes, few have enjoyed the longevity of Spinning.® This high-intensity, high-energy indoor cycling class was first launched in the late 1980s and is still among the most popular offerings at clubs and gyms across America today [ACE sponsored one of the first indoor cycling studies, published in *ACE FitnessMatters*, Nov./Dec. 1997].

The man behind the indoor cycling phenomena is former champion ultra-distance cyclist-turned-fitness-guru Jonathan Goldberg, best known in the fitness industry as Johnny G. For nearly 20 years, he rode high on the popularity of Spinning but then in 2004, Johnny G. was sidelined with a virus that damaged his heart. No longer able to safely cycle the way he'd been accustomed to, he became depressed. Then he remembered years earlier having seen a wheelchair-bound athlete competing on a handcycle. That vision stuck with him and was the seed that eventually grew into Johnny G's Krankcycle.

The Krankcycle resembles a conventional Upper Body Ergometer (UBE) in which you sit and essentially "pedal" with your hands. The UBE is standard issue in rehab environments, but healthy exercisers have traditionally paid little attention to the machines in the gym environment. Basically a souped-up

UBE, the Krankcycle enables exercisers to sit or stand, and its crank arms can be "pedaled" independently for a wider variety of movement patterns and combinations.

Johnny G. officially launched the $2,200-machine, manufactured by Matrix Fitness Systems, last year at a major fitness tradeshow. Since that time, there's been significant buzz about it and the Spinning-esque group exercise class called Kranking. As of January 2010, approximately 1,300 Krankcycles had been sold and an estimated 35 clubs nationwide (including California-based Club One and Frog's) currently offer Kranking classes. Given its early success, ACE decided to put Kranking to the test.

The Study

To analyze the average calorie burn and exercise intensity of a typical Krankcycle group workout, ACE enlisted the help of the research experts at the University of Wisconsin, La Crosse Exercise and Health Program. The team, led by John Porcari, Ph.D., and Blake Boyer, M.S., recruited 12 volunteers, male and female, ages 20 to 30 years, none of whom had ever used a Krankcycle previously. This type of participant was selected because he or she closely resembles the average fitness center user who would most likely attend a Krankcycle class.

Prior to beginning the actual study, all subjects performed three to five "habituation trials" on a UBE in which they built upper-body endurance and became accustomed to the hand cycling–type modality.

Next, researchers at the Human Performance Laboratory conducted a maximal exercise test on each subject using the UBE machine. Throughout the maximal test, oxygen consumption ($\dot{V}O_2$max), heart rate (HR) and ratings of perceived exertion (RPE) were constantly monitored.

Once a fitness baseline was established for typical upper-body aerobic-type exercise, all 20 subjects participated together in a 30-minute Krankcycle class held at Wisconsin Athletic Club in Milwaukee. The class was led by Krankcycle's head of training and education, so it mimicked the standard Kranking class format in which each student is equipped with a Suunto heart-rate monitor and his or her own Krankcycle. As the class begins, the students follow the instructor's cues regarding tempo and Kranking technique, and every student's heart rate is projected on a video screen at the front of the room. The instructor uses the projected heart rates to foster competition and motivate each student

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Web Sighting

Learn more about the Krankcycle and see Kranking in action at www.krankcycle.com.

Table 1. $\dot{V}O_2$ and Caloric Expenditure During the 30-Minute Krankcycle Workout

Predicted $\dot{V}O_2$ (ml/kg/min)	25.0 ± 5.90
% $\dot{V}O_2$max	72 ± 10.0
Caloric Expenditure (Kcal/min))	9.0 ± 2.93
Caloric Expenditure (30 min)	269 ± 87.8

Table 2. Minute-by-Minute Heart Rate Response During the 30-Minute Trial

	Heart Rate	(Range)	% HRmax	(Range)
Minute 1	111 ± 12.2	(88–127)	62 ± 4.3	(56–70)
Minute 2	117 ± 11.6	(91–133)	65 ± 4.7	(58–73)
Minute 3	130 ± 12.1	(110–149)	73 ± 5.7	(59–80)
Minute 4	131 ± 7.1	(115–140)	73 ± 4.4	(67–84)
Minute 5	135 ± 8.8	(116–147)	76 ± 4.2	(69–84)
Minute 6	143 ± 12.5	(124–162)	80 ± 5.8	(67–88)
Minute 7	150 ± 8.8	(135–163)	84 ± 3.8	(77–90)
Minute 8	154 ± 13.1	(127–173)	86 ± 5.3	(74–91)
Minute 9	159 ± 14.7	(136–186)	89 ± 8.3	(70–97)
Minute 10	146 ± 18.0	(125–173)	81 ± 8.5	(68–95)
Minute 11	149 ± 23.7	(117–180)	83 ± 12.5	(62–97)
Minute 12	143 ± 15.1	(126–178)	80 ± 7.7	(69–91)
Minute 13	153 ± 12.3	(129–171)	86 ± 5.2	(78–95)
Minute 14	166 ± 16.3	(128–185)	93 ± 8.2	(82–109)
Minute 15	166 ± 9.5	(142–177)	93 ± 5.4	(87–105)
Minute 16	165 ± 17.2	(135–194)	92 ± 8.0	(76–100)
Minute 17	163 ± 19.3	(132–195)	91 ± 9.2	(77–102)
Minute 18	167 ± 16.8	(138–195)	93 ± 7.8	(81–101)
Minute 19	170 ± 13.1	(150–192)	95 ± 6.2	(84–102)
Minute 20	155 ± 12.0	(131–169)	87 ± 7.3	(81–96)
Minute 21	148 ± 13.6	(122–164)	83 ± 7.3	(74–96)
Minute 22	155 ± 20.0	(126–185)	87 ± 10.2	(74–101)
Minute 23	164 ± 16.1	(130–185)	92 ± 8.4	(82–106)
Minute 24	172 ± 12.9	(150–187)	96 ± 6.2	(87–107)
Minute 25	167 ± 12.1	(138–184)	94 ± 5.6	(88–105)
Minute 26	171 ± 12.3	(142–188)	96 ± 4.7	(88–105)
Minute 27	180 ± 11.1	(159–200)	101 ± 4.8	(89–106)
Minute 28	172 ± 18.1	(137–201)	96 ± 9.0	(78–107)
Minute 29	161 ± 27.8	(120–199)	90 ± 15.2	(62–109)
Minute 30	151 ± 32.1	(112–197)	85 ± 17.9	(58–108)
Average	**154 ± 10.0**	**(137–172)**	**86 ± 4.0**	**(78–91)**

to keep his or her exercise intensity within specific, choreographed heart-rate zones. Researchers also measured RPE (both for total body and arm-specific) with every participant every five minutes throughout the class.

The Results

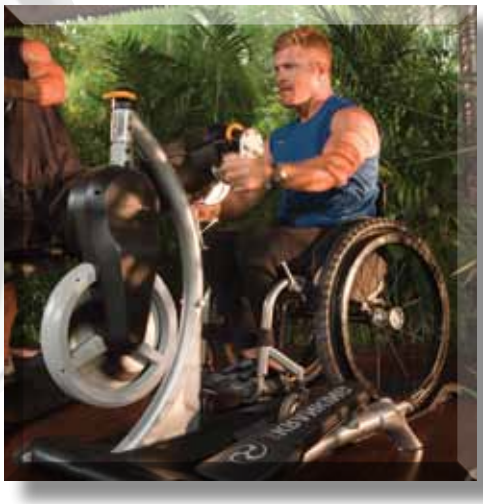
Researchers found that subjects burned an average of nine calories per minute and a total of 269 calories during the 30-minute Kranking workout. This average (and total) was based on a mathematical relationship between HR and $\dot{V}O_2$ data collected during the maximal exercise testing on the UBE (Table 1). It is important to note that these caloric estimates are substantially lower than the real-time estimates generated by the Suunto monitoring system during the actual class session. The Suunto system estimated that subjects burned an average of 393 calories during the 30-minute class, a difference of 124 calories.

This discrepancy can be accounted for by the difference in the way the UBE requires subjects to stay seated while the Krankcycle employs both sitting and standing postures. "The Krankcycle uses more muscle mass than the UBE so you'd likely burn more calories because of the different standing positions," explains Boyer. Therefore, Boyer suggests, the higher energy expenditure found by the Suunto system may more closely reflect the subjects' actual energy expenditures.

Overall, the average heart rate for all subjects hovered around 154 beats per minute, which corresponds to approximately 86 percent of HRmax (Table 2). This indicates the Krankcycle workout was considered high intensity, according to the researchers. Following an analysis of the percentage of time spent in various heart-rate zones, the data showed that approximately 90 percent of the 30-minute Kranking class was spent at greater than 70 percent of HRmax (Figure 1). Researchers also noted that there were times during the class when individual subject's heart rates were so high that they exceeded their HRmax determined from the maximal UBE test.

The average $\dot{V}O_2$ during the workout was estimated to be 25.0 ml/kg/per minute, which corresponded to 72 percent of $\dot{V}O_2$max. Due to the large number of subjects participating in the class simultaneously, researchers were unable to measure oxygen uptake ($\dot{V}O_2$). Instead, like caloric expenditure data, $\dot{V}O_2$ was determined using a mathematical equation based on the $\dot{V}O_2$ data collected during the maximal exercise testing on the UBE.

Finally, on average the total-body RPE was above a rating of 12 (on the Borg scale of 6 to 20) for 25 minutes of the 30-minute Kranking class, indicating that subjects perceived the workout to be between "somewhat hard" and "hard" for the majority of the trial. Every time RPE was collected (five-minute intervals) arm-specific RPE was significantly higher than overall RPE.

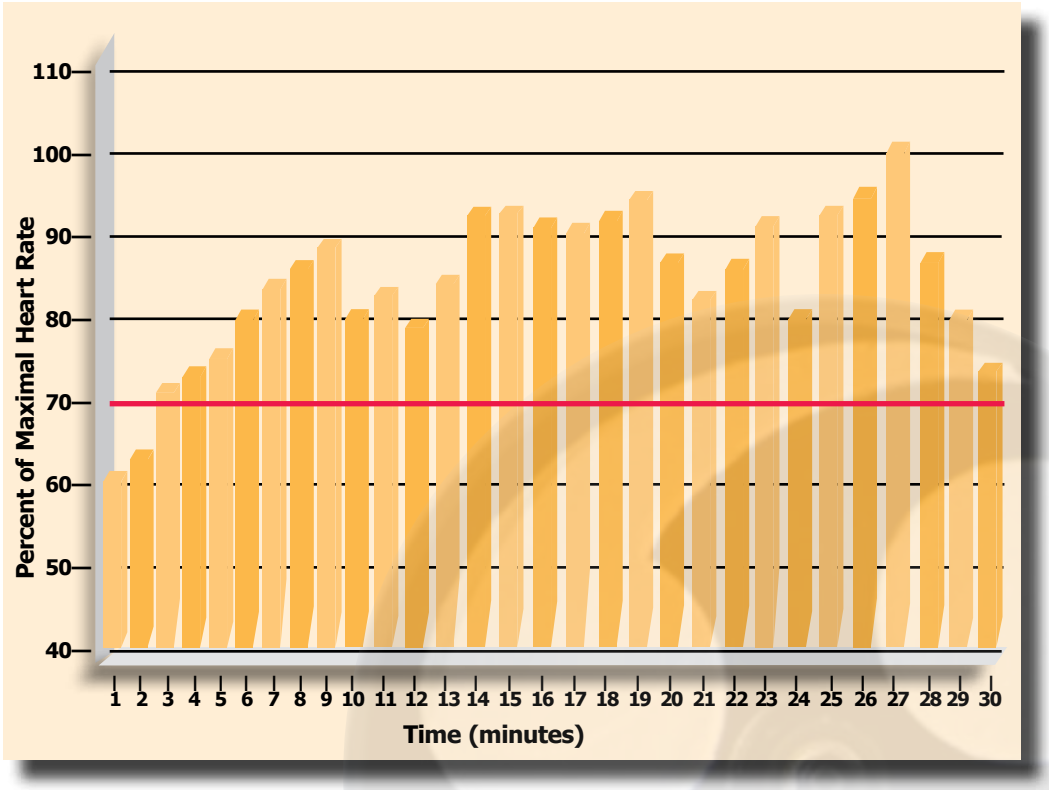


The Bottom Line

Based on their findings, researchers contend that Kranking is an intense and effective workout that may build upper-body muscular fitness, boost aerobic capacity and burn calories.

In order to meet the American College of Sports Medicine's recommendations for gaining cardiorespiratory benefits from a workout, you must exercise at between 64 percent to 94 percent of HRmax or 40 percent to 85 percent of $\dot{V}O_2$max. Kranking hits this mark in both cases. And with regards to RPE, the subjects certainly described it as a hard workout. "At times the subjects were cursing me," says Boyer, "but afterwards most said it was actually pretty fun."

Figure 1. Average Exercise Intensity During the 30-Minute Krankcycle Workout



That said, due to the elevated HR associated with this activity, Porcari warns that Kranking could pose a risk to sedentary or older exercisers and those with underlying cardiovascular disease. Naturally, you should consult with your doctor before trying a workout like this.

Because the average person lacks upper-body endurance and strength, most who try Kranking will experience noticeable strength and endurance gains. "Whereas Spinning mimics something people do in everyday life," says Porcari, "the average person doesn't do a lot of upper-body cycling in life."

This is also what makes Kranking such a unique activity. "I think Kranking would be good cross training for runners or cyclists," says Boyer. "It's a good mix of an upper-body workout that still provides cardiovascular benefits on days when you're not running or biking."

Beyond that, researchers point out that Kranking could also be effective and enjoyable for exercisers with disabilities or lower-body injuries. This, in turn, could help make the fitness club environment more welcoming to those with special needs.

Whether or not it will ever approach the popularity and staying power that Spinning has enjoyed remains to be seen, but one thing is clear: Kranking is an effective workout and probably worth a second look.

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