International Journal of Sports Physiology and Performance, 2014, 9, 2-4
http://dx.doi.org/10.1123/IJSPP.2014-1002

INTERNATIONAL JOURNAL OF
SPORTS PHYSIOLOGY
AND PERFORMANCE
www.IJSPP-Journal.com
EDITORIAL

I is for *International* and *S* is for *Sport!*

As we write this introduction to *IJSPP*'s first Winter Olympics thematic issue, countdown clocks at training centers around the world register less than 100 days until the opening ceremonies of the 22nd Winter Olympic Games in Sochi, Russia. The last time the Olympics were held in this part of the world, the year was 1980, and Russia was part of the USSR. Thirty-four years have elapsed and much has changed, also in sport. Sport has gotten bigger, more professional, with a much stronger scientific evidence base. The science of sport is more hypothesis driven, based more on cooperation with athletes and coaches, and performed more where sport and training actually happens and less in a laboratory. There is more money involved to be sure. National pride is still at stake. The Winter Olympics have grown and evolved, trying to keep pace with developments like the X Games and the extreme sport movement. Competition for the attention of a global audience that has access to highly specialized sports media has challenged the International Olympic Committee to be more dynamic. Athletes will compete for more medals, in a more spectacular array of events at Sochi than ever before. Is sport science keeping up? The realities of the evolving sport menu in the Olympics, and the implications for sport science, are discussed by Seiler[1] in a special commentary in this issue.

In 1980, several of the elite national performance-development programs contributing research to this special issue, and many others that are producing both outstanding Olympians and outstanding research, simply did not exist. The Swedish Winter Sport Research Center did not exist. *Olympiatoppen* in Norway did not exist. Sport Canada's "Own the Podium" program did not exist. The Swiss Federal Institute of Sports did not exist. The Australian Institute of Sport did not exist. The U.S. Olympic Training Center had 1 small campus and was in its infancy. The list goes on. A scan of authors and affiliations in the current issue exemplifies the professionalization of Olympic sport and the tight connection between excellent science and elite sports practice that we are trying to capture in *IJSPP*. In this issue, sport scientists from both universities and elite dedicated sport-performance and research centers have cooperated and contributed to make what we think is an excellent thematic issue.

Cross-country skiing (XC) is a traditional sport that has undergone an extreme makeover in recent years. Mass starts, shorter race distances, technique evolution, equipment improvements, more emphasis on maximal skiing speed, greater upper-body demands, and more focus on small details like speed maintenance and energy cost during downhill segments and turns have all turbocharged a sport already known for producing some of the world's most impressive aerobic machines. XC has been transformed from a very traditional endurance sport contested over several hours in the dark forest to a viewer-friendly battle for every tenth of a second. Øyvind Sandbakk (Norway) and H.C. Holmberg (Sweden) lay their national ski sport patriotism to the side and discuss this evolution in an invited commentary[2] that leads off an excellent series of research studies on XC.[3–9] Together, these studies bring us up to date on a sport that has changed dramatically over the last 20 years. Well, maybe not all the way up to date? We suspect that wireless sensor technology developments are giving scientists with tight links to national teams access to physiological, dynamometric, and kinematic data that will not reach the research journals until after the Sochi Games are in the history books.

Speed skating is also well represented in this issue. Scientific work at Vrije Universiteit (VU) in Amsterdam has perhaps more directly influenced the performance of a single winter sport than any other academic research group, with Jos de Koning at the forefront since his deep involvement in the introduction of clap skates to speed skating in the 1990s. VU is back with 2 studies in this issue. Noordhof et al[10] investigated the relationship that technique changes occurring during a race have to velocity profiles. Also, in a unique retrospective study, Orie et al[11] report how training has changed among champion speed skaters over a 38-year time frame spanning 10 Olympic Games. The lead author of this article will be coaching potential Dutch medalists at Sochi! H.C. Holmberg's lab at the Swedish Winter Sports Research Center may focus on XC, but they have also contributed 2 well-designed and thorough studies investigating the physiological and performance impact of compression garments on lower-body performance (speed skating[12]) and upper-body performance (double-poling in XC[9]) in highly trained competitors. Their investigation of muscle-compression effects on speed skating performance included wireless near-infrared spectroscopy measurements of muscle oxygenation performed under realistic on-ice competition conditions.

The retrospective study of speed skating training characteristics by Orie et al[11] adds to a growing body of research attempting to better quantify the relationship between training characteristics of highly trained athletes on the one hand and physiological adaptation and performance on the other. A key development in recent years has been improved documentation of the daily training of elite performers. However, the validity

of athlete self-report and a better understanding of the methodology used to quantify intensity distribution are important if this source of data is to optimally support further hypothesis generation and experimentation related to training optimization. Sylta and colleagues, working with *Olympiatoppen* in Norway, have critically examined training documentation validity and methodology during the training of XC Olympic team athletes blinded to the fact that their training self-report was being validated.[13,14]

Alpine skiing is an extremely complex discipline that requires integration of numerous physical and coordinative qualities for performance excellence. This explains why these athletes do so well in typical "Superstars" competitions! It also complicates the talent-identification process. Gorski et al[15] used the power of large data sets and highly standardized testing to shed light on talent-identification challenges in alpine skiing. They analyzed data from >8000 standardized tests performed on >2500 male and female Swiss alpine skiers age 11 to 20. They quantified development across age groups, examined trends over time, and distinguished national selected athletes from nonselected athletes. We think this is a nice contribution in a discipline where training and performance studies remain scarce in the sport science literature.

Unfortunately, there are many winter Olympic sports that sport science has not seemed to make much of a contribution to yet.[1] Freestyle skiing and snowboard are now major Olympic sports, with a combined 20 Olympic medal events. Hopefully, the case study of world-class mogul skiers by Pethick et al[16] will break the ice and encourage sport scientists working with these sports to contribute their work. We register with some sadness Canadian Gordon Sleivert's name as senior author on this study. Dr Sleivert was a productive scientist who made strong contributions to applied sport science in general and to *IJSPP* specifically. He passed unexpectedly in 2012, and this may have been his final scholarly publication.

Training optimization and potentially unique physiological demands in the Paralympic events also remain little investigated. We are therefore particularly happy to include an interesting study that breaks new ground by not only being the first published study to comprehensively investigate the repeated-sprint training paradigm in an upper-body-only activity but also investigating these questions on sledge hockey athletes with lower-body physical disabilities.[17]

With respect to Russia, the host country of the 22nd Winter Olympics, I, Stephen, wish to add a personal note. Recently I was invited to another outstanding national Olympic sport center, INSEP in Paris, to lecture on training-intensity issues and discuss practical implications of current research with national team coaches. It was an awesome conference, but an unexpected highlight for me was meeting and sharing experiences with 3 young Russian sport scientists. In 1986, I visited the Moscow Institute of Physical Culture for 14 days, while 20 years old and still an undergraduate in exercise science. It was my first trip outside the United States and I landed behind the "Iron Curtain"! That study tour greatly influenced my future personal and professional life in unforeseen ways. In my discussions with my new Russian friends, they described for me the "lost generation" of scientists who emigrated from the former USSR in the 1990s. That generation is my generation. Today, sport science is rebuilding in Russia in a modern form. I hope I get to return to Moscow soon.

We hope to see in the near future outstanding research on the pages of *IJSPP* from Russia, other newly emerged states from the former USSR, and other countries where sport science is becoming better with each passing month. *IJSPP* is indeed a very international journal and becomes more so each year. The *S* in *IJSPP* also very clearly stands for *sport*. On behalf of the editors at *IJSPP,* we hope you all enjoy this issue, and that your favorite Olympic athlete or team brings home the gold.

Stephen Seiler and Ralph Beneke,
Special Issue Editors

References

1. Seiler S. Same *citius, altius, fortius* . . . more women, crashes, and McTwists? *Int J Sports Physiol Perform*. 2014;9(1):122–127. http://dx.doi.org/10.1123/IJSPP.2013-0396.
2. Sandbakk Ø, Holmberg H-C. A reappraisal of success factors for Olympic cross-country skiing. *Int J Sports Physiol Perform*. 2014;9(1):117–121. http://dx.doi.org/10.1123/IJSPP.2013-0373.
3. Spencer M, Losnegard T, Hallén J, Hopkins WG. Variability and predictability of performance times of elite cross-country skiers. *Int J Sports Physiol Perform*. 2014;9(1):5–11. http://dx.doi.org/10.1123/IJSPP.2012-0382.
4. Carlsson M, Carlsson T, Hammarström D, Malm C, Tonkonogi M. Time trials predict the competitive performance capacity of junior cross-country skiers. *Int J Sports Physiol Perform*. 2014;9(1):12–18. http://dx.doi.org/10.1123/IJSPP.2012-0172.
5. Åsan Grasaas C, Ettema G, Hegge AM, Skovereng K, Sandbakk Ø. Changes in technique and efficiency after high-intensity exercise in cross-country skiers. *Int J Sports Physiol Perform*. 2014;9(1):19–24. http://dx.doi.org/10.1123/IJSPP.2013-0344.
6. Losnegard T, Hallén J. Physiological differences between sprint- and distance-specialized cross-country skiers. *Int J Sports Physiol Perform*. 2014;9(1):25–31. http://dx.doi.org/10.1123/IJSPP.2013-0066.
7. McGawley K, Holmberg H-C. Aerobic and anaerobic contributions to energy production among junior male and female cross-country skiers during diagonal skiing. *Int J Sports Physiol Perform*. 2014;9(1):32–40. http://dx.doi.org/10.1123/IJSPP.2013-0239.
8. Sandbakk Ø, Bucher Sandbakk S, Supej M, Holmberg H-C. The velocity and energy profiles of elite cross-country skiers executing downhill turns with different radii. *Int J Sports Physiol Perform*. 2014;9(1):41–47. http://dx.doi.org/10.1123/IJSPP.2013-0383.

9. Sperlich B, Born D-P, Zinner C, Hauser A, Holmberg H-C. Does upper-body compression improve 3 × 3-min double-poling sprint performance? *Int J Sports Physiol Perform*. 2014;9(1):48–57. http://dx.doi.org/10.1123/IJSPP.2013-0137.
10. Noordhof DA, Foster C, Hoozemans MJM, de Koning JJ. The association between changes in speed skating technique and changes in skating velocity. *Int J Sports Physiol Perform*. 2014;9(1):68–76. http://dx.doi.org/10.1123/IJSPP.2012-0131.
11. Orie J, Hofman N, de Koning JJ, Foster C. Thirty-eight years of training distribution in Olympic speed skaters. *Int J Sports Physiol Perform*. 2014;9(1):93–99. http://dx.doi.org/10.1123/IJSPP.2013-0427.
12. Born D-P, Zinner C, Herlitz B, Richter K, Holmberg H-C, Sperlich B. Muscle oxygenation asymmetry in ice speed skaters: not compensated by compression. *Int J Sports Physiol Perform*. 2014;9(1):58–67. http://dx.doi.org/10.1123/IJSPP.2012-0210.
13. Sylta Ø, Tønnessen E, Seiler S. Do elite endurance athletes report their training accurately? *Int J Sports Physiol Perform*. 2014;9(1):85–92. http://dx.doi.org/10.1123/IJSPP.2013-0203.
14. Sylta Ø, Tønnessen E, Seiler S. From heart-rate data to training quantification: a comparison of 3 methods of training-intensity analysis. *Int J Sports Physiol Perform*. 2014;9(1):100–107. http://dx.doi.org/10.1123/IJSPP.2013-0298.
15. Gorski T, Rosser T, Hoppeler H, Vogt M. An anthropometric and physical profile of young Swiss alpine skiers between 2004 and 2011. *Int J Sports Physiol Perform*. 2014;9(1):108–116. http://dx.doi.org/10.1123/IJSPP.2013-0223.
16. Pethick WA, Murray HJ, Gathercole RJ, Sleivert GG. Analysis of jump performance of world-class mogul skiers over an Olympic quadrennial cycle: a case study. *Int J Sports Physiol Perform*. 2014;9(1):128–132. http://dx.doi.org/10.1123/IJSPP.2013-0379.
17. Sandbakk Ø, Spencer M, Ettema G, Bucher Sandbakk S, Skovereng K, Welde B. The physiology and biomechanics of upper-body repeated sprints in ice sledge hockey. *Int J Sports Physiol Perform*. 2014;9(1):77–84. http://dx.doi.org/10.1123/IJSPP.2012-0355.