

expensive. Residents currently pay \$2265 to take a computerized examination administered by a commercial company, Prometric. In accredited pediatric residency programs, trainees have 3 years to learn, during which their competencies are assessed. There is no longer a need for an outside body to get involved. The ABP should close up shop.

### Abraham B. Bergman, MD

**Author Affiliation:** Department of Pediatrics, Harborview Medical Center, Seattle, Washington.

**Corresponding Author:** Abraham B. Bergman, MD, Department of Pediatrics, Harborview Medical Center, 325 Ninth Ave, Box 359774, Seattle, WA 98104 (oscarb@uw.edu).

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**In Reply** I thank Dr Bergman for his letter and welcome the opportunity to respond to his suggestion that the American Board of Pediatrics (ABP) should close up shop. Dr Bergman frames his major arguments from the perspectives of history, technology, and professionalism.

**History** | He writes, “When the ABP was formed in 1933, it was important for the public to have a means to identify physicians with special competence in the care of children. Now, numerous bodies (public and private) perform background checks.” In 1933, physicians could rely on a fairly stable knowledge base acquired during training to last a professional lifetime. In contrast, today’s parents are fully aware that medical knowledge changes much more rapidly. Hence, there is a public expectation of life-long learning, self-assessments, and the periodic demonstration of competence throughout a career.

**Technology** | Dr Bergman correctly asserts that “today’s wired world diminishes the value of memorized facts.” However, the instantaneous availability of information does not obviate the public’s need for an assessment of physician competence. If compassion combined with an Internet connection were all that were needed to care for sick children, then there would be little to distinguish a pediatrician from other members of the health care team or even parents, all of whom also research medical information on the Internet. The difference lies in the physician’s ability to apply extensive clinical, biological, and often sociocultural knowledge to rapidly analyze complex information, judge its applicability to a specific patient, and decide on the most appropriate therapy. The vast majority of current ABP examination content assesses these analytical and decision-making skills rather than just memorization.

**Professionalism** | Dr Bergman writes, “Nichols even sees the ABP becoming involved with assessing professionalism, a quality that used to be called integrity.” Professionalism is more than integrity. The ABP, the American Academy of Pediatrics, and more than 130 other medical organizations have endorsed a definition of professionalism contained in the *Physician Charter*,

which precisely addresses those examples that Dr Bergman lists, namely, end-of-life care, empowering immigrant families to be involved in their child’s school, or understanding the social determinants of health.<sup>1</sup> The ABP is continuing to develop examination content, life-long learning activities, and quality improvement projects around these and other professionalism topics.

Parents, practices, and payers rely on the ABP certificate as a marker of pediatrician competence. Even if the ABP were to close up shop, these individuals would still seek external validation based on national standards that a pediatrician is competent, safe, and improving the quality of her or his care. Perhaps payers or the government could perform these functions, but if pediatricians hope to maintain the public’s trust, I believe it is better for us to continue to accept the responsibilities of a self-regulating profession just as we have for more than 80 years.

### David G. Nichols, MD, MBA

**Author Affiliation:** The American Board of Pediatrics, Chapel Hill, North Carolina.

**Corresponding Author:** David G. Nichols, MD, MBA, the American Board of Pediatrics, 111 Silver Cedar Court, Chapel Hill, NC 27514-1513 (dnichols@abped.org).

**Conflict of Interest Disclosures:** Dr Nichols serves on the Data Commons Board of Directors, as committee cochair of the American Board of Medical Specialties Special Committee on the Physician Scientist, and is chair of the Medbiquitous Board of Directors.

**Additional Information:** Dr Nichols serves as president and CEO of the American Board of Pediatrics.

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### Physical Activity and Depression: Type of Exercise Matters

**To the Editor** In the longitudinal study by Toseeb et al<sup>1</sup> recently published in *JAMA Pediatrics*, the authors showed no association between objectively assessed physical activity (PA) and the development of depression symptoms in 736 adolescents across a 3-year period. These important findings are in apparent disagreement with previous interventional research relying mostly on short-term interventions with smaller cohorts and that use self-reported measures of PA.<sup>2</sup> Notwithstanding the merit and methodological strengths of the study by Toseeb et al, we believe some clarifications are needed regarding a few potential confounding factors that were not controlled for.

Toseeb et al assessed PA using heart rate and PA was expressed as energy expenditure (kilojoules per kilogram per day) or moderate and vigorous PA (minutes per day) and was divided into weekend and weekdays.<sup>1</sup> This method is undoubtedly objective and provides relevant information. Yet the type of PA, ie, the different types of activities and exercises that make up the total daily PA, was not assessed. A recent meta-analysis showed that PA is beneficial for patients with depression, with aerobic activities (vs more power-oriented or strength-oriented exercises) providing the highest benefits.<sup>3</sup> The type of PA also influences exercise induction of the brain-derived neu-

rotrophic factor,<sup>4</sup> a key mediator in the pathophysiology of depression.<sup>5</sup> Both short-term and long-term aerobic exercises increase brain-derived neurotrophic factor peripheral levels whereas strength exercises (whether short-term or long-term) usually fail to induce such beneficial effects.<sup>4</sup> The benefits of exercise have not only psychological and sociological explanations; they are mediated by neurobiological mechanisms through several established pathways.

Determining circulating brain-derived neurotrophic factor levels and other neurotrophic factors together with specific assessment of the different types of PA might provide additional information to the questions addressed by Toseeb et al as well as other researchers in the field.

**Helios Pareja-Galeano, PhD**

**Fabian Sanchis-Gomar, MD, PhD**

**Alejandro Lucia, MD, PhD**

**Author Affiliations:** Universidad Europea and Research Institute of Hospital 12 de Octubre (i+12), Madrid, Spain (Pareja-Galeano, Lucia); Department of Physiology, Faculty of Medicine, University of Valencia, Fundación, Investigación Hospital Clínico Universitario/INCLIVA, Valencia, Spain (Sanchis-Gomar).

**Corresponding Author:** Helios Pareja-Galeano, PhD, Universidad Europea and Research Institute of Hospital 12 de Octubre (i+12), C/Tajo S/N, Urbanización El Bosque, 28670 Villaviciosa de Odón, Madrid, Spain (helios.pareja@gmail.com).

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**In Reply** We thank Pareja-Galeano et al for their letter on the findings reported in our original investigation recently published in *JAMA Pediatrics* on the association between physical activity and symptoms of depression in adolescents.<sup>1</sup> First, we would like to clarify that the measure of physical activity used was individually calibrated combined heart rate and movement sensing, not just heart rate. Second, the lack of statistically significant associations in our study was, strictly speaking, not in disagreement with the meta-analysis that showed an effect of physical activity on depressive symptoms<sup>2</sup> because the confidence limits overlapped. What is key to appreciate is that this was a prospective and developmentally sensitive study regarding the putative causal associations between routine activity and the emergence of depressive symptoms in a random sample of community-based adolescents. Our study addressed a distinct element in the interplay between physical and mental health development compared with other intervention studies of activity on mood.

That said, part of the variance in self-reported activity may reflect a person's perception of himself or herself being an active and dynamic person, irrespective of true activity level, and this self-image may, in fact, be protective against depression. This presents a challenge to our understanding of the etiology of depressive symptoms, which likely includes a complex interplay of true behavioral differences, social norms, and perception. It is also possible that there are true population differences in the etiology of depression; the meta-analysis<sup>2</sup> was focused on clinical trials interventions in clinically depressed adults ranging in age from 18 to 71.6 years, whereas our work concentrates on a population-based sample of adolescents.

It is possible that variations in activity type may relate to depressive symptoms in adolescents irrespective of their overall volume of activity or time spent exercising at higher intensities. While our objective data are not well suited to infer these types of activity, we have additional data from self-reports (at baseline), which relate to different types of activity performed, including participation in weight training collected as number of days per week. We used this frequency measure as indicative of strength-based exercise, classifying participants into those who performed weight training at least once per week (n = 166 and n = 147 during term and holidays, respectively) and those who did not.

We added these strength-based exercise variables to linear and logistic regression models originally presented in our manuscript (with sex and objective physical activity as predictors). We found that strength-based exercise did not predict depression or alter the effects of objective physical activity measures in any of the models. The logistic regression models at baseline were not tested owing to empty cells.

These analyses, using self-reported frequencies of weight training, suggest that in this population of adolescents, strength-based exercise did not have a differential beneficial effect on depressive symptoms compared with overall physical activity. Well-designed studies that address the role of different types of activity in the etiology of depressive symptoms within this age group need to be conducted before any firm conclusions can be drawn.

**Umar Toseeb, PhD**

**Ian M. Goodyer, MD**

**Soren Brage, PhD**

**Author Affiliations:** Development and Lifecourse Research Group, Department of Psychiatry, University of Cambridge, Cambridge, England (Toseeb, Goodyer); Medical Research Center Epidemiology Unit and UKCRC Centre for Diet and Activity Research (CEDAR), School of Clinical Medicine, University of Cambridge, Cambridge, England (Brage).

**Corresponding Author:** Umar Toseeb, PhD, Development and Lifecourse Research Group, Department of Psychiatry, University of Cambridge, Cambridge CB2 8AH, England (umar.toseeb@manchester.ac.uk).

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