BIATHLON

Complex overall performance

- Skiing speed
- Range time
- Shooting time
- Shooting performance

Laaksonen et al., 2018, in *Frontiers in Physiology*
Laaksonen et al., 2018, in *Journal of Sport and Health Science*

Skiing

- Heart rate 90% of maximal HR
- High VO2max, lactate treshold, gross efficiency (energy used and mechanical work) essential for successful performance
- Flat, uphill, downhill → demands frequent change of techniques
- Endurance athletes
- Track profile, snow conditions, altitude, ski preparations

Laaksonen et al., 2018, in *Frontiers in Physiology*
Laaksonen et al., 2018, in *Journal of Sport and Health Science*

Shooting

- Heart rate 60% of maximal HR
- 25-30s shooting range and shooting time
- Shooting techniques demands extensive fine-motor control
- Body sway: specific balance training
- Weather conditions (especially wind)

Laaksonen et al., 2018, in *Frontiers in Physiology*
Laaksonen et al., 2018, in *Journal of Sport and Health Science*

Training

- 700-900 hours physical training a year
- Endurance training
    - 80% low intensity
    - 4-5% moderate intensity
    - 5-6% high intensity
- 10% strength and speed training
- May-November 60-70%
- December-April 30-40%

Laaksonen et al., 2018, in *Frontiers in Physiology*

Speed and strength training

- Speed: 10-20 sprints at maximal intensity with 2-3 min recovery
- Strength: movement-specific training of maximal upper body strength improves skating techniques

Laaksonen et al., 2018, in *Frontiers in Physiology*
Wagner et al., 2024

Training shooting

- Ressembling competition conditions (ex. against each other, time pressure)
- 60% combined with endurance training
- 40% at rest (accuracy, speed)

Laaksonen et al., 2018, in *Frontiers in Physiology*

Injuries and illness

- Little research
- 40.5% injury rate of slight to minimal severity
- More injuries in female athletes:

    - Lower back: rifle, static muscle contraction while shooting standing

    - Knee: not from skiing, off-season, running

Blut et al., 2010

Sources

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- Wagner, C., Sandbakk, Ø., Röhrs, D., Schiemann, S., Schmidt, T. & Keiner, M. (2024). *High-Volume Resistance Training Improves Double-Poling Peak Oxygen Uptake in Youth Elite Cross-Country Skiers and Biathletes: A Pilot Study. Applied sciences, 14*(7). https://www.mdpi.com/2076-3417/14/7/2774