INVITED COMMENTARY

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Same Citius, Altius, Fortius . . . More Women, Crashes, and McTwists?

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Almost half of the record 98 events being held at the 2014 Sochi Winter Olympic Games were either not held 20 years ago at Lillehammer or have been substantially modified. The Olympics as a global sports event are not stationary but must adapt and evolve in response to changing demands, just as the remarkable athletes who are competing do. While the Winter Olympics program has steadily grown since Chamonix in 1924, the rate of development has greatly accelerated in the last 20 years. Three factors seem to be instrumental. First, the Winter Olympics program has become more gender balanced. Female hockey teams are battling for gold, and this year women will compete in ski jumping for the first time. Most Winter Olympics sports have equal numbers of events for men and women today, although female participation still lags somewhat behind. Second, many traditional events have been modified by sport-governing bodies toward a more “TV friendly” format. Time-trial starts have been replaced by mass or group starts. “Sprint” and team events have been added to spice up traditional sports like cross-country skiing and speed skating. Finally “extreme” sports like half-pipe and ski-cross have crossed over from the X Games to the Olympics, with some arguing that the Olympics need these popular sports more than the X Games sports need the Olympics. All of these changes create new research questions for sport scientists who are also willing to adapt and evolve.

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Athletes must adapt to changing demands if they are to emerge victorious. But, it is not just the athletes competing who must constantly raise the bar in elite sport. International sport-governing bodies and the International Olympic Committee (IOC) must also adapt and evolve over time or risk stagnation, irrelevance, or, at worst, extinction. Despite their fundamentally conservative ethos, the Olympic Games have steadily evolved and adapted to the forces that drive international sport, to retain relevance and impact as arguably the world’s greatest sporting spectacle. In recent years, the pace of adaptive change has accelerated. For sport scientists reading the International Journal of Sports Physiology and Performance (IJSPP), the Olympics give us a bird’s-eye view of a very large swath of the elite-sports landscape, allowing us to see where the sands are shifting and where, perhaps, we have fallen behind. They have always showcased a wonderful buffet of what we are traditionally good at measuring and dissecting physiologically, citius, altius, fortius. Contemporary research also demonstrates that the expression of this motto in the form of measurable performance improvement (ie, new world records) can actually be objectively allocated to “athlete” and/or “technology.”1 This distinction does not account for the courage required for any athlete to embrace new technologies or new training ideas.

This special issue of IJSPP celebrates the 22nd Winter Olympics in Sochi, 2014. The first winter version of the modern Olympic Games took place in Chamonix, France, in 1924 (although they were assigned that status after the fact). In 1924, 16 events were contested, with 247 men and 11 women from 14 countries competing.2 The only female athletes competing were figure skaters. As Figure 1 shows, the Winter Olympics have surely grown. The Sochi Olympics will host a record 98 different events. This is a 6-fold increase since the Winter Olympics’ infancy in 1924, but, perhaps more interesting, a 60% increase just since 1994. Juan Antonio Samaranch famously declared the Lillehammer, Norway, games “the best Olympic Winter Games ever.” Yet the 2014 edition will include 37 events that were not held in Lillehammer. And many of those that were held there have changed markedly. This is a time span well within memory for most of us. In Sochi, as many as 3000 athletes from more than 80 nations will gather and compete for these 98 gold medals. What factors have driven this massive remodeling and expansion of the event menu in the last 20 years? I think there are 3 key factors, all of which have meaning for sport science and our own research menu.

Toward Gender Equity

While the early games were primarily a men’s club, we are now nearing gender equality based on the distribution of Winter Olympics events (Figure 2). But, the gap

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remains a bit larger based on athlete participation (Figure 3). True parity is likely at least a quadrennium or so away. This long road is better described in a sociology context, but “science,” both good and bad, has also played a role. In 1896, Baron Pierre de Coubertin embraced the prevailing Victorian sentiments of his day when he stated, “No matter how toughened a sportswoman may be, her organism is not cut out to sustain certain shocks.” This quote exemplified a broadly held myth unsupported by research, and it had remarkable staying power.

For decades, male-led governing bodies latched on to indefensible arguments about gender differences to resist changes in their sport. There are many examples, but my favorite winter-sport anecdote comes from the
mid-1980s when the emergence of the skating technique was throwing cross-country-skiing powers Norway and Sweden into a tailspin. Fighting this new technique, which they were behind in adopting, some Norwegian “experts” publically argued that the skating technique could damage the hips and uterus of female skiers and should be banned. Never mind that female athletes had competed at the highest level in speed skating for decades. They lost that battle to suppress innovation, and today the Olympic cross-country-skiing program shows both full gender parity and full inclusion of “free technique” events. At Sochi, only the sport of Nordic combined event will be without events for women.

Have we made the same progress toward gender parity in sport science research? Opportunity is equal, for sure. *IJSPP* has recruited outstanding female scientists to the editorial board. But the reality remains that sport scientists studying performance and training (as opposed to sport nutrition and health-related aspects of exercise) are most often men. As 1 estimate of the relative distribution of men and women doing “IJSPP-relevant” research, I count that 34 of 40 current *IJSPP* editorial board members are male (85%). Similarly, among publications in *IJSPP* from 2010 to 2012, 81% of the authors were nominally identified as male. We also tend to perform most of our research on male athletes, as Figure 4 shows. Is the training and performance of female athletes understudied? This is an issue we need to be sensitive to moving forward to Rio 2016 and beyond.

**Television and Extreme Makeovers**

Today, sport and television seem inextricably linked. But historically, sports were not designed with viewer friendliness in mind. Cross-country skiing was contested for decades with an event format that could be described as skiers disappearing into the forest one by one and returning to view, exhausted and grimacing, after a few hours. In the biathlon’s early decades, the technical challenge of quantifying the shooting portion of the event meant that neither the athletes nor any spectators bothering to watch actually knew who won until 1 or 2 days after the event was finished. While Olympic events were first broadcast on television in 1956, the sale of exclusive broadcast rights (and the use of instant replay) began in 1960. With the sale of broadcast rights began an epoch marked by increasing revenue for the IOC, greater commercialization of international sport, and growing pressure for sport-governing bodies to make their “product” more TV friendly. The pressure began innocently enough with TV broadcasters pushing local organizers to schedule popular events like hockey and figure skating during TV “prime time.” In recent years the sport–television symbiosis has become more pervasive and invasive. The sport of cross-country skiing has been part of the Winter Games from the start, and its evolution is illustrative of this broader trend. While cross-country skiing evolved technically over many decades because of equipment developments, technique innovation, and course grooming, the reshaping of the current cross-country-skiing event menu has undeniably been driven by the International Skiing Federation’s courting of television viewers, not cries for event reform from athletes. Mass-start events have replaced time-trial formats, bringing in more strategy, crashing, and sprint finishes that can remind us of cycling. And, “sprint” events have been added to make the sport more compact in time and space for TV viewing. The athletes have been forced to adapt. In an accompanying commentary in this issue of
IJSPP. Sandbakk and Holmberg describe how these event changes have influenced athlete characteristics, training, and technique development in this traditional sport that has reinvented itself in recent years.5

In general, television producers love spills and thrills. For example, American broadcaster NBC packaged the 2002 Winter Olympics as “Fear Factor on snow and ice,” emphasizing “speed, risk, and edginess.”6(p833) Mass starts and short-duration events in short-track speed skating, cross-country skiing, biathlon, ski-cross, and snowboard cross can all be seen as moves to add speed, risk, and edginess to the event menu. These viewer-centered moves obviously affect athlete preparation. For example, snowboard-cross and ski-cross athletes must not only battle the course and the clock but also react to the tactics and mistakes of other athletes careening down the course. This increased risk of carnage makes for good television! It also drives innovation in the training process.7

The X Games Challenge

The most recent driving factor for innovation in the Winter Olympics program has been the development of the action/extreme-sport culture and the appeal of the X Games. The watershed year seems to be 1998. The X Games had shown themselves to be a massive success, and the IOC tried to reconnect with the young male TV market that they were losing rapidly.6 In Nagano, snowboarding was introduced as a medal event. The reaction among elite snowboarders was mixed. Norwegian snowboard legend Terje Haakonsen refused to participate, protesting against snowboarders being turned into “uniform-wearing, flag-bearing, walking logos.”6(p837) Other snowboarders did not want to be part of the citius, altius, fortius ethos. For example, California skateboarder/snowboarder Cara Beth Burnside argued, “Snowboarding is great because it’s so different from other sports. Now it will get too serious, training, competing, working out in gyms. . . snowboarding isn’t like that.”6(p837) Fast-forward to 2014; snowboarding has become a TV viewer favorite, and both the Olympics and the extreme-sport athletes it has courted seem happy with the relationship.6 Sensationally acrobatic and “edgy” Shaun White is not just a favorite to win gold again at Sochi; he is worth his weight in gold for the IOC. Perhaps cross-country skiing needs more backside air, rodeo flips, and mcTwists baked into the 50-km race.

At Sochi, 20 gold medals will be up for grabs in snowboard and free-style skiing, compared with only 4 (moguls and aerials in freestyle) in 1994. Acrobatic, action events are here to stay and are demanding more space in the expanding Winter Olympic program. Meanwhile, in the Summer Olympics, the IOC has chosen to hold the number of events constant at about 300. If a new sport comes in, another has to be removed. After 2016, one of the Olympics’ most ancient, traditional events, wrestling, is now scheduled to be removed from Summer Olympics program. For Olympic federations who count total Olympic medals, Winter Games events are demanding more attention as their relative share increases. Are we doing more winter-sport research?

I have examined all original investigations published in IJSPP since 2010 and attempted to categorize them in different ways. Examining a 4-year sample of IJSPP publications confirms that we currently receive and publish heavily in the areas of endurance and team sport and a fair amount of strength-, speed-, and power-related studies but very little from combat and acrobatic or action sports (Figure 5).

We can also divide research contributions along more specific sports categories. I reviewed all
Figure 5 — Topical distribution of original investigations published in the *International Journal of Sports Physiology and Performance (IJSPP)*. Publication sample is from 2010 and online in press as of August 2013 but does not include the current special issue. A small number of original investigations did not clearly fit any one of these categories and were excluded.

Figure 6 — Distribution of original investigations and case studies nominally categorized as specifically investigating Winter, Summer, Paralympic, or non-Olympic sports. Publication sample is from the *International Journal of Sports Physiology and Performance (IJSPP)* between 2010 and online in press as of August 2013 but does not include the current special issue.
publication titles since 2010. Distance running, swimming, cycling, and rowing are heavily investigated. But, we have also published numerous strong studies on soccer, rugby, and Australian football. And, since 2010, we have published well-designed, interesting studies on boxing, tennis, judo, taekwondo, karate, artistic gymnastics, surfing, and even competitive cross-country hang gliding.

Publications on the broad range of Winter Olympics sports have been sparse. Before the current special issue, I only identified 12 original investigations or case studies on winter sports published since 2010 (Figure 6). Eleven of these 12 were about speed skating or cross-country skiing. Studies investigating training and performance aspects of the nonendurance winter-sport disciplines are largely absent. As proud as I am of this special issue for the excellent applied sport science it contains, as editors, we would have liked to see an even broader spectrum of the Winter Olympics program represented. The new events are not easy to simulate in laboratories and are difficult to quantify in the field. As Sandbakk and Holmberg present in their commentary, the attributes required for success have become more multidimensional. Training characteristics in technical events are not easily summarized with heart-rate or blood-lactate measurements. Pure endurance events account for perhaps 20% of the Winter Olympics event menu but are the topic of at least 80% of the total research related to training and performance in Winter Olympics sport. Making a strong research contribution to training and performance in the broader array of Winter Olympic sports down the road will take many of us out of our comfort zone.

We are happy that the current special issue of *IJSPP* makes such a strong contribution to the Winter Olympics–sport knowledge base, but we also hope that outstanding winter-sports research becomes both broader in scope and more visible in *IJSPP* between now and the PyeongChang, South Korea, Winter Games in 2018. Like the Olympic Games we love, and the competing athletes we cheer on, sport scientists must also continue to adapt and evolve.

**References**