# Are Ice Hockey Players Becoming Faster and Stronger? A nine-year Trend Study of the Swiss U18 Men's Ice Hockey National Team

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## Introduction

Physiological performance capabilities, such as power, strength, and endurance, are critical success factors in elite ice hockey. Specifically, these fitness attributes increase the probability to win puck battles, create space, and out maneuver opponents. Taken together, they give a competitive advantage (Secomb et al., 2021; Thompson et al., 2020). Several studies have shown overall improvements in these qualities among elite-male ice hockey players over the years 1979–2005 (e.g. Cox et al. 1995; Montgomery 2006; Quinney et al., 2008). The last decade, in contrast, has received less attention to date. Anecdotal evidence suggests that today's players are faster, stronger, and more agile than players were 10 years ago. However, no study has confirmed this claim so far. The aim of this study is therefore to examine physical and physiological changes among the U-18 Swiss men's Ice hockey national team over the years 2011–2019.

## Method

The data were collected as part of the annual off-season testing procedures from all rostered U18-Men's national team players from 2011–2019. We tested the players'

- anthropometric measures: height (A) and weight (B)
- Countermovement-jump peak power output ($CMJ_{rel\_peak\_power}$) (C)
- 30m-off-ice Sprint time (30m-Sprint) (D)
- Yo-Yo intermittent recovery test level 1 (Yo-Yo-IR1) (E)

306 athletes (17.0±0.3 years) were tested at the Swiss Federal Institute of Sports. Goaltenders were excluded from analysis. All subjects underwent identical testing procedure and conditions.

To quantify changes over time, test results were divided into three time periods:

- period 1: 2011–2013 ($n$ = 99)
- period 2: 2014–2016 ($n$ = 105)
- period 3: 2017–2019 ($n$ = 102)

Separate one-way ANOVAs followed by Bonferroni post-hoc tests were run to assess differences in the testings between the time periods. For all pairwise comparisons, effect sizes (Cohen's $d$) were calculated to evaluate the meaningfulness of the difference and interpreted as: trivial: <0.2, small: 0.2–0.59, moderate: 0.6–1.19, large: 1.2–1.99, and very large: ≥2.

## Results

Figure 1 displays group median with ±1 Quartile and individual data points for each time period. One-way ANOVA revealed significant differences in $CMJ_{rel\_peak\_power}$, 30m-Sprint time, and Yo-Yo-IR1 between at least two time periods (all $p$'s <0.05). No differences between time periods were observed in anthropometric measures. Significant differences were observed between time periods 2014–2016 and 2017–2019 for 30m-Sprint time (mean percentage difference $\%Mdiff$ = -1.1%, $p$ < 0.05, $d$ = -0.33) and Yo-Yo-IR1 ($\%Mdiff$ = +12.7%, $p$ < 0.05, $d$ = 0.64) and between time period 2011–2013 and 2017–2019 for $CMJ_{rel\_peak\_power}$ ($\%Mdiff$ = +4.8%, $p$ < 0.05, $d$ = 0.48), 30m Sprint time (%Mdiff = -1.7%, $p$ < 0.05, $d$ = -0.51), and Yo-Yo-IR-1 ($\%Mdiff$ = +8.1%, $p$ < 0.05, $d$ = 0.46) (Figure 1 C, D, and E). Although not reaching significance level, post hoc tests revealed superior levels of $CMJ_{rel\_peak\_power}$ ($\%Mdiff$ = +3.2%, $p$ = 0.07, $d$ = 0.33) and 30m-sprint time ($\%Mdiff$ = -0.7%, $p$ = 0.64, $d$ = -0.21) for time period 2014–2016 in comparison to 2011–2013 (Figure 1 C and D).

## Discussion

This study identified small to moderate positive developments in physiological fitness parameters over the course of the last nine years, while body mass and body size remained unchanged. From the observed trend in the data, we can infer that off-ice fitness test performance has increased by small to moderate margins over the last nine years in our sample of youth elite male ice hockey players. These data may not represent the entire elite hockey playing population worldwide. We do not know whether players from other nations or age groups have experienced the same or even a more pronounced improvement over this timespan. Since 2011, the Swiss Ice Hockey Federation conducts physical performance tests for all rostered national team players beginning at U15 on an annual basis. The aim is to track, evaluate, and optimize individual players' performance and physical fitness needed to compete at an elite-level. Furthermore, the tests enable to collect normative data and to monitor the evolution of the players' motor performance continuously at the country level.

In conclusion, our data support the common perception that ice hockey players are becoming faster and stronger. Moreover, today's players possess more stamina than their predecessors.

## Literature

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**Figure 1**

*Performance test results across consecutive time periods for (A) Height, (B) Weight, (C) CMJ, (D) 30 Sprint, and (E) Yo-Yo-IR1. Note: Individual data points are presented with median ±1 Quartile.*