




# 'I want to ski and race, not just ski': a qualitative study on athletes' and stakeholders' perspectives on return-to-sport in high-performance Snowsports

Philippe O Müller <sup>1,2</sup>, Moritz Helbling,<sup>1,2</sup> Evert Verhagen <sup>3</sup>, Jörg Spörri <sup>1,2</sup>, Caroline Bolling<sup>4</sup>

**To cite:** Müller PO, Helbling M, Verhagen E, *et al.* 'I want to ski and race, not just ski': a qualitative study on athletes' and stakeholders' perspectives on return-to-sport in high-performance Snowsports. *BMJ Open Sport & Exercise Medicine* 2024;**10**:e001967. doi:10.1136/bmjsem-2024-001967

► Additional supplemental material is published online only. To view, please visit the journal online (<https://doi.org/10.1136/bmjsem-2024-001967>).

POM and MH contributed equally,  
JS and CB contributed equally.

POM and MH are joint first authors.

Accepted 10 June 2024



© Author(s) (or their employer(s)) 2024. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

**Correspondence to**  
Caroline Bolling;  
c.silveirabolling@amsterdamumc.nl

## ABSTRACT

This study explored stakeholders' perspectives on current practices, challenges and opportunities related to the return-to-sport (RTS) process in high-performance Snowsports. We conducted fourteen semi-structured interviews with athletes, coaches and health professionals from multiple countries using online video platforms. The data were transcribed verbatim and analysed based on constant comparative analysis employing the principles of Grounded Theory. Codes were grouped into categories and main concepts and a conceptual model were derived. According to the participants, RTS should be considered a continuous process to bring the athlete back to competition as fast and safely as possible, whereas speed is often prioritised over safety. Participants described the need for a structured and criteria-based process. Despite the multiple phases and the diversity of involved professionals, the process is individualised and unique, highlighting the value of having the athlete at the centre of the RTS process. It was considered essential to provide a safe environment and build trustworthy relationships. Additionally, access to resources, communication and cooperation among all experts was perceived as critical to successful RTS. Our participants described the value of continuity and an athlete-centred approach to the RTS process. The challenges, such as interprofessional communication, the lack of objective sport-specific criteria, and the diversity of resources and network structures, were perceived as practical issues that influenced the process, which should be tailored for each athlete accordingly to reach a successful RTS.

## INTRODUCTION

Nearly every athlete will be injured and endure a return-to-sport (RTS) process during their active career in high-risk Snowsports.<sup>1,2</sup> The RTS process is complex and influenced by biological, physical, psychological and social factors.<sup>3</sup> In particular, the RTS after severe traumatic injuries such as ACL injuries has been the subject of many studies, which have defined tests and criteria for a safe RTS.<sup>4</sup> Some factors, such as physical requirements (ie, strength, flexibility and absence

## WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Return-to-sport (RTS) poses a challenge in an athlete's career.
- ⇒ RTS is supported by professionals from different fields of expertise, and shared decision-making is recommended.
- ⇒ RTS encompasses different phases monitored by functional and clinical criteria/milestones.

## WHAT THIS STUDY ADDS

- ⇒ Stakeholders reported needing more interprofessional cooperation and better information flow across the RTS phases.
- ⇒ Expert networks, resources and structure strongly influence interprofessional cooperation and information exchange.
- ⇒ Athletes must be well informed and supported by a team of experts to have trust and confidence in the process.

## HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ There is a practical need to develop cooperation and communication tools between experts to facilitate interprofessional work.
- ⇒ The RTS process needs to be athlete-centred, requiring a tailored approach that considers the athlete's needs, the available resources and the professional network.

of pain), have been widely researched<sup>5</sup> while psychosocial factors have limited evidence.<sup>4,6</sup>

The STaRRT (strategic assessment of risk and risk tolerance for return-to-play decision-making) framework proposes facilitating RTS decision-making by assessing the factors involved in the process.<sup>7</sup> Such factors can be related to the injury itself (tissue health), the load that this tissue will be exposed and contextual factors, making the decision making a complex puzzle. The STaRRT combines factors belonging to different levels, requiring a 'big picture' view to assess the risk. In this way, the RTS process can be

influenced by factors such as age, time in the season and available resources, ultimately influencing decision-making, outcomes and timelines. Although biological factors are widely researched, there is a lack of knowledge about which psychosocial factors play a role in high-performance Snowsports and how they impact the RTS process.

High-performance Snowsports are known for a high injury risk, with a risk of suffering at least one traumatic injury during an entire season.<sup>1</sup> The most common injuries concern the head, lumbar spine, lower leg and knee.<sup>1</sup> The RTS process differs in every sport. For example, in comparison to rehabilitation programmes for court or field athletes, the skiing RTS process must focus on slow eccentric loading, weight-bearing power and endurance,<sup>8</sup> and environmental/contextual factors such as snow availability and competition schedule play an important role. Considering the multiplicity of scenarios, that is, the various subdisciplines, injuries and levels in this context, there is a need to understand how the RTS process is experienced in Snowsports and how contextual factors, for example the setting (clinical, off-snow or on-snow), influence the journeys of Snowsports athletes while returning to their sports.<sup>8</sup>

Athletes and stakeholders, including coaches (on- and off-snow), physiotherapists, medical doctors, strength and conditioning coaches, and sport psychologists, are involved in the RTS process and address the influencing factors and make decisions. To better understand these influencing factors, examining the RTS process from different perspectives is necessary. Athletes and stakeholders can provide an insider view of the RTS process as they deal with it daily, and they actively shape the process of RTS with their knowledge and expertise. Qualitative research methods can give voice to athletes and stakeholders to gather multiple perspectives and experiences and better understand the real-world setting.<sup>9 10</sup> Furthermore, qualitative research methods may help to understand how to implement practices by including all athletes and stakeholders in the decision-making process.<sup>11–13</sup>

Accordingly, this study explored perspectives and experiences regarding the RTS process in high-performance Snowsports to understand current practices, challenges and opportunities.

## METHOD

### Study design

This study followed a constructivist approach<sup>14</sup> which assumes that athletes, stakeholders and their environment represent a social reality. The participants influence the researcher's belief and interpretation, allowing for the cocreation of knowledge between researchers and participants. Considering the exploratory nature of our study and acknowledging the importance of exploring personal meaning and the interrelationship between subjects' perceptions and their context, we applied Grounded Theory (GT) principles<sup>15 16</sup> to design and

analyse the data. To do so, we applied iterative data collection and analysis, constant comparison, and theoretical sampling. The reporting structure followed the Consolidated Criteria for Reporting Qualitative Research (online supplemental material).<sup>14 17</sup>

### Participants and recruitment

Active or retired World Cup athletes with at least one severe injury, on-snow coaches, strength-conditioning coaches, psychologists, physiotherapists and physicians working in high-performance Snowsports (alpine skiing, freestyle skiing and snowboarding) were recruited based on the authors' personal contacts. All participants were adults. The authors, who made the initial personal contacts, passed on the interested participants to the interviewers who collected the data. However, the interviewees had no relationship with any of the interviewers. Furthermore, participants were asked to provide contact details for potential interviewees. Additional participants were invited using this respondent-driven sampling approach. We aimed to include participants from different countries, ages, backgrounds and modalities to cover a wide range of perceptions according to the principle of maximum variance sampling. A total of 17 stakeholders were invited, and three did not respond, even after two reminders. Each participant was contacted by email, informed of the study's background and signed an informed consent form. They did not have a prior relationship with the interviewer. This study was approved by the Cantonal Ethics Committee KEK Zurich (BASEC Nr. Req. 2020-00643) and was judged not to fall within the scope of the Human Research Act.

### Data collection

Individual semi-structured interviews were conducted by POM (five interviews) and MH (nine interviews), depending on their availability, in German or English through Microsoft Teams or WhatsApp between June and November 2022. The research team developed the interview guide, presented in [table 1](#), in several meetings, according to the current literature on RTS.<sup>2 3 18 19</sup> A pilot interview with a high-performance athlete from another high-risk sport was conducted and was not included in the data collection. After the pilot interview, the interviewers fine-tuned their interview practices, and the guide was further refined. Adjustments were made, particularly regarding psychosocial aspects, by explicitly asking about them in the 'safe RTS criteria' and 'barriers of RTS' interview sections. The interview guide did not distinguish between the various stakeholder groups but instead focused on conducting in-depth discussion regarding the diverse expertise of the interviewees. After 13 interviews, no new categories emerged during the data collection or the generation of no new codes, indicating data saturation.<sup>20</sup> An additional interview was conducted to ensure that theoretical saturation had been reached, resulting in a total of 14 interviews that were further analysed.

**Table 1** Topic list and interview questions

Topic	Questions
Definition of RTS	How would you define and what is your perception of the RTS process?
Goal of RTS	What is your goal for the RTS process?
Structure of RTS	Do you think having a structure in the RTS process is necessary?
	Suppose you need to describe a timeline or the structure of an athlete's journey from injury to the RTS. How would you describe this process?
	Do you divide or see different phases along the process?
	When and where does it need sport-specific rehab?
	Where does your responsibility lie in an athlete's RTS process?
Safe RTS criteria	What do you consider important factors in a safe RTS process?
	Do you use criteria during the RTS process?
	What are important checkpoints/milestones for you?
Barriers of RTS	Are there/what are barriers in the RTS process?
	What is missing today regarding the RTS process?

RTS, return-to-sport.

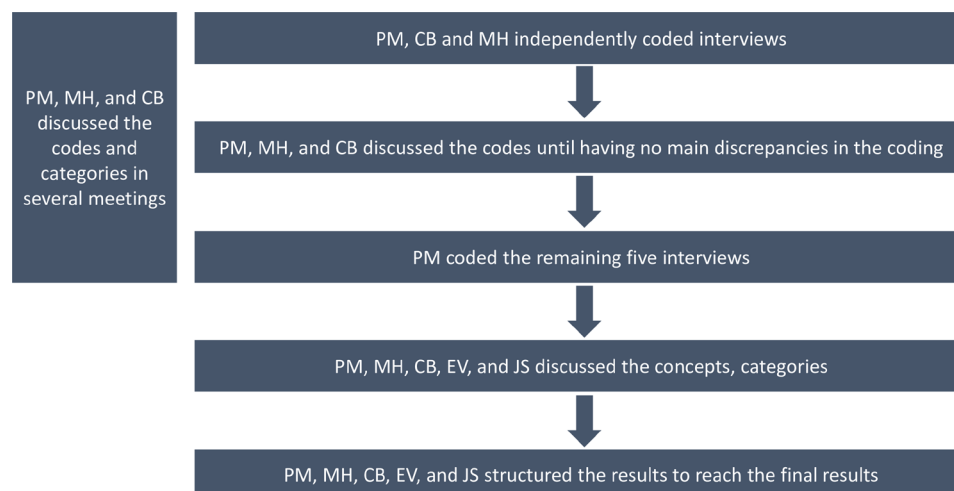
### Data analysis

All interviews were audio recorded and transcribed verbatim. The transcriptions were not returned to the participants. The data were analysed inductively via constant comparative analysis, employing the principles of GT using MAXQDA software.<sup>16 21</sup> The data analysis structure is illustrated in [figure 1](#). Initially, POM and CB independently coded three interviews. After the first alignment (POM and CB), POM continued coding the following interviews (n=7). Subsequently, MH and POM independently coded two interviews. After CB, MH and POM agreed on the main codes and categories, the remaining interviews (n=5) were coded by POM. CB, MH and POM discussed the final concepts and categories in several meetings. The results were debated with two coauthors (JS and EV) who were not involved in the interviews or coding. In this session, codes, categories

and discrepancies were discussed and compared between the researchers (POM, MH, CB, EV and JS) until the categories of interest for the analysis were agreed on. Finally, the results were structured, considering similarities, differences and connections to reach the main concepts, categories and subcategories, building the final conceptual model of the analysis. The interviews were coded in the original language, and the codes were written in English. Only the selected quotes were translated by POM and verified by MH.

### RESULTS

We conducted 14 interviews with 2 athletes, 2 former athletes, 2 on-snow coaches, 2 strength-conditioning coaches, 1 sports psychologist, 3 physiotherapists and 2 physicians. Of the 14 interviewees, 5 were women. Participants came from Germany (n=3), Austria (n=1),


**Figure 1** Data analysis structure.



**Figure 2** A multifactor framework for the return-to-sport (RTS) journey in Snowsports. The colours group the categories and subcategories into the three concepts. Starting left in the figure and moving right; (blue) describes the RTS as a process; (green) entails the athlete-centred factors; (yellow) represents the multiple resources and experts in the system.

Switzerland (n=3), Norway (n=3), Slovenia (n=3) and the USA (n=1). No further details will be provided to guarantee the anonymity of our participants. The mean length of the interviews was 32 min (range: 18–55 min).

Our analysis revealed three main concepts, each with subsequent categories and subcategories, as illustrated in [figure 2](#). The first concept describes RTS as a continuous process with one end goal: returning the athlete back to competition through a structured and criteria-based process. The second concept acknowledges the individuality and uniqueness of the athlete being the centre of the process. The third concept represents the setting of multiple resources and experts, showing the importance of having an integrated system and a tailored process according to the context. To illustrate the concepts and categories, [tables 2–4](#) contains representative quotes.

### Concept 1: RTS is a process

#### Category 1.1: The process requires goals

The participants described RTS as a goal-oriented process guided by short- and long-term goals, according to the different phases.

##### Subcategory 1.1.1: Small steps

According to most participants, small steps help them reach their end goal. In particular, the athletes highlighted the need for small steps to see the path of returning to sports. The achievement of small goals in different phases of the RTS process was referred to as indicating the progression of the rehabilitation. These goals are strongly shaped by expertise. The physicians emphasised reducing the swelling and the absence of infection, while the physiotherapists focused on reaching full ROM and building strength and muscle mass. Coaches stated that they targeted primarily sport-specific goals. To achieve the next phase of the process, the short-term goals of an earlier phase need to be accomplished, indicating the continuity of the process and the integration of the

phases (ie, postoperative, early, middle or late rehabilitation).

##### Subcategory 1.1.2: ONE final goal

All participants mentioned that ‘returning to competition as quickly and safely as possible’ was their ultimate goal. Health professionals emphasised that, in addition, they also aim to reduce athlete re-injury risk. In contrast, coaches emphasised the importance of returning to sport while healthy as soon as possible. It was mentioned several times that the end goal should be defined by the athlete and adapted according to their circumstances. For instance, an athlete on the eve of his career, shortly before his last Olympics, may differ from a youth athlete. Some participants mentioned the stress and pressure of achieving the final goal of returning to competition as soon as possible. In particular, athletes expressed stress and pressure to justify returning to competition too fast or too early. In contrast, several times, it was emphasised that it is easier to go through the challenging rehabilitation process with the final goal of returning to competition in mind.

#### Category 1.2: The process requires structure

All the interviews highlighted the importance of a structured RTS process. According to the athletes and stakeholders, two components are central to structuring the RTS process: milestones and criteria.

##### Subcategory 1.2.1: Milestones

Milestones were described as points in the timeline that assisted in structuring the process. Despite the importance of structure, the process needs to be individualised and flexible. Different Snowsport discipline-specific skills (jumps with rotations in freestyle disciplines vs jumps in alpine skiing) were mentioned as required to be developed at different times.

##### Subcategory 1.2.2: Criteria based

Criteria are typically used to verify whether intermediate goals have been achieved. The interviewees emphasised that the more precisely the criteria are defined in cooperation with the experts involved, the easier it is to control and adjust the process. According to the participants, reasonable criteria should be Snowsport-specific. Participants stated that the goals must be measurable and verified on a criteria-based approach. Accordingly, criteria are necessary to progress and to be able to assess deficits and return to the desired starting point. Some participants named numerous milestones in early and middle rehabilitation but reported a lack of given or defined criteria for sport-specific later RTS stages.

### Concept 2: For one athlete

#### Category 2.1: Athlete is in the centre

Participants highlighted the value of considering each RTS process as unique and individual, requiring an athlete-centred approach tailored to their needs.

**Table 2** Categories, subcategories and quotes related to the first concept, 'RTS is a process'

Category	Subcategory	Illustrative quotes
1.1 The process requires goals	1.1.1 Small steps	<p>'A lot of different injuries and healthcare exist. Most are in a grey area, only a few are black and white. Try to give as much objectivity as you can to the athlete, but also, as a clinician, have objectivity to rely on. It does make things clearer, and it helps to ensure that a certain level of health, safety and proficiency is met' (participant 2/strength-conditioning coach).</p> <p>'That you say, when you have achieved this, now comes the next' (participant 9/strength-conditioning coach).</p> <p>'Yes, at every point, so that begins after the interaction, I will say postoperatively, all those involved are first brought on board, from the surgeon to the rehabilitation facility,(...), which then deals with the topic step by step in the further process at a, I will say now, goal setting in these different stages' (participant 7/on-snow coach).</p>
	1.1.2 ONE final goal	<p>'The goal is always to get the athlete back to competition as quickly as possible. That is our task here - in addition, of course, healthy' (participant 7/on-snow coach).</p> <p>'However, in the end, the goal is that you get back to where you were, and you can move on to achieve your career goals or seasonal goals again' (participant 6/on-snow coach).</p> <p>'I think it is very important to have a goal once you are injured. It is much easier, I guess, going through the injury with the mindset of coming back' (participant 12/active athlete).</p>
1.2 The process requires structure	1.2.1 Milestones	<p>'You then build up the data of the follow-up training, as I said, when is he ready for single-leg jumps? These whole subsections go from physiotherapy back to performance training. You define very clear milestones together' (participant 9/strength-conditioning coach).</p> <p>'And then as we introduce impact and we start collecting data on the impact those requirements or those goals then become benchmarks that we are striving to achieve this metric, this marker and then as we are truly lifting, we're losing our restrictions they can like we're truly starting to prep to get back to snow' (participant 2/strength-conditioning coach).</p> <p>'And then, as we discussed before, to reach smaller goals and to achieve something before you truly return to your sport' (participant 12/active athlete).</p> <p>'Of course, it is determined in detail. First, we have phase goals. In addition, each phase, in turn, has an end goal, where I know how these phases must proceed. If the final goal is reached, the person moves on to the next phase. Because each phase can run for a different length of time, and it is also possible that you return from a higher-level phase to another phase, for example, phase 3 in phase 2' (participant 10/physician).</p>
	1.2.2 Criteria based	<p>'I mean, if you take an ACL injury, for instance, we usually take nine months before we say that people are healthy and good to go if they also, of course, fulfil some of our criteria, which are based on strength level, muscle mass and of course function. Therefore, we can expect to see that they have good movement patterns in exercises and things they are used to doing and that we see that they can do, but in Alpine skiing, for instance, they ski all the disciplines and different terrains, different offset, different speeds and so on' (participant 1/physiotherapist).</p> <p>'That there are clearly defined steps. That you say, when you have achieved this, then the next one comes. There are very clear criteria of fulfilment, and then the next one comes' (participant 9/strength-conditioning coach).</p>

### Subcategory 2.1.1: Trust

According to the athletes and stakeholders, good decisions can be made only with trust in the experts and the process. The participants indicated that the athletes need to trust the team of professionals, the process and their abilities. Some participants, especially athletes, mentioned that an injury enables reflection and processing to regain physical and mental well-being and self-confidence.

### Subcategory 2.1.2: Build a safe environment

Participants acknowledged that an injury takes the athlete out of their familiar environment. It was considered important to ensure that the athlete feels comfortable away from their usual clinical, training and social settings, and potentially working with new experts. Participants perceived social support as essential for recovery. An atmosphere that provides warmth, understanding and support was perceived as key to feeling secure and safe.

**Table 3** Categories, subcategories and quotes related to the second concept, 'For one athlete'

Category	Subcategory	Illustrative quotes
2.1 Athlete is the centre	2.1.1 Trust	'Therefore, I think this is a part that communication comes in as well, and trust. If the athlete trusts the process and trusts the people who they work with, it will be easier' (participant 11/physiotherapist). 'And yes, I believe that the people are not only professionally competent but that the athlete can also trust them and dare to communicate and have a contact point when frustrations arise' (participant 3/former athlete). 'First, I think the most important is that the athlete feels secure' (participant 1/physiotherapist).
	2.1.2 Build a safe environment	'It is very important who we are surrounded with. Therefore, I think good friends or family are very important in this situation, and it is much easier for the athlete to have this at home, to feel good where they stay. I would say all these aspects are very important' (participant 12/active athlete). 'Therefore, what I'm saying is, in the end, it is the whole environment you surround yourself with. From the family to the doctors, etc., is crucial if you can be successful' (participant 8/former athlete). 'I think it is important for the athlete to have confidence. They don't let me fall. They still believe in me. They support me. They listen to me. I think that is the most important thing. The worst thing is when the athlete feels lost somewhere or thinks they are no longer interested in me' (participant 6/on-snow coach).

Additionally, a functioning environment protects the athlete from disturbing external influences (eg, social media, pressure from the federation and sponsors).

### Concept 3: Multiple resources and many experts

#### Category 3.1: Multiple resources

The RTS process requires resources such as expert networks and infrastructure. Considering that the participants were from different countries, different resources and networks were described according to the supporting system of the athlete and the organisation policies and budget.

##### Subcategory 3.1.1: Experts network

All participants mentioned the need for RTS experts and support staff to assist the athletes in making the right decisions at the right time. However, connections to a supportive network are not always given or available. Youth athletes struggle to access the 'best' specialists. An athlete explicitly acknowledged the benefit of having a network before the injury. This happens to successful or previously injured athletes but not to youth athletes. Several participants mentioned that the geographical proximity of experts in terms of distance is a challenging problem. On the one hand, most specialists, such as physiotherapists, travel with their teams during the season. On the other hand, the athletes' distance (geographically) to the training centre can also impose financial and logistical challenges.

##### Subcategory 3.1.2: Infrastructure

Several participants mentioned that the infrastructure provided to the athletes differs from country to country according to the available resources. Some participants reported the structure of having one centralised rehabilitation/training centre where all injured athletes of

all disciplines trained together; others had several local centres. In other nations, no specific rehabilitation centres exist, and athletes need to organise rehabilitation mostly on their own. The resources and facilities were described as influencing factors. However, no ideal setting was proposed, and the pros and cons of different settings were mentioned.

#### Category 3.2: Many experts, one workflow

All participants considered cooperation between the experts and the athletes essential for successful rehabilitation. Constant exchange during the process with shared planning, was considered to support decision-making. Throughout the process, the successful management of transitions is critical. To do so, many interviewees believed that the experts must be coordinated systematically.

##### Subcategory 3.2.1: Cooperation

Some experts (eg, on-snow coaches and sport psychologists) work mostly outside the medical RTS process, which is perceived as ineffective. Greater integration of the RTS team is desirable so that the right experts can be involved at the right time. Some participants underlined the frequent lack of cooperation and exchange across the RTS phases. The dialogue between the early stages (physicians and physiotherapists) and the late-stage experts (on-snow coaches and strength and conditioning coaches) was mentioned as difficult or non-existent. Several times, a lack of knowledge or expertise in areas other than their own was indicated.

Furthermore, most interviewees highlighted the positive impact of athletes who fully comprehend the steps in the RTS process, as they facilitate the entire process. In addition, the importance of sharing experiences was mentioned, suggesting, for instance, that older athletes

**Table 4** Categories, subcategories and quotes related to the third concept, ‘Multiple resources and many experts’

Category	Subcategory	Illustrative quotes
3.1 Multiple resources	3.1.1 Experts network	<p>‘And if problems arise somewhere in these structures, that you keep saying where you can ask if it still does not work. That you have a good network there,(...)’ (participant 9/strength-conditioning coach).</p> <p>‘And it is a challenge for us in the youth sector, where we will work locally because we still have to fight a bit to make sure that the children can go to a good sports doctor for a check-up or can also have the surgeries at a certain time’ (participant 3/former athlete).</p>
	3.1.2 Infrastructure	<p>‘Being in the winter world is a challenge. In that, you need equipment. You need the capability to do those skills, and you must have some snow because while there are indoor options, they just are not quite the same’ (participant 2/strength-conditioning coach).</p> <p>‘We do miss an institution that would like to help you go through the whole process and have some experts there because you need you are a bit on your own, and you need to find people they do this process with you’ (participant 12/athlete).</p> <p>‘Of course, barriers exist because we are not in a safe, closed practice. Therefore, we normally must play around or like organise everything by ourselves. Sometimes, we must solve the problem on the field, and sometimes the resources we have with us are not 100%, so there are limited resources, especially when we are in the process of travelling’ (participant 11/physiotherapist).</p> <p>‘Barriers are clearly the resources, I would say. Because you cannot work as individually with everyone as you should. In addition, everyone is different. You cannot make a pot. I think resources are a problem’ (participant 6/on-snow coach).</p>
3.2 Many experts, one workflow	3.2.1 Cooperation	<p>‘It needs to be in a collaboration like a multidisciplinary collaboration’ (participant 11/physiotherapist).</p> <p>‘Who oversees it overall, who is coordinating it overall, and what parts do we have in it so that these components are coordinated with each other, and everyone knows from each other what is happening. In addition, this lack of coordination and communication is certainly the biggest factor’ (participant 5/sports psychologist).</p> <p>‘If it is during a season, we usually come by for some of the sessions to check in and see how they do, and we also have meetings now and then every month or sometimes also more frequently, with everybody involved, and together with the athlete also. To check and see the progression’ (participant 1/physiotherapist).</p>
	3.2.2 Communication	<p>‘However, I think it is very important for us, the medical team, the strength and conditioning team and everyone else to basically know how to communicate everything with the athlete, work with them’ (participant 11/physiotherapist).</p> <p>‘It is important that they also stick together and talk between each other and give information to each other’ (participant 13/active athlete).</p> <p>‘This transition should be better. This communication is sometimes, well, too lacking. In addition, there is the same problem. The medical doctor also has many appointments and many, I almost said, guests, many patients, and then it is also difficult to find time with every coach. It is clear’ (participant 6/on-snow coach).</p>

who have undergone the same processes could support younger athletes.

#### *Subcategory 3.2.2: Communication*

All participants mentioned that communication between all experts is key to a successful RTS process. Several times, it was emphasised that the athlete, the only one following the whole process, needs clear communication. Most participants mentioned that sharing knowledge and experiences among RTS experts is essential. The athlete should report, share their feelings and discuss with the experts as often as possible to help improve, adapt and individualise the RTS process. Moreover, all participants emphasised the challenge of good communication. Several participants mentioned the RTS

experts’ availability and the transfer of responsibility in the various phases of the process as challenging. Poor or insufficient communication can lead to losing vital information, especially during transitions between phases. Several interviewees mentioned that it would be beneficial to have a centralised steering committee with organised meetings every few weeks, including all the involved experts.

## **DISCUSSION**

The current study emphasises the need for an athlete-centred approach, fostering a multidisciplinary network. The challenges highlighted by the participants were interprofessional coordination, efficient communication,

establishing a safe environment and providing access to resources tailored to the athlete.

### **Returning to competition as quickly and safely as possible is the ultimate RTS goal**

In our study, all participants mentioned the same end goal: returning to competition safely and in the shortest possible time. Additionally, some athletes and stakeholders defined RTS as returning to (preinjury) performance. In the literature, different terms such as return-to-activity, return-to-play/competition, or return-to-performance are used.<sup>22</sup> Considering the RTS as a continuum,<sup>3 23 24</sup> return-to-participation, RTS and return-to-performance were mentioned in some way by our participants. The return-to-performance, defined as performing at the same level as before the injury, is usually defined as the end of the RTS process.<sup>3</sup> However, our participants perceived returning to competition, the moment that they resumed their participation at the competitive level, as the end goal of the process. We can assume that the competitive context and the performance-driven environment, influence such perceptions, making the concept of returning to competition central for this group. The definition of RTS seems to be context dependent and will probably differ at other levels and be influenced by factors such as the motivation to return to sports.

The idea of a fast and safe return to competition described by our interviewees is consistent with the current literature. The literature recommends reducing re-injury risk and having a time-efficient process,<sup>3</sup> which was also mentioned in our study. A more 'accelerated' RTS process is also described as part of the elite sports context, considering the performance-driven nature of this context, which is also aligned with evidence.<sup>7</sup>

### **RTS continuum comprises distinct phases associated with intermediate functional and clinical goals and is monitored using meaningful milestones/criteria**

RTS was described as a continuous process built by many smaller or larger goals and monitored by milestones and criteria. Goals, milestones and criteria bring structure to the process and were also mentioned by the athletes to keep them motivated. While the participants agreed on the final goal, the smaller goals, milestones and criteria were described differently depending on their focus and expertise. Many interviewees mentioned a lack of Snowsports-specific criteria, especially in the later RTS phases. Phase models often end with transitioning to on-snow training or reintegration into the team.<sup>5</sup> In particular, the on-snow coaches preferred to have valid criteria, as they reported working on trial-and-error methods based on their experiences. Furthermore, addressing the challenges described in the transition between the phases is necessary by involving the different experts and their focus on certain RTS phases. To this end, existing RTS frameworks<sup>3 4 6</sup> need to be made more Snowsport-specific.<sup>8</sup>

### **Transparent communication for better decision-making**

Our study revealed that active and open communication is perceived as one of the most critical factors for successful rehabilitation. Better communication improves shared-information, prevents loss of information and clarifies the roles and responsibilities of each stakeholder.<sup>25 26</sup> Transparency is required to talk honestly about problems and setbacks, allowing appropriate actions to be taken.<sup>27</sup> Our participants stressed the need for good communication and cooperation within the team and with the athletes to foster transparency and shared decision-making, which is often lacking. However, to improve communication, knowledge is key.<sup>28</sup> Knowledge about the work of all experts fosters a better understanding of each phase.<sup>29-31</sup> First, athletes must be appropriately educated, as patient education benefits the healing process,<sup>32</sup> allowing them to play an active role in decision-making. The transfer of knowledge not only between athletes and experts but also between athletes with similar experiences is recommended.<sup>33</sup> In our interviews, it was mentioned several times that athletes who are or have been in the same situation should share their experiences and expectations. Support and being understood by colleagues also help athletes handle difficult situations.<sup>34-36</sup>

### **Providing a safe environment based on trust**

Several times, our participants mentioned the relevance of a safe environment for building trust. First, trust is needed for communication with experts throughout the process. Second, trust helps in the active involvement of injured athletes, while the literature recommends promoting autonomy and self-efficacy.<sup>6 37</sup> This is reinforced by evidence indicating that motivation, confidence, and low fear are positively related to a faster return to pre-injury levels.<sup>18</sup>

Social support is essential for rehabilitation.<sup>26 36</sup> The athletes in our study reported that social support from experts, friends, teammates and family was crucial for handling psychosocial challenges. Some participants mentioned that athletes are often pressured to return as quickly as possible. The pressure comes from the athletes themselves (eg, comparison with other athletes, fear of losing selection) and from the outside (eg, the pressure of the coaches or federation, loss of the starting position, loss of sponsors).<sup>18 36 38</sup> Some athletes reported that, in retrospect, they had returned too early, suggesting that future measures should reduce psychosocial stressors to protect athletes from returning too soon.

### **Tailoring resources to athletes' needs**

RTS includes physical, psychological and social aspects.<sup>39-42</sup> Athletes and stakeholders repeatedly highlighted that the RTS process must be individualised and athlete-centred. Therefore, resources such as experts networks and infrastructure must be tailored accordingly. In our interviews, it was mentioned several times that the rehabilitation services available for young athletes are limited due to a lack of resources. Barriers to healthcare



often include access and financial restraints.<sup>43</sup> This is strongly related to the health insurance model and can negatively impact athletes. Various experts are involved in athletes' RTS journeys,<sup>28 44</sup> and direct access to an expert network is crucial for athletes, parents (especially young athletes) and coaches to address athletes' individual needs. In addition, the availability of infrastructure was highlighted as being different in each nation. Some countries have central rehabilitation facilities, and rehabilitation is completely decentralised in others. Finally, there is the financial challenge of having access to on-snow training and travelling around the globe throughout the season. However, if the RTS is tailored to the athlete and experts are available comprehensively, whether the infrastructure differs or the rehabilitation is centralised or decentralised seems unimportant.<sup>6</sup>

### Clinical implications

From an implementation perspective, milestones must be measurable and verified on a criteria-based approach. Accordingly, criteria are necessary to progress, to be able to assess deficits and return to the desired starting point. Different Snowsport disciplines require specific skills. The physical and mental demands of a skill determine at which stage it can be reintroduced after an injury. Therefore, the criteria should be Snowsport-specific.

An athlete-centred approach is needed to meet the individual's physical, psychological and social needs. To build trust, the athlete needs to be informed about the different phases of the process and be involved in all the decisions along the way. The rehabilitation can allow time for reflection and processing to restore physical and mental well-being. Social support is essential to help the athlete feel safe in the new environment and to deal with the new situation.

Improving the information flow and communication during RTS is needed. It would be beneficial if all experts on the RTS pathway would decide in a shared decision-making process on important goals, milestones, and criteria, including on-snow training. The progression between phases should be supervised by all stakeholders, especially when there is a shared responsibility to meet specific criteria.

Therefore, a consistent RTS team that supports athletes from the beginning to the end is crucial. Platforms could be created to facilitate the exchange of experiences between athletes. For implementation, open and continuous communication should be guaranteed, for example, by having one coordinator through the entire process or by regular RTS team meetings with all the experts. As resources in the RTS process are often limited, available resources should be used as effectively as possible and tailored to the athlete's needs.

### Methodological considerations

This study includes a wide range of perspectives on the RTS process. Using a broad sample of different athletes and stakeholders from various Snowsport disciplines

captures many relevant areas of the RTS. The athletes' perspectives are, for instance, well represented by the inclusion of active versus retired athletes and athletes who have suffered from a variety of different types of injuries.

Due to our inclusion criterion of high-performance experts, the sample does not represent the average. We also have a limited representation of countries restricted to two continents. Additionally, some professionals were under-represented in our sample, and despite the thematic saturation being reached, the limited inclusion of other professions could have influenced the results. Furthermore, sex was not equally distributed, with more male than female participants.

POM and MH were trained and supervised by CB (experienced qualitative researcher) to conduct and analyse qualitative interviews. They also followed the same structure to guarantee consistency in the data collection. There was a continuous exchange between the interviewers after each interview to constantly compare information and guarantee consistency. Independent coding and ongoing alignment were carried out with three researchers to ensure objectivity in the data analyses. To reduce coder bias, independent researchers were involved in the later phase of data analysis. Numerous discussions took place to validate the generated theories with the literature and to increase their confirmability. This study followed a constructivist approach. We assumed that the social and professional backgrounds of the interviewers can influence the data collection and analysis. Our research team, which included one woman and four men, consisted of an international group from the Netherlands, Brazil and Switzerland with different professional backgrounds. POM works as a sport psychologist and PhD candidate. MH works as a medical doctor. CB is a sports physiotherapist and a postdoctoral researcher. JS and EV are senior researchers with experience in injury prevention and Snowsports.

### CONCLUSION

In high-performance Snowsports, current RTS best practices involve an athlete-centred process with distinct phases and milestones monitored by functional and clinical criteria. In this context, the RTS should be considered a continuous process supported by the experts and resources tailored to the athlete's needs. In addition, there is a need for more interprofessional collaboration and better information flow between the different RTS phases.

#### Author affiliations

<sup>1</sup>University Centre for Prevention and Sports Medicine, Balgrist University Hospital, University of Zurich, Zurich, Switzerland

<sup>2</sup>Sports Medical Research Group, Department of Orthopaedics, Balgrist University Hospital, University of Zurich, Zurich, Switzerland

<sup>3</sup>Amsterdam Collaboration on Health and Safety in Sports, IOC Research Centre for Prevention of Injury and Protection of Athlete Health, Department of Public and Occupational Health, Amsterdam Movement Sciences, Amsterdam UMC, Amsterdam, The Netherlands

<sup>4</sup>Amsterdam Collaboration on Health and Safety in Sports, IOC Research Centre for Prevention of Injury and Protection of Athlete Health, Department of Orthopedic Surgery and Sports Medicine, Amsterdam Movement Sciences, Amsterdam UMC, Amsterdam, The Netherlands

X Evert Verhagen @evertverhagen

**Acknowledgements** We would like to thank all the interview participants. Special thanks go to Professor Dr med. Mazda Farshad, who supervised MH's medical dissertation, which coincides with this publication.

**Contributors** POM, MH, JS and CB conceptualised and designed the study. JS, POM and MH recruited the participants, and POM and MH collected the data. POM, MH and CB analysed the data. All authors contributed to the interpretation of the data. POM and MH drafted the current manuscript; all authors revised it critically, approved the final version of the manuscript, and agreed to be accountable for all aspects of the work. POM is the responsible author for the overall content as the guarantor and accepts full responsibility for the work and/ or the conduct of the study, had access to the data, and controlled the decision to publish. JS and CB are joint last authors.

**Funding** This study was funded by the International Ski and Snowboard Federation (FIS) as part of the Athlete Health Unit (AHU) framework project 'Athlete Health Protection'. The funding source was not involved in the study design; in the collection, analysis or interpretation of the data, in the writing of the report or in the decision to submit this paper for publication. CB was funded by the IOC Medical Research Funds within the last 36 months.

**Disclaimer** AI use statement: during the preparation of this work the authors used the DeepL Translator (DeepL SE, Germany) and the American Journal Experts (AJE) Digital Editing Tool (Research Square Company, Springer Nature, USA) to improve the English language of the manuscript. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

**Competing interests** EV and CB are members of the BMJ Open Sports & Exercise Medicine (BOSEM) Editorial Board.

**Patient consent for publication** Not applicable.

**Ethics approval** The present study protocol was reviewed by the Cantonal Ethics Committee KEK Zurich (BASEC Nr. REQ.2020-00643) and was judged not to fall within the scope of the Human Research Act (HRA). Despite not being required in such cases, all participants received a participant information sheet and provided written informed consent to participate in the study.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** All data relevant to the study are included in the article or uploaded as supplementary information.

**Supplemental material** This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

#### ORCID iDs

Philippe O Müller <http://orcid.org/0009-0009-3104-8318>

Evert Verhagen <http://orcid.org/0000-0001-9227-8234>

Jörg Spörri <http://orcid.org/0000-0002-0353-1021>

#### REFERENCES

- Fröhlich S, Helbling M, Fucntese SF, et al. Injury risks among elite competitive alpine skiers are underestimated if not registered prospectively, over the entire season and regardless of whether requiring medical attention. *Knee Surg Sports Traumatol Arthrosc* 2021;29:1635–43.
- Tarka MC, Davey A, Lonza GC, et al. Alpine ski racing injuries. *Sports Health* 2019;11:265–71.
- Ardern CL, Glasgow P, Schneiders A, et al. Consensus statement on return to sport from the First World Congress in Sports Physical Therapy, Bern. *Br J Sports Med* 2016;50:853–64.
- Keller M, Kurz E, Schmidlein O, et al. Interdisciplinary assessment criteria for rehabilitation after injuries of the lower extremity: a function-based return to activity algorithm. *Sportverletz Sportschaden* 2016;30:38–49.
- Hewett TE, Ford KR, Hoogenboom BJ, et al. Understanding and preventing ACL injuries: current biomechanical and epidemiologic considerations - update 2010. *N Am J Sports Phys Ther* 2010;5:234–51.
- Truong LK, Mosewich AD, Holt CJ, et al. Psychological, social and contextual factors across recovery stages following a sport-related knee injury: a scoping review. *Br J Sports Med* 2020;54:1149–56.
- Shrier I. Strategic assessment of risk and risk tolerance (STARRT) framework for return-to-play decision-making. *Br J Sports Med* 2015;49:1311–5.
- Müller PO, Taylor J, Jordan MJ, et al. Call for the application of a biopsychosocial and interdisciplinary approach to the return-to-sport framework of snow sports athletes. *BMJ Open Sport Exerc Med* 2023;9:e001516.
- Verhagen E, Bolling C. We dare to ask new questions. are we also brave enough to change our approaches *Transl SPORTS Med* 2018;1:54–5.
- Bekker S, Bolling C, H Ahmed O, et al. Athlete health protection: why qualitative research matters. *J Sci Med Sport* 2020;23:898–901.
- Bruder AM, Donaldson A, Mosler AB, et al. Creating prep to play PRO for women playing elite Australian football: a how-to guide for developing injury-prevention programs. *J Sport Health Sci* 2023;12:130–8.
- Ageberg E, Bunke S, Linnell J, et al. Co-creating Holistic injury prevention training for youth Handball: development of an intervention targeting end-users at the individual, team, and organizational levels. *BMC Sports Sci Med Rehabil* 2024;16:10.
- Bruder AM, Crossley KM, Donaldson A, et al. Through the athlete lens: a novel study exploring the perspectives and experiences of injury prevention practices in women playing elite Australian football. *Braz J Phys Ther* 2021;25:756–66.
- Levers M-JD. Philosophical paradigms, grounded theory, and perspectives on emergence. *SAGE Open* 2013;3:215824401351724.
- Glaser BG, Strauss AL. *The discovery of grounded theory: strategies for qualitative research*. Routledge, 2017.
- Charmaz K. *Constructing grounded theory: a practical guide through qualitative analysis*. Sage, 2006.
- Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007;19:349–57.
- Ardern CL, Taylor NF, Feller JA, et al. A systematic review of the psychological factors associated with returning to sport following injury. *Br J Sports Med* 2013;47:1120–6.
- Podlog L, Eklund RC. The Psychosocial aspects of a return to sport following serious injury: a review of the literature from a self-determination perspective. *Psychology of Sport and Exercise* 2007;8:535–66.
- Saunders B, Sim J, Kingstone T, et al. Saturation in qualitative research: exploring its conceptualization and operationalization. *Qual Quant* 2018;52:1893–907.
- Boeije H. A purposeful approach to the constant comparative method in the analysis of qualitative interviews. *Qual Quant* 2002;36:391–409.
- Doege J, Ayres JM, Mackay MJ, et al. Defining return to sport: a systematic review. *Orthop J Sports Med* 2021;9:23259671211009589.
- Buckthorpe M, Frizziero A, Roi GS. Update on functional recovery process for the injured athlete: return to sport continuum redefined. *Br J Sports Med* 2019;53:265–7.
- Meredith SJ, Rauer T, Chmielewski TL, et al. Return to sport after anterior cruciate ligament injury: panther symposium ACL injury return to sport consensus group. *Orthop J Sports Med* 2020;8:2325967120930829.
- Wedge C, Crowell M, Mason J, et al. Rehabilitation and return to play following Meniscus repair. *Sports Med Arthrosc Rev* 2021;29:173–9.
- Podlog L, Dionigi R. Coach strategies for addressing psychosocial challenges during the return to sport from injury. *J Sports Sci* 2010;28:1197–208.

- 27 King J, Roberts C, Hard S, *et al.* Want to improve return to sport outcomes following injury? Empower, engage, provide feedback and be transparent: 4 habits *Br J Sports Med* 2019;53:526–7.
- 28 Dijkstra HP, Pollock N, Chakraverty R, *et al.* Return to play in elite sport: a shared decision-making process. *Br J Sports Med* 2017;51:419–20.
- 29 Capin JJ, Snyder-Mackler L, Risberg MA, *et al.* Keep calm and carry on testing: a substantive reanalysis and critique of 'what is the evidence for and validity of return-to-sport testing after anterior cruciate ligament reconstruction surgery? A systematic review and meta-analysis'. *Br J Sports Med* 2019;53:1444–6.
- 30 Kneck Å, Flink M, Frykholm O, *et al.* The information flow in a Healthcare Organisation with integrated units. *Int J Integr Care* 2019;19:20.
- 31 Ferrer L, Goodwin N. What are the principles that underpin integrated care *Int J Integr Care* 2014;14:e037.
- 32 Paterick TE, Patel N, Tajik AJ, *et al.* Improving health outcomes through patient education and partnerships with patients. *Proc (Bayl Univ Med Cent)* 2017;30:112–3.
- 33 Murphy GP, Sheehan RB. A qualitative investigation into the individual injury burden of amateur Rugby players. *Phys Ther Sport* 2021;50:74–81.
- 34 Podlog L, Eklund RC. A longitudinal investigation of competitive athletes' return to sport following serious injury. *Journal of Applied Sport Psychology* 2006;18:44–68.
- 35 Flint F. *Seeing helps believing: modeling in injury rehabilitation. Psychological bases of sport injuries.* Morgantown, WV: Fitness Information Technology, 1999:1999. 221–34.
- 36 Bianco T. Social support and recovery from sport injury: elite skiers share their experiences. *Res Q Exerc Sport* 2001;72:376–88.
- 37 Putukian M. The psychological response to injury in student athletes: a narrative review with a focus on mental health. *Br J Sports Med* 2016;50:145–8.
- 38 Podlog L, Dimmock J, Miller J. A review of return to sport concerns following injury rehabilitation: practitioner strategies for enhancing recovery outcomes. *Phys Ther Sport* 2011;12:36–42.
- 39 Ardern CL, Österberg A, Tagesson S, *et al.* The impact of psychological readiness to return to sport and recreational activities after anterior cruciate ligament reconstruction. *Br J Sports Med* 2014;48:1613–9.
- 40 Crossman J. *Coping with sports injuries: psychological strategies for rehabilitation.* Oxford: Oxford University Press, 2001.
- 41 Forsdyke D, Smith A, Jones M, *et al.* Psychosocial factors associated with outcomes of sports injury rehabilitation in competitive athletes: a mixed studies systematic review. *Br J Sports Med* 2016;50:537–44.
- 42 Johnston LH, Carroll D. The context of emotional responses to athletic injury: a qualitative analysis. *J Sport Rehabil* 1998;7:206–20.
- 43 Walker A, Hing W, Gough S, *et al.* 'Such a massive part of Rehab is between the ears'; barriers to and Facilitators of anterior cruciate ligament reconstruction rehabilitation: a qualitative focus group analysis. *BMC Sports Sci Med Rehabil* 2022;14:106.
- 44 Yung KK, Ardern CL, Serpiello FR, *et al.* A framework for clinicians to improve the decision-making process in return to sport. *Sports Med Open* 2022;8:52.