Current Challenges in the Research About Physical Activity and Sedentary Lifestyles

José Javier Varo and Miguel Ángel Martínez-González

Departamento de Medicina Preventiva y Salud Pública, Clínica Universitaria-Facultad de Medicina, Universidad de Navarra, Pamplona, Navarra, Spain

Analyzing the benefits of regular physical activity and the risks derived from a sedentary lifestyle have been the research objectives of numerous observational, epidemiologic studies given its important contribution to morbidity and mortality, principally thru increased cardiovascular risk and the relationship with metabolic syndrome. The costs of these pathologies mean the sedentary lifestyle and consequent overweight represent an economic burden for health service comparable to that caused by smoking or alcohol abuse.

Despite the worryingly increased prevalence of the sedentary lifestyle, it seems we have yet to consciously accept the urgent need to develop population-based policies and effective strategies to promote physical activity and prevent it. One notable advance is the recent NAOS strategy,[1] although it is still early to evaluate its impact. In the fight against smoking we have taken substantial steps, invested nationally and internationally with the committed support of very different sectors of society, and acted synergetically on different fronts. However, an intersectorial attack of a similar magnitude has yet to be launched against the sedentary lifestyle.

Perhaps we are too easily satisfied by centering our attention almost exclusively on secondary prevention (pharmacological interventions in patients labeled as high risk), thus forgetting the underlying priority of defining a population-based strategy. This error means primary prevention will come too late,[2] despite the fact that to reduce exposure population-wide, without needing to label individuals as being at high risk, primary prevention would constitute a decisive difference. Recently, it has been proved that engaging in physical activity in infancy and teenage years is associated with greater levels of physical activity in adults.[3] Today's sedentary teenagers will be tomorrow's least active adults. Therefore, we really must promote physical activity among children and young people so that when they become adults they maintain these healthy life habits. Consequently, it is essential we provide these age groups with access to sports installations, educate them in the benefits of physical activity and encourage active leisure, in the face of the growth in sedentary leisure activities in the form of videogames, television, the internet and so on.[4,5] This requires a commitment from health service agents as well as authorities, governments, legislators, educators, and other professionals. Once and for all, we need suitably audacious, robust, intersectorial healthcare policies.[6] Ideally, these interventions would be founded on results obtained in large scale randomized trials dealing with "hard" outcomes (myocardial infarction, ictus, cardiovascular mortality); research such as that being conducted in the field of nutrition like the Spanish PREDIMED trial.[7] Conducting trials of this type may well be the greatest challenge facing research in physical activity.

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Although current scientific knowledge on physical activity and the sedentary lifestyle has clearly grown in recent years, we still lack experimental designs in primary cardiovascular prevention thru physical activity. A primary prevention trial with sufficient statistical power to evaluate cardiovascular events initially requires randomization of ≥5000 cardiomyopathy-free participants and ≥4-6 years follow-up.

At the same time, researchers continue to face different challenges that limit their capacity to present clear, comparable, population-based results on the prevalence of the sedentary lifestyle. This limitation prevents them from reaching consistent conclusions and makes it difficult for them to provide tools that would be useful to other professionals in their daily clinical practice.

A further and by no means lesser limitation that is elegantly but directly confronted by Cabrera de León et al[8] in their study published in this issue of *Revista*

Correspondence: Professor M.A. Martínez-González.
Dpt° Medicina Preventiva y Salud Pública. Hospital de Navarra.
Irunlarrea 1. 31080 Pamplona. Navarra, España.
E-mail: mamartinez@unav.es

Española de Cardiología, is the lack of a clear, universal definition of the sedentary lifestyle. Perhaps, it has been more simple to define the opposite concept, the active person, by analyzing engagement in physical activity during a specific period of time. However, attempts to define clearly what is considered a sedentary lifestyle are few and far between.[9,10] Previous research has tried to define it as the number of hours the individual spends seated during leisure time, or the number of times the individual participates in physical activity in a specific period. Applying different methods or protocols to establish levels of physical activity or sedentary lifestyle means results obtained by different studies are difficult to compare, which would explain why results diverge so much.[11]

Cabrera de León et al compared the use of two dichotomous definitions: one based on energy expenditure, the other on active leisure time, both of which seem to have advantages and disadvantages. Using a definition based on energy expenditure suggests greater precision and has been trialled successfully,[9-11] but a definition based on time criteria may be more practical in daily clinical practice as it is simple and needs no added "tools" to measure it. However, we still need to fine tune the criteria, combining the 3 elements–duration, type, and intensity of activity–to be able to define an individual as active or sedentary. This same limitation has been found in attempts to specify levels of physical activity required in cardiovascular prevention. Despite the current agreed, internationally approved recommendation of accumulating ≥30 minutes of moderate or more intense physical activity almost every, if not every day of the week, many current studies of physical activity have been criticized because not only do they omit a clear recommendation as to how much physical activity should be prescribed in the population at large, but they also avoid any proposal that would facilitate personalizing that recommendation to maximize potential achievable benefits.[12]

The underlying problem consists in better establishing a dose-response criterion relating physical activity (or sedentary lifestyle) and health.[13] It is more than likely that the risks associated with a completely sedentary lifestyle are greater than those associated with a partially sedentary lifestyle. Beyond continuing the debate in search of the best dichotomous definition to derive a cutoff point and subsequently label individuals as sedentary or not, we need to be convinced that some degree of a (more or less) sedentary lifestyle is practically universal in the adult Spanish population. This makes it expedient to treat sedentary lifestyle as a continuous variable. It is not far-fetched to assume that everyone would benefit if they increased their levels of physical activity, gradually learning to better integrate and increase the physical activity in their daily routine. To achieve this, we would need to apply the population-based strategy of preventative medicine (to increase *mean* energy expenditure in the entire population) and not just intervene for high risk individuals. Clearly this is necessary as we find questions are beginning to be raised as to the very existence of the metabolic syndrome as a dichotomous classification.[14] Whatever the case may be, we need access to better *relative* indices of sedentary lifestyle so we can move beyond the dichotomous (yes/no) definition.

One further added obstacle in this search for a definition is the absence of a simple tool to evaluate the degree of sedentary lifestyle, similar to those used to evaluate other problems like, for example, the CAGE questionnaire on alcohol use. The design of quick, reliable, tools that can be easily introduced in clinical practice would enable us to determine which individuals have a more sedentary lifestyle and give them personalized medical advice. Possible candidates to achieve this objective are the short version (7 questions) of the International Physical Activity Questionnaire (IPAQ)[15] or the self-administered questionnaire used in Spain with the SUN cohort.[16]

The availability of a biological marker that would permit a more objective approach to diagnosing a sedentary lifestyle would represent an extraordinary advantage: we could apply this as we currently do other markers like glycosylated hemoglobin, used in the follow-up of patients with diabetes. Analysis of the serum paraoxonase activity level employed by Cabrera de León et al is especially relevant as it has been found to diminish in sedentary individuals. Evidently, to propose its widespread use as a marker requires further research but, to be able to call on markers of this type would endow physical activity research with greater objectivity and scientific quality since epidemiologic studies have almost always been based on self-reporting questionnaires about participation in different types of physical activity. Although we know interviewees tend to exaggerate when reporting their level of physical activity, the validated physical activity questionnaires have been considered appropriate tools to measure levels of physical activity and/or sedentary lifestyle. Instruments such as pedometers or accelerometers are becoming more common in objective studies, though they remain expensive and problematic which, frankly, makes it difficult to use them in large population studies. It seems, therefore, convenient to go more deeply into researching and validating biological markers to increase the objectivity and scientific quality of our evaluations.

The present study by Cabrera de Leon et al[8] represents a substantial contribution to our knowledge of the relation between sedentary lifestyle and metabolic syndrome and constitutes a new step forward in research into physical activity as a determinant factor for health. Unfortunately, we still have a long way to go both in defining the sedentary lifestyle with precision and in the global, integral population-based promotion of physical activity. The good news is that because the sedentary lifestyle is so prevalent, opportunities to develop preventative activities are unlimited.

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