



Competitive analysis of performance of strongest junior and senior cross-country skiers

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Abstract

Objective of the study was to profile and analyze the dynamics of competitive progress of the national and foreign elite cross-country skiers in the international events in the youth and senior age.

Methods and structure of the study. The reports of the major 2005-2021 World Ski Championships, Olympic Winter Games, European Youth Olympic Festival and Youth Olympic Winter Games were analyzed, along with the statistical data analysis, and percentages, the data visualization was done using RSudio v. 3.6.3 and Microsoft Excel graphics.

Results and conclusion. We found that for the study period Russia and Norway junior cross-country skiers were virtually at par in youth competitions, whilst at the major international events and Olympic Games Norway was 2.4 times more successful than Russia in the men's individual medal standings, and twice as likely to rank in the top-six. Most of the Russian leaders at the 2021 World Cup entered the national elite at the age of 17-18; although only two (0.56%) of them still compete in the World Cup events. The other study data and analysis show that the national long-term cross-country skiing training system has long been in need of improvements.

Keywords: *long-term training system, cross-country skiers, competitions, age groups, Youth Olympic Games.*

Background. The 2021 FIS Nordic World Ski Championships demonstrated the continued leadership of the Norwegian men's cross-country skiing team due to, among other things, the perfectly designed youth reserve long-term training system. We believe that the still secondary competitive progress of the Russian elite cross-country skiers may be partially explained by the premature intensification of the youth training systems [1]. A few studies have proved that a premature specialization and plain mimicking of the adult elite training methods by the children's and youth sports groups drains the adaptive resources and, hence, hampers progress in the sports disciplines with high loads on the cardiovascular system [2]. It was also found that winners and runner-ups of the summer youth events seldom if ever show excellent competitive success at the Youth Olympics. The

cross-country skiing research community still needs the relevant studies as far as we know.

Objective of the study was to profile and analyze the dynamics of competitive progress of the national and foreign elite cross-country skiers in the international events in the youth and senior age.

Methods and structure of the study. We analyzed, for the above purposes, reports of the 2005-2021 World Ski Championships (WSC), Olympic Winter Games (OWG), European Youth Olympic Festival (EYOF) and Youth Olympic Winter Games (YOWG) readily accessible at fis-ski.com ; plus reports of the Youth cross-country skiing events and national cross-country skiing events [3, 4] for the period – to mine the individual results in the youth and senior cross-country skiing events classified by the classic, freestyle, ski-athlon, sprint and ski cross (exclusively YOWG event).

Results and discussion. In 2005-2020, 13 nations have been dominating at the international youth events (EYOF, and YOWG), with 25, 22 and 14 medals won by Norway, Russia and Finland, respectively. It should be mentioned that leadership of the Norwegian competitors of this age group is noticeable albeit not overwhelming (see Fig. 1).

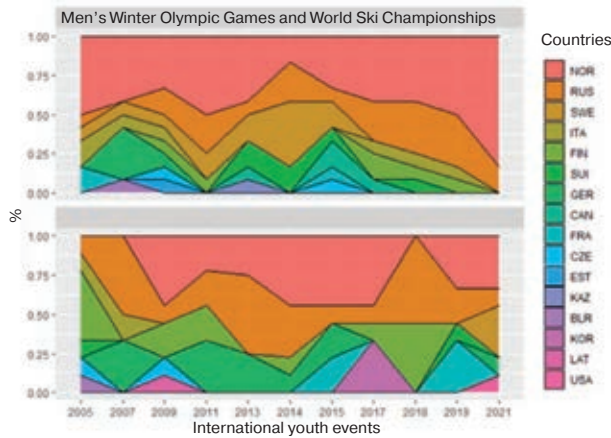


Figure 1. Medals won by the leading nations in the 2005-2021 major men's/ youth cross-country skiing events, %

At the World Ski Championships and Winter Olympics of this period, Norway, Russia and Sweden have won 58, 24 and 14 medals, respectively – versus at most 10 medals scored by other nations. As demonstrated by the curves, Norway marked some decline in 2015 to let Sweden ahead, but since then demonstrated excellent competitive progress.

Analysis of the top-six results in each race shows the similar trends. The international youth games have

been more competitive than the men's ones (see the Table hereunder). We found that for the study period Russia and Norway youth teams were actually at par in the top-six standings at the major international competitions, whilst in the men's events Norway was twice as often in the top-six than Russia. Note that the average competitive performance (top-six places to the team total ratio) was about the same for the both nations.

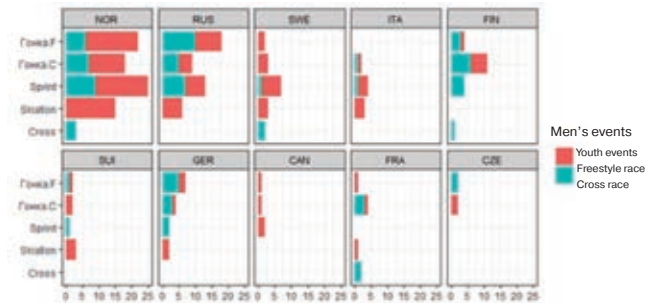


Figure 2. Medals won by the leading nations for the period

Russia has demonstrated leadership in the freestyle races, but has never won medals in the new ski cross discipline with obstacles (Fig. 2) – versus Norway that collected virtually the same medal stocks in both disciplines.

Furthermore, we analyzed the progress of the national 15-16-year old youth in the Russian cross-country skiing events. The best of those who competed in the 2011-2013 events have since then joined the men's team competing at the World Cup and Olympic Games. For three seasons of 2011-2013, classic and skate ski races and sprints were won by 36 juniors,

Table 1. Performance of junior and senior athletes at international cross-country skiing events: comparative analysis

Nation	EYOF and YOWG			WSC and OWG		
	Top-6	Places in Top-6	Average success	Top-6	Places in Top-6	Average success
NOR	18	42	2,3	28	97	3,5
RUS	18	36	2,0	14	47	3,4
SWE	4	9	2,3	13	31	2,4
FIN	12	27	2,3	4	12	3,0
FRA	10	19	1,9	7	12	1,7
ITA	2	5	2,5	6	12	2,0
GER	11	18	1,6	4	11	2,8
SUI	0	0	-	1	10	10,0
CAN	0	0	-	2	9	4,5
CZE	1	3	3,0	3	7	2,3
BLR	0	0	-	2	5	2,5
USA	1	3	3,0	2	2	1,0
SVK	0	0	-	1	2	2,0

Note: Listed are the nations having 1+ places in the top-6



with only 22.2% of them qualified for the All-Russian competitions; only three (0.83%) ranked among the top-40 cross-country skiing competitors; and only two (0.56%) still competing in the World Cup events.

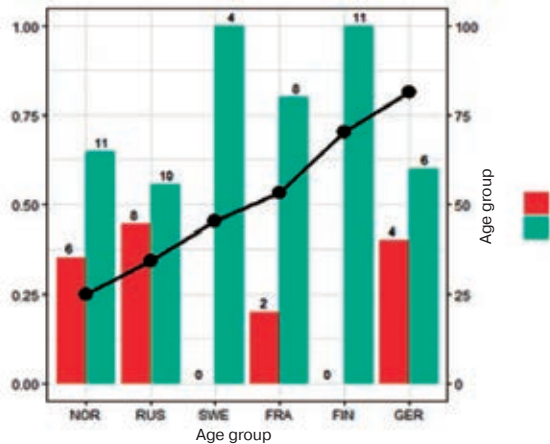


Figure 3. Leading junior cross-country skiers' careers for 2009-2017: still active and retired, %

We analyzed careers of the leading junior cross-country skiers on the global arenas for 2009-2017 as reported by the major international competitions. Ranked in the top-six in races and sprints for the period were 81 athletes of 15 nations. Presently 69% of them still compete in the international and national events having active FIS points. Given on Figure 3 are the percentages of the strongest active/retired junior cross-country skiers with the median FIS points for the period.

We also found that of the 12 competitors at the 2021 World Cup, only two won medals at the Russian Youth Cross-Country Skiing Championship for 15-16-year-olds; and 9 of them, having reached 17-18-plus years of age won medals in at least some race. Figure 4 shows averaged competitive progress of the Russian elite cross-country skiers in the youth/senior events – that demonstrate meaningful growths in the core and ranking events at 17-18 years of age. This age appears critical for progress and selection in the modern cross-country skiing sport.

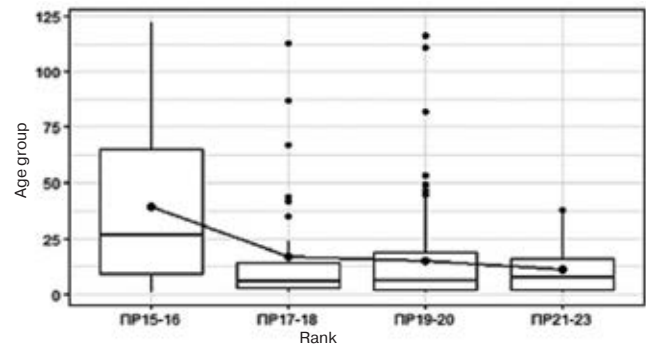


Figure 4. Competitive progress of the Russian elite cross-country skiers in the youth/senior events

Conclusion. Our analysis of the competitive progress of the national Nordic skiing elite in the major senior (men's)/ youth international events demonstrate that the national youth cross-country skiing long-term training system need to be improved fast to facilitate the progress of the young prospects and take leadership at the Winter Olympics and World Ski Championships.

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