



Navigating Evolving Conditions

Youth Nordic Ski Coaches' Reflections on the 2023-2024 Season and Future Forecasts

Preliminary Survey Results

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Background and Purpose

Cross-country skiing—often referred to as “Nordic”¹—is one of the most popular winter sports. Hundreds of dedicated trails and an increasing number of manufactured snow loops support participation across the season. The Upper Midwest (i.e., Michigan’s Upper Peninsula, Minnesota, and Wisconsin) has a vibrant ski community. Many participants learn to ski through youth clubs and school teams, becoming lifelong skiers. The community’s passion is highlighted each winter at events like Michigan’s Noquemanon Ski Marathon, Minnesota’s Vasaloppet USA and City of Lakes Loppet, and Wisconsin’s American Birkebeiner (the largest race in North America). The Upper Midwest is also a global hub for skiing: Minneapolis has the highest number of cross-country skiers of any city outside of Oslo. Relatedly, Upper Midwest develops world-class talent. Top U.S. skiers, including Olympic gold medalist and two-time World Champion Jessie Diggins, are from the region.

In 2023-2024, higher-than-normal temperatures and low snowfall characterized the Upper Midwest’s winter. Snowmaking loops became the only option for many to ski on snow during the competitive Nordic season. Abnormal weather patterns led to the cancellation of races like the Vasaloppet USA and to modifications to races like the American Birkebeiner. Despite weather-related challenges, it was also a year of historic success for the Upper Midwest Nordic ski community: The Loppet Foundation hosted the first Cross Country World Cup race held in the United States in over 20 years.

As researchers who develop strategies for improving access and quality in youth sports, we were concerned about how the 2023-24 weather conditions affected Nordic coaches and youth teams. We were also curious about how coaches managed to coordinate successful seasons while facing weather-related challenges. We conducted this pilot study hoping to generate discussion and share strategies for supporting Nordic coaches in future warm, dry winters. Guided by previous studies, we developed a survey with input from three stakeholders: a Nordic coach; a citizen racer and competitive Nordic ski parent; and a Wisconsin State Champion who skied at the Junior National, Senior National, and Division I collegiate levels.

From April through May 2024, we surveyed Nordic ski coaches from Michigan, Minnesota, and Wisconsin. (We also interviewed a subset of these coaches; interview results will be presented elsewhere.) We recruited coaches to complete our survey by e-mailing personal connections and publicly available addresses for high school, club, and collegiate Nordic teams. Twin Cities Metro ski shops like Pioneer Midwest, Finn Sisu, and Gear West also shared our study online and via posters. Skinnyski, CXC, and The Loppet Foundation shared our study electronically with their networks. To be eligible to participate, coaches had to have coached in 2023-24 and coached at least one skier who was 18 or younger.

We asked coaches:

- How 2023-24’s winter weather conditions impacted skiers’ performances and mindsets,
- What resources coaches needed and what pressing demands coaches faced,
- And whether coaches experienced symptoms of coaching burnout.

¹ We acknowledge “Nordic” refers to multiple disciplines, though our report is specific to cross-country skiing. We chose to use “Nordic” here in keeping with the names of many (but not all) school and club leagues in the Upper Midwest. We use “youth” to refer to skiers 18 and younger to distinguish from teams of adults, though our findings may be most pertinent to teams of “junior” skiers ages 13-18 years old.

Description of Survey Participants

Table 1 (below) describes the 116 coaches who participated in our survey. Many coached in the Twin Cities Metro (n = 50), though most coached in Michigan, greater Minnesota, or Wisconsin (n=66). Our sample was balanced between head versus assistant coaches and coaches of beginner versus advanced skiers. Coaches were fairly experienced: over 70% had coached 4 or more years.

Table 1

Description of Coach Participants (N = 116)

	n (%) of Total Sample*
Coaching Position	
Head Coach	56 (48%)
Assistant Coach	53 (46%)
Other Coaching Roles (e.g., Instructors, Managers, Presidents)	7 (6%)
Years of Coaching Experience	
1–3 Years	23 (20%)
4–6 Years	26 (22%)
7–9 Years	11 (10%)
10–14 Years	23 (20%)
15 or More Years	33 (29%)
State	
Michigan	4 (3%)
Minnesota	92 (79%)
Wisconsin	20 (17%)
In or Outside 7-County Twin Cities (MN) Metro	
In Twin Cities Metro	50 (43%)
Outside Twin Cities Metro	66 (57%)
Team Type	
School-Affiliated Team (Middle or High School Club or Interscholastic Team)	59 (51%)
Club Team (Not School-Affiliated)	53 (46%)
Collegiate Varsity Team or Collegiate Club Team	4 (4%)

* Percentages are rounded and may exceed 100%.

How disruptive were the weather conditions in 2023-2024?

We asked coaches if the 2023-24 winter weather conditions (e.g., low snow; inconsistent and warm temperatures) were disruptive to their teams' ski seasons. 53% of the sample believed the conditions were very disruptive and 41% believed the conditions were *somewhat* disruptive. **Only four coaches believed the conditions were not at all disruptive to their team.** All four of these coaches had at least 13 years of coaching experience.

The 2023-24 season was not the only one that posed challenges to the coaches we surveyed. Over 70% of coaches said they had experienced a previous season in which low snow was a challenge for their team: about one-third of coaches reported having experienced at least four challenging seasons due to weather.

Regarding scheduling and canceling practices, **78% of coaches had to reschedule or cancel practices at least once during the season. About 35% of these coaches had to reschedule practices 10 or more times.** Fourteen coaches reported rescheduling practices 20 or more times throughout the season.

Nearly all coaches reported having at least one race canceled. **One-third of these coaches shared that four or more of their teams' races had been canceled.**

“We shifted our whole club season to be after high school Sectionals. Then, we met twice per week instead of once per week, for four weeks instead of eight.”

Weather conditions impacted skiers' training outcomes and psychological responses—in nuanced ways.

Training

Over 60% of coaches agreed skiers on their teams had **lower overall fitness levels** in 2023-24 compared to previous seasons with more optimal conditions. Over 70% thought their skiers had **worse technique**. Some coaches thought **beginner skiers may have been particularly disadvantaged**, compared to previous years.

“In general, the elite youth skiers on the team I coach power through adverse conditions. But intermediate and beginner level athletes are disproportionately affected by lack of opportunities to practice. So even though training can be worked around, learning to ski in adverse conditions is most challenging.”

“While we are lucky that we had it, [trail name] is a very difficult trail system and not fun for beginners to ski on. It also provided limited areas to practice different techniques for skiers. Many of our seasoned skiers were able to still have a successful year, but it was very hard for beginners to learn on man-made snow.”

Psychological Responses

Over 70% of coaches agreed that **weather-related disruptions caused skiers to feel less confident, less psychologically prepared to race, and less motivated to train.** More than 70% of coaches believed their skiers enjoyed the 2023-24 season less than other seasons. Yet, coaches who felt able to foster teams that emphasized positive relationships, enjoyment of Nordic, and progress more than outcomes noticed their skiers felt committed and enthusiastic.

“I didn't have as many issues as some coaches in the area did as far as skier engagement. Our team really emphasizes the social-emotional aspect of being on the ski team, rather than pushing competitiveness—we only had one skier quit due to lack of snow.”

“I found that having a strong team bond made a huge difference in team morale, as they were able to overcome poor snow conditions, taking the positive out of what we could creatively muster for practice when it did snow. If the skiers were engaged and having fun, it didn't matter if there was snow or not. The lack of snow in the future may result in a different stance to how we coach.”

Building and maintaining such an environment took concerted effort from coaches. Role modeling positive attitudes helped skiers stay motivated.

“Due to the positive attitude of our coaching staff, we made sure to not let it [the weather] affect the experience of our ski team. Success was measured by progress and attitude of our skiers.”

Several coaches noted this year was a lesson in adversity and helped skiers learn to be adaptable. Skiers became more appreciative of opportunities to ski on snow. A few coaches, especially those in the Twin Cities Metro, noted that hosting the World Cup and seeing Jessie Diggins in Minneapolis made skiers more excited to learn and improve in the sport.

Disruptions in weather caused (unequal) disruptions in access.

Having space to practice and transportation to get to and from practice was difficult for teams, especially for teams who regularly do not travel to sites with manufactured snow.

Alternate Practice Sites

The most common result of weather-related disruptions was teams needing to access alternate practice sites. **Ninety-six out of 116 coaches had to use alternate sites for practice in the 2023-24 season.** Fourteen of the 20 coaches who did not use alternate practice sites coached teams that typically practice at facilities with snowmaking loops. **Those who had to use alternate sites experienced significant increases in costs and demands for other resources.** Many teams found themselves having to pay for ski passes they usually do not need.

“We had to travel farther to get to the man-made snow. Each of our 120 skiers purchased a daily pass or season pass for an extra \$149 that we don't usually have to buy.”

Estimates from the Minnesota Youth Ski League (MyXC) offer additional insight on use of practice sites in 2023-24. Of their 56 clubs (totaling 3,766 members), 24 clubs (42%; serving 1,589 members) had to use snow-making backup sites and 19 (32%; serving 1,189 members) only had access to natural snow sites.

Space Concerns at Practice Sites

Even with access to snowmaking loops, many coaches and teams in our survey faced difficulties with course congestion, limited terrain, and repetitive loops. Only a small amount of snow could be made and maintained at each site (e.g., 1–2-kilometer loops). **Beginner skiers had few designated, flat areas to learn technique.** The mix of performance levels

sharing the same space made environments feel chaotic (though a few coaches noted skiing the repetitive loops was a positive social experience for skiers because they had more opportunities to talk and interact).

Transportation

The need for alternate practice sites increased transportation demands. Though some teams and skiers have high travel demands every season, **the 2023-24 season was difficult for teams who usually use nearby natural snow trails. Most had zero days they could practice at their home sites.**

Fifty-two coaches surveyed had teams who had to travel more than 30 minutes, one-way, at least once per week for practice in 2023-24. **Many dealt with insufficient transportation budgets, shortages or complete lack of buses and bus drivers for school teams, and increased reliance on parents to provide transportation.**

“The biggest [added] financial cost was for transportation. In general, we probably had 20 cars driving an extra 60 miles three times a week for eight weeks. Increased carpooling helped, but I'd say we drove an extra 25,000 miles.”

Coaches said increased travel times meant student-athletes had less time for homework, sleep, family meals, and other responsibilities. Travel also conflicted with parents' work schedules and care for their other children.

“The school doesn't provide bussing for sports teams, so parents have to drive kids and this was a huge inconvenience. As a middle school team, none of the students drive. Parents made it work, but I'm afraid some skiers won't come back next year because of it.”

Coaches also worried about road safety for their skiers and families commuting longer for practice, especially in dangerous road conditions and at night.

“[Our practice site] is accessed on local roads, which can get sketchy. One of my biggest fears is injury in a car accident for the athletes, because 50% of them drive themselves.”

Another coach described overlapping transportation, logistics, and morale challenges:

“Transportation excluded middle schoolers and those without cars or parent transportation. We are a very young team and have a team with a lot of kids without finances to [drive themselves to practice], so this was a huge issue for our team. Carpooling could only take us so far because we couldn't use a bus. Also, staying together as a team while at the location was extremely hard with all the other teams practicing too. Morale was also extremely low in January and February. Kids just wanted to be done.”

Equipment

Many coaches and teams maintain equipment fleets to decrease barriers to participating in Nordic. This equipment is often donated by coaches or community members. Compared to previous seasons, 57 out of 116 coaches (49%) of coaches reported more damage to team-owned equipment. During the 2023-24 season, 33 of 116 coaches (28%) reported making more equipment

purchases, including wax; rollerskis; fish-scale skis; and “rock” or “grass” skis (i.e., lower quality or heavily worn skis to use on thin snow). While many teams had skis available, and some had multiple types of equipment to loan, this was not true for all teams.

Rollerskiing, ski-erging, weight-training, and running were the most common training adaptations coaches made when they could not access snow. However, each of these activities requires equipment—often, expensive equipment. (Running may only require appropriate shoes and clothing, but some skiers may not have adequate, running-specific shoes.) Some teams do not own rollerskis, rock or grass skis, or fish-scale skis, or do not own enough for their entire team. Some teams can access a weightroom at their school, but ski ergs are less common.

Waxing

Almost 60% of coaches reported more challenges to waxing skis properly in 2023-24, compared to years with more optimal conditions. It is often tough to achieve perfect waxing on race day, regardless of the weather, but coaches noted increased difficulty with waxing for warm, manufactured snow. For some coaches, waxing responsibilities were reduced in 2023-24 due to less time spent on high-quality skis. **But for many, waxing costs increased, and reliance on Klister was a (messy) necessity.**

“We blew through more Klister and Klister remover, and I was lucky in that I spent \$5,000 on skin skis to aid the newer classic skiers in difficult conditions.”

Cost Increases

Considering all of the changes in practice and race locations, travel, and equipment, **about 50% of coaches reported increased expenses in the 2023-24 season.** Increased costs were incurred by teams in every state in our sample and teams in and outside of the Twin Cities. Expense increases ranged from a few hundred dollars to over \$10,000. Most coaches indicated a 10–20% increase, or a \$1,000–\$3,000 increase. Most additional expenses were covered by skiers and skiers’ families.

Nordic coaches work hard and worry about the future, but they are taking challenges in stride.

Coaching Demands

Coaches reported different demands on their time, energy, and creativity during the 2023-24 season. **Many had to find new ways to “keep skiing fun”, which became more difficult as the season progressed.** Last-minute changes to training plans (e.g., activities, techniques, locations) were common and required more coordination with team members and families. Even with these high demands, few coaches reported strained relationships with their skiers this season. **Coaches were largely able to remain supportive to their teams, despite frustrations they felt.**

Coach Burnout

To measure whether 2023-24 demands contributed to burnout among Nordic coaches, we used a valid, reliable questionnaire. Coach burnout involves three different elements: physical and emotional exhaustion; a reduced sense of accomplishment; and loss of interest and passion in coaching (see References for more information).

Nineteen (16%) of coaches reported scores indicating a “high” level of burnout (i.e., an average score of three or higher on the questionnaire). Among the 19 coaches with high levels of burnout, 14

were head coaches. 16 of the 19 had to reschedule or cancel at least one practice. **Combined, these 19 coaches had to reschedule 112 practices and cancel 89 practices.** All 19 had at least one race canceled. We suspect having to make more adjustments, particularly at the last minute, increases coach stress.

We observed that most coaches, including those with and without signs of burnout, still introduced new skiers to the sport; prepared competitive skiers to race at locally, regionally, and nationally competitive levels; and sustained Nordic communities in their areas. Coaches shared what made stress easier to manage, including: their own enjoyment of and passion for the sport (often fueled by what their own coaches had done for them when they were young); their motivation to provide youth with opportunities to make friends, be active, learn and improve; and close social ties with Nordic communities in their areas and at large. **Coaches told us community support was a major factor helping them remain resilient, including:**

- Financial and logistic support from school administrators and booster clubs
- Parental involvement, including help with transportation
- Skiers and parents being flexible with changing plans
- Skiers and parents demonstrating positive attitudes
- Team cultures emphasizing improvement and building positive relationships

The Future of Youth Nordic

Coaches had concerns continued weather disruptions will affect youth Nordic in the Upper Midwest in future seasons. We asked coaches to indicate the extent to which they agreed with a series of statements regarding how future weather challenges might impact the sport. In Table 2, we have combined responses from coaches who selected Strongly Agree or Somewhat Agree; other response options included Neither Agree nor Disagree, Somewhat Disagree, and Strongly Disagree.

Table 2

Youth Nordic Coaches' Concerns for the Future (N = 116)

Statement	Level of Agreement
“Continued changes in weather, snow, and temperature patterns may make it harder for Nordic ski teams in the Upper Midwest with fewer financial resources to be competitive.”	106 Coaches (91%) <i>Strongly or Somewhat Agreed</i>
“Continued changes in weather, snow, and temperature patterns may compromise fitness and performance in future generations of skiers in the Upper Midwest.”	82 Coaches (71%) <i>Strongly or Somewhat Agreed</i>
“Continued changes in weather, snow, and temperature patterns may make racing against skiers from other regions less fair for Upper Midwest skiers.”	76 Coaches (66%) <i>Strongly or Somewhat Agreed</i>

Ideas for Action

For Coaches

Plan ahead for low-snow seasons. We recommend Nordic coaches create adjustable plans and manage expectations for low-snow seasons before stress sets in:

- Consider making back-up plans for if and when races are cancelled.
- Pre-plan a variety of training activities (see Appendix A for examples).
- Have skiers bring extra equipment to every practice (e.g., running shoes and clothes for conditioning).
- At pre-season meetings with skiers and families, discuss potential variability during the season.
 - Work with skiers and parents to create plans, such as a car-pooling schedule.
 - Discuss how training schedules and race schedules could be modified.

Foster a positive team culture. Try these evidence-based sport and performance psychology tips:

- Create and revisit a list of the team’s core values with skiers and staff.
- Set team goals focused on processes, rather than outcomes.
- Encourage open communication, including coaching “office hours” for individual check-ins.
- Praise attitude, effort, and sportsmanship over rankings, times, or performances.
- Avoid comparing skiers to each other.

Keep practices fun. Especially for newer skiers, it is essential important to maintain interest and excitement for skiing. Creative, enjoyable practices that use games, offer a variety of drills, and build team camaraderie can keep skiers motivated. Fitness and technique are important in the long-term, but keeping skiers connected to the joy of skiing can sustain participation and enjoyment during low-snow winters.

Engage in mentoring and professional development. Nordic coaches are experts on navigating low-snow winters and are the best resources for each other. Head coaches and coaches with more years of experience can embrace their roles as mentors for assistant and newer coaches. Coaches may also want to help their athletes find junior coaching opportunities. Sharing knowledge and expertise can help create sustainable pipelines of coaches.

We also encourage coaches to be active members of professional organizations. State-level (e.g., the [Minnesota State High School Nordic Ski Coaches Association](#)) and national organizations (e.g., [Professional Ski Instructors of America](#); [U.S. Ski & Snowboard](#); [Women Ski Coaches Association](#)) offer opportunities for professional development and networking.

Consider sport psychology resources. Sport psychology practitioners may be able to help coaches and athletes enjoy and perform well in challenging seasons. They may be able to offer individual or team mental skills training. You can find Certified Mental Performance Consultants in your local area via this [AASP CMPC Directory](#). You may want to contact graduate school programs training sport and performance psychology students for free and more affordable services.

Examples of free or low-cost sport psychology services include:

- [Mankato State University](#) (MN)
 - Contact the Center for Sport and Performance Psychology at (507) 389-1230
- [University of Wisconsin-Green Bay](#) (WI)
 - Contact the Practicum Coordinator at bombera@uwgb.edu or (920) 465-2453
- [Springfield College](#) (MA, remote)
 - Contact the Fieldwork Coordinator at kmellano@springfield.edu or (413) 748-3858

For mental health diagnoses and treatment, coaches and athletes experiencing stress, hopelessness, or worry should connect with mental health professionals. Search tools for these include: [FastTrackerMN.org](#), [211 Wisconsin](#), and the [Michigan Crisis and Access Line](#).

For Parents and Families

Parents and family members are some of coaches' most important partners. To support your child's Nordic coach and team:

- Think of coaches and families as being on the same team: Everyone wants skiers to have safe, fun, and fulfilling seasons.
- Be patient with coaches who are dealing with difficult circumstances and trying to facilitate positive experiences for all skiers.
- Recognize that extra costs, such as for trail passes, support public infrastructure necessary for athletes and teams.
- Join or start a booster club to provide financial and logistic support to coaches.
 - Booster clubs can operate without requiring parents to give from their own pockets. Instead, they can leverage members' time, energy, social networks, grant-writing skills, and other resources to support Nordic teams.

For Nordic Ski Facilities

We encourage trail system administrators to build relationships and communicate with Nordic teams, clubs, and schools before, during, and after the season regarding logistics and use of space. Be intentional and willing to experiment with new strategies to reserve or demarcate space for teams and for newer skiers, potentially across teams, to practice technique. **We recognize this is a challenge while accommodating park systems' own lessons and other trail users, and we encourage trail systems to try and share new strategies!** More broadly, facilities, coaches, athletes, and administrators may want to continue conversations about delaying the start of the competitive Nordic season and other strategies to improve Nordic systems.

For Corporations, Foundations, and Individuals

Giving to Nordic organizations and teams is especially important before and during warm and dry winter seasons. **Gifts made to Nordic teams will help ensure any young person who wants to ski in the Upper Midwest has the chance.** Corporations, foundations, and individuals may choose to give to Nordic programs because:

- They are passionate about Nordic
- They recognize the promise of youth sport to support thriving communities
- They understand the health benefits of time in nature, including during winter

- They care about increasing access to outdoor physical activity for all
- They know the beauty of winter in the Upper Midwest and want more people to experience it

There are ample ways corporations, foundations, and individuals can support Nordic skiing in their own communities. We encourage potential givers to consider donating money, time, and other support to local Nordic organizations in their cities, school districts, and counties.

About Climate Action and Adaptation

Nordic stakeholders may want to learn more about ideas for adapting to a changing climate. Additional resources and articles include:

- [The Midwest Climate Adaptation Science Center](#)
- [Protect Our Winters](#)
- [Climate Feedback](#)
- [Greener Snowmaking is Helping Ski Resorts Weather Climate Change](#)
- [National Ski Areas Association](#)

Conclusion

Challenging weather, warm temperatures, and low snowfall caused significant difficulties for Nordic coaches and skiers in 2023-24. These conditions had considerable impacts, including on coaches' perceptions of athletes' fitness levels and motivation and teams' schedules and finances. Some coaches felt lower morale as they navigated changes to training and racing. However, coaches demonstrated resilience, finding creative solutions and fostering positive environments through a season with less-than-ideal conditions.

Looking to the future, Nordic coaches have concerns about the potential impacts of climate change on the Nordic skiing community. Coaches think it may become more difficult to recruit new athletes and make the sport more inaccessible for less-resourced teams. Such concerns call for proactive, community-driven approaches to supporting Nordic skiing in the Upper Midwest.

Dedicated approaches will be necessary for maintaining an inclusive spirit in Nordic skiing, ensuring stakeholders work to make Nordic accessible for people from all backgrounds. Innovative coaching, environmental stewardship, and efforts to create a broad sense of community may help Nordic skiing survive and thrive in the face of future climate-related disruptions.

Acknowledgements

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About the Authors

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Hans-Peter B. de Ruiter: Peter is an Undergraduate Research Assistant in The ESPI Lab. He has coached for MyXC, Loppet Trail Kids, and the Minneapolis South/Roosevelt High School Nordic Ski team. Peter has worked for The Loppet Foundation, including as Coordinator of Loppet Adventures' Summer and Winter Camps. Peter races for and is Co-President of the Minnesota Nordic Ski Club at UMN. He raced for the club at the 2024 USCSA National Championships in Lake Placid, NY.

References for Further Reading

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Appendix A: Low-Equipment and No- or Low-Snow Drills and Activities

No-Snow Drills			
Activity / Drill (Classic or Skate)	Equipment and Space Needed	Description	Purpose
Balance Drills ¹ (Both)	Equipment: Various	Many balance drills are very beneficial for Nordic Skiing. The Nordic Ski Lab has videos on various balance drills.	Balance drills are critical for Nordic skiing. They help skiers develop stability, control, and body awareness needed for efficient, smooth movements on snow.
Skier Hops (Both)	Equipment: N/A	<ul style="list-style-type: none"> • Jump side to side, mimicking lateral weight transfer in skiing • Keep movements controlled • Focus on a smooth transition from one leg to another • Make sure that after each hop, the skier's body weight is entirely over the planted foot <p><u>Modifications:</u></p> <ul style="list-style-type: none"> - This drill can be done in place or moving forward - Add poling motions 	Develops agility and balance, helping with lateral motion control for both skate and classic skiing.
Pole planting (Both)	Equipment: Poles	<ul style="list-style-type: none"> • Stand with poles planted firmly in the ground • Press down as hard as possible, engaging the upper body and core • Hold for 10-20 seconds and repeat <p><u>Modifications:</u></p> <ul style="list-style-type: none"> - Holding for longer - Shorter time between reps 	Strengthens core and upper body muscles used while double poling.
Bounding (Classic)	Equipment: Poles (Optional)	<ul style="list-style-type: none"> • Perform long, powerful bounding strides, trying to mimic the motions of classic skiing as close as possible, using your arms as if you were poling • Emphasize forward lean and powerful leg extension <p><u>Modifications:</u></p> <ul style="list-style-type: none"> - Add poles - Perform bounding going uphill 	Builds leg strength, explosiveness, and coordination.
Arm Swings (Classic)	Equipment: Classic poles	<ul style="list-style-type: none"> • Using classic ski poles, practice arm swings while standing or walking • Focus on maintaining proper timing and rhythm between arm and leg movements 	Ingrains proper timing and poling technique for striding.

Explosive Step-Ups (Classic)	Equipment: Box (or something to step onto, like a park bench, etc.)	<ul style="list-style-type: none"> Using a box or step, perform alternating step-ups, driving the opposite knee up as you push off with your leg on the step Focus on explosiveness and mimicking a striding motion <u>Modifications:</u> <ul style="list-style-type: none"> Swing your arms in a striding motion when performing step-ups Hold a low-weight dumbbell in each hand. 	Improves leg power and replicates the explosive push-off in classic skiing.
Bounding (Skate)	Equipment: Poles (optional)	<ul style="list-style-type: none"> Bound side to side with exaggerated, powerful strides, mimicking the skate ski stride Use arms (no poles) as if planting poles, focusing on correct poling timing <u>Modifications:</u> <ul style="list-style-type: none"> Add poles Perform bounding going uphill 	Builds leg strength, power, and reinforces the lateral movement in skate skiing.
Cone Weaving (Skate)	Equipment: Cones	<ul style="list-style-type: none"> Set up cones or markers in a zigzag pattern Practice weaving between them by pushing off with your legs, as in skate skiing 	Develops agility and the ability to change direction smoothly, simulating skate skiing movements.
One-Leg Glides (Skate)	Equipment: N/A	<ul style="list-style-type: none"> Stand on one leg and practice balancing while mimicking the glide phase of skate skiing Switch legs after 30 seconds 	Enhances balance and strength in each leg.
Skater Squats (Skate)	Equipment: N/A	<ul style="list-style-type: none"> Perform squats while focusing on keeping weight on one leg, with the other extended to the side in a skating motion Alternate legs with each squat 	Builds single-leg strength and balance, crucial for pushing off and gliding in skate skiing.
Core Rotations (Skate)	Equipment: Poles or weights	<ul style="list-style-type: none"> Hold ski poles or a weighted object and practice core rotations, mimicking the torso twist used in skate skiing while poling 	Develops core strength and upper body engagement for effective pole plants in skate skiing.

Low-Snow Drills			
Activity / Drill (Classic or Skate)	Equipment and Space Needed	Description	Purpose
Single-Leg Gliding (Both)	Space: 30-40 meters open space Equipment: Skis and poles	<ul style="list-style-type: none"> • Glide on one ski for as long as possible while maintaining balance and good form • Keep the other leg raised • Switching after 20-30 meters <u>Modifications:</u> <ul style="list-style-type: none"> - Have skiers pole as many times as possible while gliding on each ski before switching - Ensure skiers are not using poles to balance 	Improves balance and the ability to maintain a stable glide.
Technique-Focused Skiing (Both)	Space: N/A Equipment: Skis and poles	<ul style="list-style-type: none"> • Have skiers ski slowly, focusing only on technique while skiing around available space • You can have them switch focuses between laps, e.g., weight transfer, poling, core engagement <u>Modifications:</u> <ul style="list-style-type: none"> - Film athletes skiing and review film with them 	Helps improve skiers' technique and increase understanding of which areas of their technique they need to work on.
Double Pole with Glide (Both)	Space: N/A Equipment: Skis and poles	<ul style="list-style-type: none"> • Ski using only the double pole technique, but add a slight glide after each push • Focus on engaging the core for each pole push • Glide as long as possible before the next stroke. 	Reinforces core engagement for double poling and helps improve endurance and glide efficiency.
Step Turns in Place (Both)	Space: Enough space for skiers to turn in a circle without getting in the way of other skiers Equipment: Skis	<ul style="list-style-type: none"> • Practice step turns by planting the inside ski and stepping around with the outside ski • Perform this drill slowly to focus on control 	Improves agility and turning technique in small spaces.
Scooter Skiing (Both)	Space: 30-40 meters of space Equipment: Skis and poles	<ul style="list-style-type: none"> • This drill is especially effective for beginners • Have skiers remove one ski and “scooter” around, focusing on gliding on the ski • Have skiers switch legs halfway through • This drill can be incorporated into relays or into many games. See Trail Kids Games² list for game ideas 	Helps improve balance and confidence gliding on one ski. This drill is especially helpful for new skiers.
One-Step Stride (Classic)	Space: Either can be done while skiing on the available loop, or try taking 30-40 meters to go back and forth. Equipment: Skis	<ul style="list-style-type: none"> • Perform one exaggerated step per ski, focusing on a powerful kick and full weight transfer onto the opposite ski • Pause after each step to maintain balance 	Helps skiers focus on kicking and gliding to help improve classic skiing technique.
No-Pole Stride	Space: N/A	<ul style="list-style-type: none"> • Ski without using poles, focusing purely on leg 	Builds leg strength and balance

(Classic)	Equipment: Skis	<p>motion and balance</p> <ul style="list-style-type: none"> • Make sure to engage the core for stability and proper weight transfer 	while reinforcing proper technique without relying on poles.
Stationary Kick (Classic)	Space: Enough space for all skiers to have space to stand without disturbing other skiers Equipment: Skis	<ul style="list-style-type: none"> • Stand still and practice quick, explosive kicks on each ski without moving forward • Focus on proper kick mechanics, ensuring the weight shifts fully onto the gliding ski 	Sharpens kicking technique and strengthens legs, even in a confined space.
V1 with Minimal Movement (Skate)	Space: N/A Equipment: Skis	<ul style="list-style-type: none"> • Practice the V1 technique with small, controlled pushes, focusing on precise weight transfer and balance • Limit forward movement to a small area. 	Refines V1 technique and improves weight transfer efficiency while using minimal space.
Skate Without Poles (Skate)	Space: N/A Equipment: Skis	<ul style="list-style-type: none"> • Practice the V1 or V2 skate skiing technique without using poles • Focus on proper leg movements, balance, and weight transfer 	Strengthens legs, improves balance, and reinforces proper weight distribution, all without relying on poles.

Thank you to the individuals, teams, and organizations who shared resources! Below, you can find more information and training ideas courtesy of Nordic Ski Lab, The Loppet Foundation, and Jake Eaton at MadNorski.

- [Nordic Ski Lab](#)
 - [Balance Drills](#)
 - [Exercises](#)
- [The Loppet Trail Kids Games](#)
- [MadNorSki Trail Kids Plan](#)
- [PSIA](#) and [U.S. Ski & Snowboard](#)



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