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The effects of adolescent physical growth and maturation on selection into sport and the long-term effects on sports participation (2013-2016)

Project Summary

Sport Canada's Long Term Athlete Development (LTAD) model acknowledges that there are limitations to ensuring appropriate development of team sports, especially with regards to selecting into chronological age (CA) bands. Adolescent of the same CA can be 4 to 5 years apart developmentally (Biological Age; BA). It's suggested that late maturation could impede selection and effect long-term sports participation. The purpose of this study was to determine whether growth and biologically maturity played a role in selection onto provincial sport teams. 820 participants (564 males, 256 females) aged 11 to 17 attending Saskatchewan youth sport team tryouts (hockey, soccer, basketball, football, volleyball, and baseball) were recruited. CA and anthropometric measures were recorded. A biological age (BA, years from peak height velocity [PHV]) was predicted. Participants were grouped into three maturation categories; pre (0.5 yrs before PHV), peri (1 year around PHV), and post (0.5 yrs after PHV). At the end of the tryouts team rosters were developed. In male athletes there were significant within group differences between the proportion selected verses not selected in both pre-PHV (37.5 vs. 62.5%) and peri-PHV (38.3 vs. 61.7%), but not in the post-PHV groups (48.7 vs 51.3%) ($p>0.05$). In females, there were no differences post-PHV (56.7 vs. 43%) ($p>0.05$), only 38.5% of peri-PHV were selected and 0% of pre-PHV. There was a significant team selection by sport and maturity grouping interaction ($p<0.05$). The proportion of athletes selected versus not selected did not differ between maturity groups in baseball, hockey or volleyball. It was also found that athletes born in the first 6 months of the selection year were favoured. In this sample of youth athlete's, selection bias during adolescence in favour of more mature athletes was only observed in males and only in specific sports: soccer, basketball and football. It can be concluded that given the older BA of the girls, maturity did not appear to influence selection. However, the results suggest provincial sport organizations need new and better strategies for dealing with the potential selection bias of maturity in males for certain sports. Furthermore, a balance of shorter-term performance outcomes with longer-term athlete development and talent identification processes should be considered.

Research methods

Between January 2014 and February 2015 fourteen to fifteen-year-old athletes were recruited during team tryout sessions across the province of Saskatchewan for the following sports: Baseball, Basketball, Football, Hockey, Soccer and Volleyball. At each try out sessions participants, height, sitting height and weight was recorded along with date of birth, test date, mother's height and father's height (either measured or recorded). From this information a child's chronological (CA) and biological age (BA) was calculated. BA was calculated in years from attainment of peak height velocity (PHV) using a regression equation developed from anthropometrics and age. The equation predicated years from the attainment of PHV. Actual PHV was calculated my adding CA to BA. Participants were grouped as pre PHV, per PHV or post PHV. In addition, birth months were quartiled, e.g. Jan to March = quartile 1, etc. In addition to the physical measures athletes also completed the following questionnaires: (i) Sports Participation Activities; (ii) Sport Enjoyment: (iii) What Am I

Like; (iv) Parental Involvement; and (v) Perception of Coaching. At the end of the tryouts coaches provided list of individuals who were selected for the teams. Participants were contacted at 6 and 24 months and invited to complete the five questionnaires again.

Research results

Initial data and 6-month follow-up has been collected. 24-month follow-up data is currently being collected. 827 participants were recruited (60 male baseball; 50 males and 34 female basketball; 73 male football; 275 males and 96 female hockey; 74 males and 64 female soccer; and 35 males and 66 female volleyball). 42% of the athletes made the provincial team. Average age of athletes was 14.5 ±0 .9 yrs. (range 11.3 to 17.9).

Males average height was 172.5 ± 9.1 cm and females 165.5 ± 8.0 cm. 18.3% were pre PHV, 42% were peri-PHV and 39% were post-PHV. Comparison between sports showed that female volleyball players were taller than hockey, basketball and soccer players ($p<0.05$), Differences was found between the heights of their fathers but not their mothers. In males, sports differences in height were also found with Volleyball players being significantly taller ($p<0.05$) and soccer players significantly shorter ($p<0.05$). The same patterns were found in the parents of the athletes. No significant differences in height were found between female selected and not selected ($p>0.05$). In comparison male selected basketball and volleyball players were significantly taller than those not selected ($p<0.05$). This was also true for the fathers of volleyball players.

18.3% of athletes were pre PHV, 42% were peri-PHV and 39% were post-PHV. Sports differences were observed the vast majority of Volleyball players were post PHV, indicating they were more mature for their CA. This was also true for football players and basketball players but less so for baseball and soccer players.

Looking at month of birth distribution in females only 17% were born between October and December, with the other 3 quartiles similar in distribution. A similar pattern was observed in males. Broken down by sport and sex it was observed that 74% of male basketball players were born within the first 6 months of the year. Looking at distributions for selection into teams 65% of males selected were born within the first 6 months and 56% of females.

After 6 months the vast majority of athletes were still involved in the sport they participated in at try-outs.

Policy implications

The launch of the Long Term Athlete Development (LTAD) model is a demonstration of Sport Canada and individual Provincial and National sporting organizations commitment to lifelong sports participation. The LTAD Resource paper (V2) published by Canadian Sports Centres recognizes the limitations of grouping individuals by chronological age; “Athletes of the same age between ages 10 and 16 can be 4 to 5 years apart developmentally. Thus, chronological age is a poor guide to segregate adolescents for competitions”. Indeed, within many team sports, an adolescent boy with greater physical growth and maturity (either because he has a birthday early in the selection year, and thus is older and/or because he is an early maturer) will be more likely to be selected for sports teams. This is likely because of the advanced development in size, strength, speed and endurance of males with greater physical maturity. However, regardless of this recognition of the limitations of age based sport structure, youth sports is still concentrated on 1 or 2 year groupings; a structure which, at least in males, likely places

youth with less physical maturity at a disadvantage. Understanding the impact of youth growth and physical maturation on success at try-outs and then on long term (2-year) participation in sport, in males and females, will provide empirical evidence highlighting the youth most at risk for dropping out of team sports. Our results have shown that in certain sports the concentration on choosing the oldest, tallest and most maturity advanced individuals is still occurring, even though the LTAD model has sought to address this imbalance. In 2004 we worked with the Saskatchewan Minor Hockey and showed them that they were choosing the most advanced males in terms of growth and maturation for their provincial bantam team. Ten years on this study has shown that this is no longer the case. This suggest that working and educating directly with sporting bodies is a worthwhile approach to change coach's perceptions of what constitutes success for a provincial team. We would encourage this type of education in all sports.

Next steps

Although this study has addressed the fist objective to describe the role of growth and maturation on selection into teams and has shown that sports do not need to concentrate of physical maturity to choose the best athletes, The second objective is still to be addressed, that role on sports participation. We are now collecting data from these individuals as we enter the two-year period after selection camps and will have some answers to this question in the coming years. The role of growth and maturation in youth sport still continues to confound outcomes and it is important we continue to educate coaches and provide them with the tools necessary to ensure the late bloomer is not overlooked. This suggest more work is required in the area of potentially closed systems for sport talent identification in the growing years

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Key stakeholders and benefits

All youth sports organization