CORRESPONDENCE

Physical Performance in Middle Age and Old Age: Good News for Our Sedentary and Aging Society

by Prof. Dr. med. Dr. Sportwiss. Dieter Leyk, Dr. Sportwiss. Thomas Rüther, Dr. rer. medic. Max Wunderlich, Dipl.-Sportl. Alexander Sievert, Prof. Dr. med. Dr. Sportwiss. Dieter Ebfeld, Dr. phil. Alexander Witzki, Dr. med. Oliver Erley in volume 46/2010

Sports and Health: Nil Nocere (Do not Cause Harm!)

The authors interpreted the results of a sample that spontaneously self-selected with increasing age (older than 45 years), from $n=46\,800$ to $n=105$. They also relate the results to health initiatives, risk factors, prevention campaigns, health relevant exercise and behavioral measures. However, I did not find any mention of the contraindications to, and the cardiovascular and orthopedic adverse effects of, long distance running. I hope that interested readers have noticed the back cover page of issue 46, which advertised books such as “Sportverletzt, was jetzt? [What to do after a sports injury?]” and “Laufnebenwirkungen [adverse effects of running]”. As our ancestors said: Nil nocere [physicians should cause no harm to their patients with their actions].

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Prof. em. Dr. med. Hans-Volkhard Ulmer
Institut für Sportwissenschaft
der Johannes Gutenberg-Universität
Saarstr. 21
55099 Mainz, Germany
ulmer@uni-mainz.de

Biological Aging and Physical Performance

An active lifestyle can undoubtedly delay the aging process and minimize the loss of physical performance. However, doubts are indicated if performance analyses of 20–79 year old marathon runners are used as the basis for the claim that endurance performance is not subject to relevant deterioration before the age of 55 (1). It is nevertheless true that the mean oxygen intake drops less in middle age than at an older age (2). The authors contradict their own earlier findings, according to which mean marathon running times in the top 10 athletes of each decade of life increased significantly after the 35th year of life (3)—this discrepancy was not commented on in the current article. The cohorts under comparison included leisure time athletes with mara-

thon running times between 4 and 5 hours and different numbers of years in training, depending on their age. By contrast, among the world's top 10 best marathon runners in 2009, none was aged 40 or older (mean age 28.1 years, range 22–37 years). Such a homogenous group reflects the age related physiological changes better because the aging of the organ systems becomes particularly obvious when the limits of people's physical performance are reached. No reason therefore exists to rewrite the textbooks and place the onset of loss of physical performance, especially endurance performance, at an older age.

I agree with the authors that adaptations of the training and impressive achievements are possible at an older age. It was shown, for example, that comprehensive endurance training can lead to cardiac hypertrophy—that is, physiologic hypertrophy or “athlete's heart”—even in older persons who had previously been physically inactive (4).

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Prof. em. Dr. med. Wilfried Kindermann
Institut für Sport- und Präventivmedizin
Universität des Saarlandes
Campus Saarbrücken
Postfach 151150
66041 Saarbrücken, Germany
w.kindermann@mx.uni-saarland.de

Study Group Was not Representative

I read the well founded analysis of marathon running times with great interest. However, I was not able to share the authors' main conclusion—“good news for our sedentary and aging society.” No one would contradict the scientifically proven fact that physical exercise can result in a substantially improved physical performance even in the 6th and 7th decades of life. However, what the authors describe in their article is primarily a sociological phenomenon. They analyzed a small proportion of the population—well educated, health conscious, with an affinity for sport, and, with increasing age, primarily male. After starting their career and

families, the proportion of persons who pursue sports activities in any decade of life continually falls in the respective age cohort in the total population. The proportion of marathon runners who are older than 60 ($n=12\,558+x$) among the total number of physically active persons older than 60 in the population ($n=21\,186\,785$ in 2009[1]) is about 0.6 per 1000—this means that one marathon runner corresponds to 1600 inactive peers. This is particularly notable in this study with regard to women (age >70, with $n=62$). By contrast, Germany's population is continually getting more overweight (Federal Statistical Office, microcensus 2005 [2]) and the patients in accident and emergency-orthopedic wards older and more multimorbid (Bavarian Working Group for Quality Assurance [3]). A current study of the quality of care in old people's residential homes is able to evaluate with any degree of scientific validity only one-third of its residents owing to a low score in the mini mental state test.

The description of the ability to run marathons in a tiny subgroup of the total population shows astonishing performance data, but does not allow any reverse conclusion about the total population. The data with regard to this are not as optimistic. The athletic potential of women, strata of the population with less access to education, and blue collar workers all have enormous scope for improvement.

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Prof. Dr. med. Michael A. Scherer
Amperkliniken – Akademisches Lehrkrankenhaus der
Ludwig-Maximilians-Universität München
Abteilung für Unfallchirurgie und Orthopädie
Krankenhausstr. 15
85221 Dachau, Germany
michael.scherer@amperkliniken.de

In Reply

While Professor Scherer categorized the study cohort of over 500 000 long distance runners as a “tiny subgroup of the total population”, the group of the world's top 10 marathon runners is enough to evaluate the age associated development of physical performance for Professor Kindermann.

As explicitly explained in our study (1)—cited by Kindermann—a generalization/transfer of the performance criteria of the top 10 athletes is problematic and does not make sense, for various reasons. Studies have shown, for example, that the most extreme high performance training of world class athletes can rarely be

tolerated for any more than 10 years, independently of an athlete's age (1). Restricting the data pool to the top 10 also entails enormous selection biases, genetic particularities, potential problems with doping and more. Comparing performance between younger professional athletes and elderly amateur athletes may be quick and easy to do, but this will certainly not reflect the age-related physiological changes in endurance fitness that are relevant for the broad population.

A general problem in tracing age related performance changes is the fact that it is difficult to differentiate between physiological aging processes and effects that are caused by changed everyday habits (for example, a less active lifestyle). This matter of fact has widely been ignored in medical studies, which are often based only on small sample sizes, and has ultimately prompted the assumption that loss of performance begins around the age of 30 and is “fateful”. This hypothesis can no longer be maintained on the basis of the available data.

Scherer's comments make it necessary to reiterate the objectives of the PACE study. By analyzing a subpopulation of the general population, which practices successfully and self-motivatedly health relevant exercise and behavioral measures, the objective was to clarify the potential of regular physical exercise for an inactive and aging society. However, our study did not intend to provide a representative snapshot of the status quo in society. For this reason the proportion of marathon runners within the general population is not relevant in this context, and neither is the question whether this is a sociological phenomenon. We share Scherer's view that the statistics he cites paint a dismal picture of said status quo and that promoting sports in the population has “enormous potential for improvement.”

With regard to the correspondence by Professor Ulmer: It is undisputed that knowledge of “contraindications to sports” and “sports related adverse effects” is highly relevant for the clinical practice of sports physicians and general practitioners. This has repeatedly been a topic in the recommendations from the Deutsche Gesellschaft für Sportmedizin und Prävention (DGSP, the German Society for Sports Medicine and Prevention), in several monographs, and in our own publications (2, 3). Furthermore, attentive readers will find relevant information in the discussion section of our article.

It is, however, equally undisputable that regular exercise is of huge importance in prevention and therapy (4). It seems that Ulmer did not gain clarity about our actual research question, methodological approach, and objectives of the statistically—although they are being emphasized in the article with their own subheading (“Marathon running as a study model for physical performance”) and paragraph. The PACE study showed that performance losses in middle age were not so much the result of physiological aging processes but, rather, unfavorable lifestyles and lack of training.

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Prof. Dr. med. Dr. Sportwiss. Dieter Leyk
 Institut für Physiologie und Anatomie
 Am Sportpark Müngersdorf 6
 50933 Köln, Germany
 Leyk@dshs-koeln.de

Conflict of interest statement

The authors of all contributions declare that no conflict of interest exists according to the guidelines of the International Committee of Medical Journal Editors.