Huffines Sports Medicine Podcast

#142 – Dr. Ed Howley

[music]

S1 00:18 Our next speaker is a legend in exercise science, and we often talk in science about scientific lineage and scientific trees, like family trees. And If you will look at the scientific tree of exercise scientist, this guy actually would have more limbs and more branches; his own tree and of himself. And so, we're very pleased and honored to have Dr. Ed Howley here from the University of Tennessee. Please join me in welcoming.

[applause]

S2 00:48 Thank you sir. Howdy. It's a great pleasure to be here, and Tim, thank you for the invitation. I'm very impressed by Tim's ability to jumble responsibilities with the Huffines Institute, as well as maintain a scholarly research program, and mentor his students - a great job. The title of my talk is How Much Exercise is Enough. I've been involved in fitness-related issues most of my professional life. At the University of Tennessee, I was involved in the creation of the faculty staff fitness program. And yes, that is me, just a short 40 years ago; haven't changed a bit.

S2 01:32 One of the most common questions that was asked when I worked with the participants was what do I need to do to be fit. And answers the question of how much exercise is enough is not new at all. But before I get into that, what I'd like to do is just introduce you to a few terms that I'll use throughout the talk to make sure that we're all on the same page.

S2 01:53 The first term is cardiorespiratory fitness. It's the ability of the heart and lungs to deliver oxygen to the working muscles during strenuous exercise. For example, running on the treadmill. The individual is hooked up to measure oxygen consumption, and the highest value that is achieved is called the maximum oxygen uptake or VO2 max. That's your cardiorespiratory fitness. It's expressed in a term called MET. You folks out there sitting at rest are at energy expenditure of one MET. The average value at the end of a maximal test for the typical adult is 10 MET, 10 times the energy expenditure of sitting at rest. In contrast, an elite endurance athlete would achieve a value of 20 METs, to put it in perspective.

S2 02:42 The MET term is also used to describe the absolute intensity of activity. For example, if an individual is walking at three miles an hour - that's a mile every 20 minutes - they're expending energy at the rate of 3.3 times resting,worth 3.3 MET. If they're jogging at six miles an hour, it's a 10 MET activity.

S2 03:03 Last of the terms is relative exercise intensity. You can judge the effort an individual experiences during exercise by characterizing the activity as a percentage of the maximum. So if an individual is between 40 and 59% of their maximal oxygen uptake or cardiorespiratory fitness, they're doing moderate intensity exercise. If they're at 60 to 84%, they're doing vigorous intensity

exercise.

S2 03:32 So the question: How much exercise is enough? If you were to ask the average individual on the street, they say that the amount needed is different for achieving health, fitness, or achieving extreme performance in a marathon. And of course, they'd be right. When you look at the typical exercise recommendation for health, it's moderate intensity activity - that's the 40 to 59% of max - and the FIT on the left side of the slide stands for frequency, intensity, and time. So doing exercise five to seven days a week for about 30 minutes a session at a moderate intensity, that's walking about 8 to 12 miles a week. That's a typical recommendation for achieving health outcomes.

S2 04:17 The traditional recommendation for achieving fitness is working out three to four days a week at a vigorous intensity. Thus, the 60% to 84% of max that I introduced you to earlier, and doing it for about 25 minutes a session. That's like jogging 8 to 12 miles a week. Now, when you deal with the elite performers in a marathon race, they're working out seven days a week, several of their workouts are at extreme intensities, two hours a day, and they're running about 100 miles a week. Clearly, that's a very, very different outcome.

S2 04:50 Now, why all the interest on this question? My sense is it has to do with the medical issues. The medical issues related to the aging of the population of which I am a proud member, the prevalence of overweight and obesity in our society, and just frankly, the amount of cardiovascular risk that we all carry around. Example is type 2 diabetes, which is epidemic right now in this country, and it's linked to the obesity problem, and the amount of hypertension, or high blood pressure, in which we have tens of millions of individuals carrying that particular risk factor.

S2 05:24 And so, when we talk about the question of how much exercise is enough, we're really not talking about elite performances in this talk. The focus is on moderate intensity activity, vigorous intensity activity, in which the exercise is used as medicine to deal with the prevention, as well as the treatment of chronic diseases. So, there's no question about the beneficial aspects of participation in physical activity. Regular participation of physical activity lowers the risk of early death, various cardiovascular diseases, type 2 diabetes, metabolic syndrome, colon and breast cancer, and abdominal obesity, and then it improves, of course, fitness, cognitive functioning in older adults - which I really appreciate - and weight loss.

S2 06:17 When exercise recommendations were first presented - this goes back into the early 70s - what is interesting is that most of the organizations recommended vigorous intensity physical activity to improve cardiorespiratory fitness as well as achieve health outcomes. And the example in 1972, the American Heart Association, they recommend beginning the intensity level at 60% of max. That's vigorous exercise done three or more days a week for about 15 to 20 minutes a session.

S2 06:46 A year later, the YMCA recommended exercise at an intensity of 80% of your max. That's at the higher end of vigorous intensity, three days a week for 40 to 45 minutes a session. And in 1978, the American College of Sports Medicine - the ACSM - came out with this first position stand. And in that position stand that emphasize that quantity and quality of exercise for health and fitness, they recommended a range of exercise intensity - that should be pointed at the eye -

of 50 to 85% of VO2 max done three to five days a week for 15 to 16 minutes.

S2 07:24 These organizations really had some insights into the importance of achieving a high level of cardiorespiratory fitness as far as it relates to a decrease in the risk of chronic disease. Because years later, the evidence became clear that as individuals became more fit, the risk of disease decrease. And an example - this one is taken from 2010, but I can go back to 1989 and show you a figure - is that it shows the cardiorespiratory fitness on the lower axis. And on the left side of the screen, you have the risk of dying from cardio vascular disease. And as you can see, that the higher the fitness level categorized from one out of five, the higher the cardiorespiratory fitness, the lower is the risk of dying from cardiovascular disease. But what's important is that when you look at the first part of the graph, just moving one category - from category one to category two - that one movement creates a dramatic drop in risk of this particular problem. And I'll come back to that a little bit later.

S2 08:33 In the very same year that the American College of Sports Medicine came out with their position stand in 1978, Dr. Pathenbarger published his classic paper Looking at the Volume or Quantity of Ordinary Physical Activity - not structured exercise - ordinary physical activity as it is related to the reduction in the risk of disease. And as you can see in a figure on the left axis, you have the relative risk of a heart attack, and on the lower axis the amount of physical activity an individual does per week. The more activity, the lower the risk. And so, at a volume of activity of 2,000 calories per week, the individuals experience a 25% reduction in the risk of a heart attack compared to an individual who is sedentary. But what I also want to point out on this graph - as I did in the previous one - is that moving a person from the sedentary state to the somewhat active state results in a very dramatic drop in the risk of this chronic problem.

S2 09:33 Throughout the 1980s, there was an explosion in research showing that participation in physical activity - not necessarily structured exercise program - just participation in physical activity resulted in an improvement, a drop in the risk of chronic diseases. And in 1992, the American Heart Association made physical inactivity a primary risk factor - the same as smoking, high cholesterol, and high blood pressure. In many ways, just like you have smoking intervention programs programmed to monitor blood pressure and cholesterol in order to achieve it, this stimulated groups to deal with the problem of physical inactivity as a public health issue.

S2 10:17 So just a few years later, the Centers for Disease Control and Prevention in the American College and Sports Medicine published the first major public health physical activity recommendation. And in that recommendation, they emphasized a shift from vigorous to moderate physical activity. The focus was on the number of calories you expend - that's calories per week - or the volume of activity, and they made the point that the least active would make the greatest gain in terms of a reduction of disease. What's interesting about this? It actually created a major controversy. Because up to this particular point, vigorous activity was the primary recommendation, as I've mentioned to you. Now, moderate intensity physical activity is being recommended beyond vigorous as the most important thing to do.

S2 11:10 Part of the controversy relates to how the public health recommendations define the intensity. They used absolute intensity, that is what I mentioned

earlier, that they measured the activity level in terms of how much energy you're expending. So, moderate intensity was defined as three to 5.9 METs. That again is 3 to 5.9 times the amount of energy you're using seated at rest. Vigorous intensity was defined as six or more METs. So, they use the absolute intensity scale.

S2 11:43 Now, in contrast to that, the classic recommendation for achieving fitness used the relative intensity scale. So moderate intensity, again, was 40 to 59% of maximum. Vigorous intensity was 60 to 84% of maximum. So, what is the connection between these two different ways of expressing intensity? One way to show it is, let's look at the relative intensity for just walking, a common activity. But walking in this case at four miles and hour, which is a mile every 15 minutes. That's moving along. You'd have to move along like that on campus to get from one building to the next, given the size of your campus. Walking at four miles an hour is a five MET activity, it requires five MET. The lower axis shows the cardiovascular fitness expressed in METs, and on the let axis, you see the percent of maximal oxygen uptake, what is the relative intensity.

S2 12:37 So for an individual who has a capacity of 14 METs, cardiorespiratory fitness of 14 METs, they were at only 36% of their max. It's not even modern intensity activity, walking at four miles an hour. On the other hand, if their max is only 10, which is an average value, they are at 50% of their max - right in the middle of modern intensity range. But if their maximum capacity is only eight MET, they are already into vigorous intensity. And if their maximum capacity is only six METs, they're at the upper end of vigorous intensity. So the same absolute activity, same absolute intensity, will be a very different relative intensity depending on the cardiorespiratory fitness of the individuals.

S2 13:20 The bottom line is that physical activity done at an absolute intensity that you call moderate - 3 to 0.593 to 5.9 METs, may exceed the relative intensity needed for cardiovascular training effects, especially in the sedentary individuals, the elderly,and those with chronic disease. So you'd expect an increase in VO2 max, cardiorespiratory fitness, as well as health outcomes.

S2 13:43 Now, all of the public health recommendations focus on the volume of physical activity that you do for the health benefits. Volume is nothing more than a product of intensity and time. So, if an individual is doing a moderate intensity physical activity - that's three METS - and does it for 150 minutes a week, they're generating 450 units of physical activity. If an individual chooses to do vigorous intensity, and the beginning level at 6 METS, and does it for 75 minutes a week, they also generate 450 units of physical activity. It just takes half as long. This particular approach where you have the same volume of activity done, just accommodating intensity with time, was used when the US physical activity guidelines were published in 2008. Substantial health benefits can be achieved by those doing moderate intensity physical activity, 150 minutes a week, or vigorous intensity for 75 minutes a week.

S2 14:49 So the way the guidelines dealt with it was looking at the effective health benefit that can be achieved whether you do moderate physical activity or vigorous activity, what you do is adjust the time in order to achieve the right outcome. The more, the better if individuals go beyond this limit, the risk of disease actually goes to a lower level. Pulling these all together, the intensity continued in terms to how much exercise is enough is a real continuum, a real continuum in terms of health benefits. You don't have to get in to a debate

about moderate or vigorous intensity. You do what works for you. If you want to walk, do it. If you want to play basketball, go for a jog, do vigorous intensity activities, do it. You do what works for you, and you do the activity long enough so that you achieve a volume high enough to realize those health benefits.

S2 15:48 What if you can't do moderate intensity physical activity? The guidelines are also indicated that some is better than none. If you can't do moderate intensity physical activity, do light intensity physical activity. If you can't walk for 30 minutes, walk for 10 or 15. In fact, if you walk for 10 minutes three times a day, you get your 30 minutes. It doesn't matter how you package it in 10-minute vouch, you can do time two 15s. And if you can't get a total of 30, do 10. Do something, because the evidence also indicated that doing as little as 60 minutes of physical activity a week in a modern intensity achieve some health outcomes.

S2 16:28 One last thing, all I have talked about is the aerobic and the continuum, that aced the guidelines from the US physical activity. The US physical activity guidelines also recommends doing flexibility exercises two more days a week, and strengthening conditioning exercises two more days a week, but that's a topic for another time. Thank you for your attention.

[applause]

S1 16:57 Thank you Doctor Haley.

S2 16:59 Yes.

S1 16:59 Great talk.

S2 17:00 Thank you.

S1 17:01 We have-- it's been burning up the phones here. We have some questions for you. So Katniss E., in the category chart of increasing activity and decreasing cardiovascular disease, why is moving from category one to two better for women than for men?

S2 17:18 That's a tough question. The general values for cardiorespiratory fitness is lower for women by about 15 to 20%, depending on the age group, if you take a 15% difference. So, moving from one category to the next is going to be a larger percent change in their cardiorespiatory fitness, but the basic pattern is still intact. The work done by Steve Blair with the Aerobics Center in some years ago, decades ago now, showed that if men achieve a value for cardiorespiratory fitness around 10 METs, it represents a good level of risk, meaning risk is at a low level. The value for women was effectively about 9 MET. So, the goal to achieve in many programs are 9 and 10 METs on the basis of without a surgery.

S1 18:08 We have a question from Robert R. What are risks of programs, such as insanity, P90X ,and to certain extent, cross-fit, that are high intensity for people who are sedentary and have no foundation of fitness. Do you see these programs as friends or foes for our field?

S2 18:24 I just heard a 60-minute presentation on that, explaining that question, so I'm not sure I'll be able to answer it quickly. The approach that I have taken with adult fitness programs, and still do, is you start off at the low end and you work up. You do too little rather than too much. And in many cases, you'll find - especially with adults who have been inactive and have had no previous physical

activity history - is that their interest is in doing regular physical activity, and not getting in to something vigorous. Vigorous, in fact, was a turn off. What stimulated the movement of from vigorous to moderate intensity physical activity, is that even though the vigorous intensity programs worked, most people were not doing them. And so the movement from a public health perspective to moderate intensity physical activity was related to the fact that people weren't doing vigorous, so let's get them into moderate. Those particular programs clearly have benefits. Individuals who do interval training, get faster gains in cardiorespiratory fitness than doing the traditional programs. But there are some unknown risks if a person has been totally sedentary, inactive, and an [unknown?] risk factor profile. That would be much riskier than beginning with moderate intensity physical activity and working up from there.

S1 19:41 We certainly want to continue to exercise, don't we?

S2 19:43 That's right.

S1 19:43 Yeah. Our last question from Matt H. at VCU. Do you feel adding exercise physiologists as third party reimbursement eligible providers may help people change their exercise volume more effectively?

S2 19:55 The answer I think is yes. And If you're-- anybody here familiar with the PAR-Q that is used for screening people? They have just revised it, it's called The PAR-Q Plus. And as part of the analysis that the Canadian government has done in evaluating that, they changed the forms, but one of the recommendations was to put in place an individual who - and I think their classification is a clinical exercise specialist or something like that - that acts as an important part of the professions involved in translating individuals from a risk situation into an exercise situation, and getting out of that. They see the importance of having the exercise professional plugged in and to work especially with those who are risky patients or those who have been physically inactive for a very long period of time. That's of course been a part of the American College of Sports Medicine recommendation for some years, but they actually have put that in as a part of their revision of their PAR-Q in the paramedics program.

S1 20:58 Excellent. Always changing, isn't it?

S2 20:59 Yew.

S1 21:00 Please join me in thanking Dr. Haley for being with us.

S2 21:02 Thanks folks.

[applause]

S1 21:04 Thanks Ed.

S2 21:04 Thank you.

[music]