

Conversation with Steven Blair, Research Coordinator at Cooper Institute of Aerobics

I subscribe to many on-line medical journals to keep abreast of the current goings on in the fitness industry. I recently came across this abstract:

Relationship Between Low Cardiorespiratory Fitness and Mortality in Normal-Weight, Overweight, and Obese Men

Ming Wei, MD, MPH; James B. Kampert, PhD; Carolyn E. Barlow, MS; Milton Z. Nichaman, MD, ScD; Larry W. Gibbons, MD, MPH; Ralph S. Paffenbarger, Jr, MD, DrPH; Steven N. Blair, PED

Context: Recent guidelines for treatment of overweight and obesity include recommendations for risk stratification by disease conditions and cardiovascular disease (CVD) risk factors, but the role of physical inactivity is not prominent in these recommendations.

Objective: To quantify the influence of low cardiorespiratory fitness, an objective marker of physical inactivity, on CVD and all-cause mortality in normal-weight, overweight, and obese men and compare low fitness with other mortality predictors.

Design: Prospective observational data from the Aerobics Center Longitudinal Study.

Setting: Preventive medicine clinic in Dallas, Tex.

Participants: A total of 25,714 adult men (average age, 43.8 years [SD, 10.1 years]) who received a medical examination during 1970 to 1993, with mortality follow-up to December 31, 1994.

Main Outcome Measures: Cardiovascular disease and all-cause mortality based on mortality predictors (baseline CVD, type 2 diabetes mellitus, high serum cholesterol level, hypertension, current cigarette smoking, and low cardiorespiratory fitness) stratified by body mass index.

Results: During the study period, there were 1025 deaths (439 due to CVD) during 258,781 man-years of follow-up. Overweight and obese men with baseline CVD or CVD risk factors were at higher risk for all-cause and CVD mortality compared with normal-weight men without these predictors. Using normal-weight men without CVD as the referent, the strongest predictor of CVD death in obese men was baseline CVD (age- and examination year-adjusted relative risk [RR], 14.0; 95% confidence interval [CI], 9.4-20.8); RRs for obese men with diabetes mellitus, high cholesterol, hypertension, smoking, and low fitness were similar and ranged from 4.4 (95% CI, 2.7-7.1) for smoking to 5.0 (95% CI, 3.6-7.0) for low fitness. Relative risks for all-cause mortality in obese men ranged from 2.3 (95% CI, 1.7-2.9) for men with hypertension to 4.7 (95% CI, 3.6-6.1) for those with CVD at baseline. Relative risk for all-cause mortality in obese men with low fitness was 3.1 (95% CI, 2.5-3.8) and in obese men with diabetes mellitus 3.1 (95% CI, 2.3-4.2) and as slightly higher than the RRs for obese men who smoked or had high cholesterol levels. Low fitness was an independent predictor of mortality in all body mass index groups after adjustment for other mortality

predictors. Approximately 50% (n = 1674) of obese men had low fitness, which led to a population-attributable risk of 39% for CVD mortality and 44% for all-cause mortality. Baseline CVD had population attributable risks of 51% and 27% for CVD and all-cause mortality, respectively.

Conclusions: In this analysis, low cardiorespiratory fitness was a strong and independent predictor of CVD and all-cause mortality and of comparable importance with that of diabetes mellitus and other CVD risk factors.

JAMA. 1999;282:1547-1553

I have a problem with this conclusion.

I decided to contact the Cooper Institute and ask a few questions. So that you understand I was not trying to be rude when I sent this letter, I did not know I was sending it to Steven Blair as his email address did not specify his full name. Therefore I wrote "To whom it may concern."

On the JAMA website page, the sidebar had a "comments" heading. Clearly they welcomed commentary and/or questions.

The following is a word-for-word dialogue with Stephen Blair. I changed nothing.

11/04/99

To Whom it may concern,

I am curious as to how muscular strength was factored out of the analysis in this study. Clearly a low-level of lower body strength will cause a poor result on a treadmill fitness test. Strong legs will perform quite well regardless of VO₂ capacity.

How do you know it was not a low level of muscular strength that was the cause of a higher incidence of all-cause mortality in this study?

Sincerely,
Fred Hahn

Here is Mr. Blair's response:

Dear Mr. Hahn,

I am afraid that I do not agree with you that maximal exercise test performance on a treadmill (using a protocol similar to the one used in our study) is determined by lower extremity muscular strength. I am not saying that there is no influence of muscular strength on cardiorespiratory fitness, but I think the effect is minimal. I would be interested in learning about any peer-reviewed articles on lower extremity muscular strength and treadmill test performance.

Steve Blair

Here is my response to Mr. Blair:

Dear Mr. Blair,

Thank you for your prompt response. I appreciate it very much.

My point WAS that muscular strength or the (lack thereof) can influence the outcome of any study attempting to measure CV fitness. And, as I'm sure you're aware, for a study to suggest anything, all possible variables that could influence the outcome must be factored out. By your own admission (and you are indeed correct) you agree that muscular strength could have had an influence. This was my point.

Keep in mind also that it is literally impossible to prove cause and effect from epidemiological studies. The most that an epidemiological study can do is alert us to possible factors that contribute to a disease. We must then devise and conduct direct, controlled experiments to determine if the previously observed association does in fact cause or contribute to the disease. The study simply illustrates an "association." This is not evidence of "cause and effect."

Having said that, clearly in order to test the heart and vascular system you have to go through the skeletal muscles. The condition of the skeletal muscles, therefore, exerts an influence.

For example, if you were to test a sedentary individual on a treadmill test much like the one in your study, record the outcome, and then for the next 3 months do nothing but strength train the subject *properly* increasing his muscular strength significantly over the 3 month period (without adding any traditional aerobic training during the same time), and tested him again at the end of the 3 months on the same treadmill test, his results would improve markedly.

Conversely, if a marathon runner sustained a minor knee injury requiring meniscal surgery, the surgery would severely atrophy his quadriceps muscles. The surgery itself takes all of an hour. Recovery is quite rapid these days due to the advanced techniques used and he will more than likely be able to run again a few days later. However, his injured leg will be very weak post-op. His run time will now suffer. And suffer not because his cardiorespiratory / cardiopulmonary / cardiovascular health will have deteriorated in these few days of not running, but suffer because he is weaker.

Not only could muscular strength "muddy the waters" so to speak, genetically inherited, already present heart or vascular disease could have caused the increase in mortality as well. Were the subjects in the study all given angiograms to see if they already had arteriosclerosis? Or were they simply tested on a treadmill (which, of course, cannot detect lurking vascular disease) and assumed disease free? You know as well or better than I do that just because one can perform feats of incredible vascular fitness, this does not mean one is free of vascular disease. Runners die from heart attacks all the time -- almost with the same frequency as non-athletes. To quote cardiologist Henry Solomon MD from his book 'The Exercise Myth':

"Most of the improvement in functional capacity due to exercise is not even directly related to the heart. It is due to an effect on the peripheral muscle cells whereby they more efficiently extract oxygen from the blood."

"Not only is superb physical performance possible in the presence of severe coronary heart disease, but also the person may himself not feel the symptoms. I know patients of exceptional fitness who have severe coronary artery disease. Even people with imminently fatal heart disease can play sports, exercise and run. They may have no symptoms and may be capable of outstanding physical performance with hearts that will kill them."

Bruce Charash, MD current head of cardiology at Lenox Hill Hospital in NYC agrees. From his book Heart Myths:

"When patients participate in exercise programs, they often assume that their heart becomes stronger. This is not the case. Physical training results in a sense of well being because of other effects. It improves the efficiency of the muscles. It improves the hormonal tone of the body. It improves the control of sugar in people with diabetes. However, exercise will not make the heart beat more strongly."

The late George Sheehan MD known as the "Guru of Running" had this to say:

"You might suspect from the emphasis on cardiopulmonary fitness that the major effect of training is on the heart and lungs. Guess again. Exercise does nothing for the lungs that has been amply proved...Nor does it especially benefit your heart. Running, no matter what you have been told, primarily trains and conditions the muscles."

Devoid of peer-reviewed studies, it is fairly common knowledge these days that increasing muscular strength will increase aerobic capacity -- perhaps not as much as performing formal aerobics, but increases it nonetheless. (This is one of the reasons that runners and other endurance athletes these days are taking up strength training at an ever increasing rate.) Dr. Ted Lambrinedes, head of research at MedX Corporation in Ocala Florida, www.medxonline.com can steer you towards a large body of peer-reviewed studies which support this. Dr. Ellington Darden www.classicx.com can also aid you in your search for such information. One study that I know of is by Messier and Dill, Research Quarterly for Exercise and Sport, 1985 Vol. 56, No. 4 pp.345-351. Their conclusion:

"The results of this study suggest that for a training period of short duration, Nautilus circuit weight training appears to be an equally effective alternative to standard free weight (strength) and aerobic (endurance) training programs for untrained individuals."

The authors state on page 348 second paragraph, that there was a significant increase in VO2 max in the Nautilus group and that "There was no significant difference between the Nautilus and Run groups." in VO2 max.



Another is by Goldberg, Elliot, Kuehl, Human Performance Laboratory, Division of General Medicine, Oregon Health Sciences Services, Portland Oregon published in the Journal of Applied Science Research 1988 Vol. 2, #3, pp. 42-45. Their conclusion:

"Traditional, non-circuit weight training for both the athlete and the general population can be viewed as a method of reducing myocardial oxygen demand during usual daily activities. This cardioprotective benefit allows the individual to perform isometric exertion combined with dynamic work with lower cardiac oxygen requirements, and, thus, improvement in cardiovascular efficiency. Although standard methods of weight training and strength acquisition may not improve running, cardiovascular benefits do occur."

I have others.

And also keep in mind that obese people find it much harder to run on a treadmill than to cycle on an exercise bike. The reason I think is pretty obvious -- they don't have to cart around all the extra weight on the bicycle. Perhaps the outcomes would be different using different devices. Perhaps not, but I think it likely.

It would be interesting for your organization to perform a study using proper strength training techniques as to its influence on aerobic capacity. Of course, the strength training would have to be performed under controlled conditions, with good equipment, using a high intensity protocol and expert supervision. Otherwise, left to their own devices, most people will not strength train hard enough.

Assuming the outcome to be positive, perhaps we would learn that what we should be teaching the general public is not that they need to be physically active or cardiovascularly fit, but muscularly fit -- best achieved through proper strength training.

I'd be more than happy to help with such an endeavor. I know many other physiologists who own and run successful fitness facilities who'd participate as well. After all, like any legitimate science, it's all about truth, furthering knowledge and learning what's best and what's safest for people in order to live longer, healthier and happier, isn't it?

I'd enjoy keeping our dialogue open and ongoing.

Sincerely,
Fredrick Hahn, President
Serious Strength Inc.
National Council for Exercise Standards

Here is Mr. Blair's response:

Dear Fred,

I repeat, can you refer me to articles in peer-reviewed scientific journals in which lower extremity muscular strength is strongly correlated with aerobic power? I am not impressed by the quotes from those such as Henry Solomon, who has not conducted and published research studies.

Since you state that epidemiological studies cannot prove cause and effect, I take it that you do not believe that smoking causes lung cancer or that thalidomide is a cause of birth defects. Neither of these examples were based on controlled experimental trials.

And my response:

Dear Steve,

I believe the two examples I included in my letter to you were/are peer reviewed and published in scientific journals. Am I incorrect on this? Please explain.

And simply because you do not know of or possess peer reviewed studies which indicate that stronger muscles increase aerobic power does not mean that these studies do not exist. With all due respect, you need to become more familiar with the research on the subject. No offense intended but it is not for me to educate you. I am merely pointing out the facts. The information is out there whether you are aware of it or not.

But for the record here's another. This is a peer-reviewed study printed in a scientific journal:

The Usefulness of Weightlifting Training in Improving Strength and Maximal Power Output in Coronary Artery Disease, McCartney Ph.D., McKelvie MD, Haslam MSc, Jones MD, American Journal of Cardiology May 1991 pp. 939-945.

The authors conclusion:

"In patients with CAD, combined weight lifting and aerobic training was a more effective method of increasing aerobic performance and strength than traditional aerobic training alone."

Again I have many more studies in my library but I think I've done more than enough to enlighten you to the fact that muscular strength can greatly influence CV fitness.

As for your examples, smoking and Thalidomide, realize that not all people who smoke contract lung cancer. Many people who don't smoke DO get lung cancer. Therefore, it is not smoking per se that causes lung cancer. That's why the side of cigarette packs say MAY cause lung cancer and MAY cause birth defects. Your study likewise should state that a low level of CV fitness MAY cause premature death since you did not factor out many other influential variables. Again, this is my point. I am not saying you are wrong. What I'm saying is that it is misleading to state absolutes when the evidence does not yet exist. The study's conclusion that a low level of CV fitness IS a risk factor for premature death is incorrect. The conclusion should be stated as:



"It appears that people who perform poorly on a particular treadmill test MAY be at risk for premature death."

The two are quite different.

As for the Thalidomide example, this is different and you know it. Please let's refrain from "playing the party game" as it were. I'd like to keep this dialogue rational, logical and professional. I'm sure you do too.

Sincerely,
Fred Hahn

So far I have not received a response from Mr. Blair.

I leave you all to draw your own conclusions.

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