Seasonal rhythms and exercise

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Introduction
Seasonal variation impacts on many aspects of the work of a sport and exercise scientist. These aspects include seasonal variation in levels of physical activity, health and physical fitness, athletic performance and the physiological responses to exercise, especially those pertaining to the relative safety of exercise for special populations (e.g. people at risk of acute cardiac events).

Levels of physical activity in leisure time
Levels of leisure-time physical activity and physical fitness are generally higher in the summer than the winter months for most people living away from the equator. Besides the possible detrimental effects on long-term health of not maintaining physical activity levels throughout the year, it has been hypothesised that the initiation of intense exercise in the spring or summer after a winter period of detraining is a risk factor for sudden cardiac events. This hypothesis is not supported by other findings of an increased incidence and mortality of coronary heart disease in the winter rather than the spring as well as the fact that older people, who are generally more at risk of an acute cardiac event, seem to maintain activity levels in the winter to a greater degree than younger adults.

Physiological responses to exercise
There are seasonal changes in the physiological responses to exercise as well as the incidence of injuries during participation in sports. Sweating during exercise occurs earlier after the onset of exercise and more profusely in summer than in winter, although the sodium concentration is less in the summer. Elite athletes are more likely to become injured or over-trained during the competition compared to the preparation periods. Whether these changes are explained by fluctuations in activity levels and environmental conditions or by any endogenous circannual rhythms in the human remains to be established. There are indications of endogenous control for some physiological processes, e.g. the metabolic responses to a given intensity of exercise, which seem to mediate more favourable effects of exercise on body composition in the winter. Clinicians who use the exercise-induced bronchospasm to investigate and diagnose asthma should be aware that this response shows seasonal variation.

Sports Performance
Well-trained athletes show obvious seasonality in their competitive performances, generally in line with adopted annual periodization strategies, although these strategies can be disrupted by seasonality in external factors like heat stress and the likelihood of contracting an upper respiratory tract infection. Maximal oxygen consumption and other physiological indicators of exercise performance might not mirror seasonal variation in real performances, which is a suggestion that top-class athletes maintain a good level of general physical conditioning all year round.

Season of birth bias
Age categories in youth sports are often managed by having date of birth “cut-off” points, which might vary with the sport concerned. There is comprehensive evidence that soccer players selected for talent development schemes and for national teams tend to be born at the start of the competitive year. This bias can also be found in elite senior competitors. The fear of staff involved in talent identification programmes is that late developers are penalized by exclusion from selection at an early age. This season-of-birth bias is probably a result of external rather than an endogenous circannual rhythm, since the bias rapidly changes if the cut-off points for eligibility are changed. Such observations suggest that the measurement of biological maturity rather than chronobiological age would be more useful for talent identification programmes.