Exploring the factors involved in being "ready" to return to sport following a concussion

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Abstract

Objective: To explore the factors involved in athletes being ready (or not) to return to sport (RTS) following sport-related concussion (SRC).

Design: Qualitative, semi-structured interviews.

Setting: Videoconference.

Participants: Twenty-two sport injury stakeholders involved in contact and collision sports at various levels of competition (high school, university, professional), including: formerly concussed athletes (n = 4), coaches (n = 5), athletic therapists (n = 5), physiotherapists (n = 4), nurse practitioner (n = 1), and sports medicine physicians (n = 3).

Interventions: N/A.

Main Outcome Measures: We included questions in the interview guide regarding factors participants believed were involved in athletes being ready (or not ready) to RTS after a concussion.

Results: Participants described *physical* (concussion symptoms, return to pre-injury fitness), *behavioral* (changes in behavior, avoidance, malingering), *psychological* (individual factors, cognitive appraisals, mental health), and *social* (isolation, social support, communication, pressure) factors that they believed were involved in athletes being ready to RTS following SRC.

Conclusions: The graduated RTS strategy outlined in the most recent Concussion in Sport Group consensus statement focuses on physical aspects involved in being ready to RTS, which does not address behavioral, psychological, and social factors, which were identified by participants as being related to returning to sport post-SRC. More research is needed to determine if the additional factors outlined in this study are relevant among larger samples of athletes, coaches, and health care professionals.

Words: 227 (out of 250 words max)

Keywords*:* Brain Concussion; Qualitative Research; Psychology of Sports Injury

Introduction

More than 1 in 4 Canadians 15 years or older participate in sport each year.[1] Despite the many benefits of playing sports, participants risk suffering injuries. One type of injury in particular, sport-related concussion (SRC), accounts for as many as 44% of all injuries in sports such as ice hockey and rugby.[1] SRC is defined as a traumatic brain injury that results from biomechanical forces transmitted via a direct or indirect blow to the face, head or elsewhere on the body [2]. A SRC is typically manifested in one or more of the following: symptoms (somatic, cognitive, emotional), physical signs (loss of consciousness), behavioral changes (irritability), balance impairment (postural changes), cognitive impairment (slowed reaction times), and sleep disturbance (drowsiness).[2] Given the debilitating nature of concussion symptomology, researchers and clinicians continue to explore ways to enhance SRC diagnosis, management, and return to sport decision-making.[3,4]

There have been dozens of conferences worldwide dedicated to determining the best practice of evaluation and management of SRCs.[5] One of the most impactful of these meetings is convened by the Concussion in Sport Group (CISG), who have published five consensus statements since 2001[2], and have a 6th meeting forthcoming in 2022. Among their conclusions, the CISG recommended that athletes recovering from a SRC should be gradually re-introduced to sport in order to ensure a safe return to competition.[2] Table 1 highlights the graduated return to sport (RTS) Strategy, which is widely recognized as the best practice for returning athletes to sport safely. Following an initial 24-48 hours of rest following concussion, it is recommended that each step should take a minimum of 24 hours to complete.[2] Results suggest that it may take individuals 20 to 60 days to complete the RTS schedule.[6–8] Athletes must also have no new or worsening symptoms of concussion to progress through the RTS strategy.[2] Once an athlete

progresses through the RTS strategy, monitored by a medical doctor or licensed health care professional, they are deemed "ready" to resume sport participation.[9] However, one significant limitation of the RTS strategy is that it focuses almost exclusively on physical factors and gives little attention to other elements, such as behavioral[10], psychological[11], and social[12] factors, which have all been identified in previous research as being relevant to returning to sport following a SRC.[4] Although the goals of steps 4 and 5 of the RTS strategy hint at psychological factors (i.e., restore confidence, increased thinking), ignoring—or at least not comprehensively assessing—all of the factors involved in athletes' being ready to RTS following a SRC represents a significant gap in research and practice.

The objective of this study was to explore the factors involved in athletes being ready (or not) to return to sport following SRC.

Methods

Researchers examining SRC have typically employed quantitative approaches, which are helpful in generalizing rates and patterns of SRC across diverse athletic populations. Qualitative research approaches are ideal when little is known about a topic, as the goal is to provide a rich description of the experiences and perspectives of a relatively small number of participants.[13] Given that so much remains unknown regarding the factors involved in athletes being to RTS following SRC, we deemed a qualitative design was appropriate for this study.

Philosophical position

This study was approached from post-positive philosophical position (paradigm), such that the knowledge in this study was generated through a critical realist ontology and a modified dualist/objectivist epistemology.[14] Our philosophical position means that we believed there to be an apprehensible truth or understanding of the factors involved in being ready to RTS, which we

could learn through speaking with key sport injury stakeholders (athletes, coaches, and health care professionals). As such, we, the researchers, focused on generating our understanding of this topic through interviews with athletes, coaches, and health care professionals. Although we acknowledge that producing bias-free knowledge in the context of a qualitative study is unlikely,[14] we attempted to authentically represent participants' experiences and perceptions.

Procedure

Approval was obtained from University of Montreal's research ethics council prior to contacting participants. Athletes were recruited for this study via social media posts made by Author 1, whereas coach and health care professionals were contacted via their email addresses listed on their professional web pages. Individuals who were willing to participate in this research agreed to be interviewed via the Zoom videoconference platform. Participants were each sent a copy of the informed consent form prior to the initial meeting. The informed consent form was also reviewed at the beginning of each interview.

Participants

In total, 22 participants provided written consent to be interviewed for this study, which is an appropriate sample size given the purpose and our qualitative philosophical positioning.[13] The participants were key sport injury stakeholders such as formerly concussed athletes (n = 4), coaches (n = 5), athletic therapists (n = 5), physiotherapists (n = 4), nurse practitioner (n = 1), and sports medicine physicians (n = 3). To be included in this study, athletes had to have experienced SRC and returned to play by the start of the study. Athletes were excluded if they were experiencing symptoms of SRC at the time of the interview. Coaches and health care professionals had to have experience interacting, treating, or managing concussed athletes. Participants were all involved in contact (e.g., soccer, basketball) or collision (e.g., ice hockey,

rugby) sports that have a high rate of SRC[15] in high school, university, and/or professional settings (see Table 2).

Data collection

Individual, semi-structured interviews were led by Author 1 and Author 3 via Zoom. Author 1 led the first 16 interviews and Author 3 conducted the final 6 interviews. The interviews lasted an average of 72 minutes (range=56-100). Interview guides were developed for athletes who experienced a SRC (Supplemental Data File 1) as well as coaches and health care professionals who work with concussed athletes (Supplemental Data File 2). The majority of our discussions centred around the question: "What do you think it means for an athlete to be 'fully recovered' from a concussion", and the probe "What demonstrates to you that an athlete is not ready to return to sport?".

Data analysis

The interviews were audio recorded and the transcriptions were initially generated using Zoom's automated transcription feature. Subsequently, Authors 2 and 3 transferred the transcripts into Word documents while ensuring that the dialogue in the audio recordings matched the transcribed conversations. Once the transcriptions were finalized in Word documents, they were stored using the NVivo 12 qualitative software package, which was used to organize the interview data.

Author 2 led the qualitative data analysis, which followed Braun and Clarke's recommendations for performing a coding reliability approach to thematic analysis[16]. After reading the transcripts to familiarize ourselves with the data (as well as checking for accuracy of the transcriptions), Authors 1 and 2 determined that many of the participants' insights and perspectives mapped onto previous biopsychosocial models developed for athletes who suffered

musculoskeletal injuries.[17,18] More specifically, participants' descriptions of the factors involved in being ready to RTS following SRC included physical, behavioral, psychological, and social factors, which we decided to use as the names of the level 1 themes for our coding scheme. An overview of the data analysis (including level 2 and 3 themes), was then sent to the remaining members of the authorship team prior to a meeting. After meeting to discuss the feedback, we refined and reorganized some of the level 2 and 3 themes. All authors of this paper agreed that the themes presented in this paper are representative of the participants' perspectives on the factors involved in being ready to RTS following SRC.

Quality standards

In line with our philosophical position, we attempted to ensure that we accurately represented participants' experiences and perceptions. Specific to data collection, Authors 1 and 3 led interviews with participants. The same interview guides were used by both authors to help ensure consistency between interviewers. Additionally, Author 1, who has extensive qualitative training, led the first 16 interviews. Prior to conducting interview #17, Author 3 reviewed the first 16 interviews, as well as the interview guides, prior to a debriefing discussion with Author 1. This was done to help ensure consistency between our approaches to interviewing.

With respect to data analysis, the authors engaged in *peer triangulation* and *member reflections*. Peer triangulation involved Authors 1 and 2 (who led the data analysis) soliciting feedback from the remaining authorship team, which resulted in several changes to the labelling of levels 2 and 3 themes. Member reflections occurred by emailing participants a 2-page summary of the results and soliciting their feedback on our interpretations on their experiences and perceptions. Participants who responded (n=7/22 contacted) agreed that the results accurately reflected their experiences and perspectives.

Results

Participants in this study described that there are physical, behavioural, psychological, and social factors involved in being ready to RTS following SRC. Below are some quotes from participants related to main themes. Additional quotes from participants pertaining to these themes can be found in Tables 3-6.

Physical Factors

The physical factors included the types of symptoms that the athlete experienced following SRC, as well as the importance of returning to pre-injury fitness levels (see Table 3). Thirteen of the 22 participants mentioned managing these physical symptoms when returning to sport, whereas 8/22 participants also mentioned returning to pre-injury fitness as being an important component of feeling physically ready to RTS, as described by a Physiotherapist in the quote below:

> *"[I ask myself] 'Are they physically ready? Do we need to recondition them? Do we need to make sure you know how long have they been out for? Are they actually ready to go back from a physical standpoint?'"* (P1)

Behavioural Factors

The participants described instances where athletes avoided contact or collisions (4/22), malingered (7/22), or played more passively upon their RTS (see Table 4). Specific to the latter, 9/22 participants mentioned experiencing or observing an athlete playing more passively when returning to sport, as demonstrated by the quote below from an Athletic Therapist:

> *"He just looked hesitant. Hesitant—there's a good word. He just looked hesitant in what he was doing. He just wasn't as quick and as fast and as ready to go"* (AT2).

Psychological Factors

A variety of psychological factors were described by the participants (see Table 5). For instance, all 22 participants described cognitive appraisals and emotions (confidence, contemplating retirement, fear and frustration, internal pressures, motivation) as being involved in being ready to RTS following SRC. Additionally, mental health (13/22; anxiety/stress, depression/sadness) and individual factors (10/22; attitude, athletic identity, adjusting expectations) were discussed as being related to returning to sport post-SRC.

In terms of cognitive appraisals, which refers to the ways in which athletes respond and/or interpret their experiences returning to sport following SRC, one athlete described their emotions and how it was associated with returning to sport following SRC:

> *"… I was scared every day. Every practice, every game. I was always thinking, like, 'come on, please God, I don't want another concussion.'"* (A4).

Social Factors

Participants articulated various social factors (see Table 6), including external pressures (21/22), social support (11/22), isolation (4/22), as well as interactions between HCPs/coaches and concussed athletes (8/22), and interactions between HCPs/coaches and concussed athletes' teammates/roommates (7/22). Below is a quote from a Sports Medicine Physician describing the external pressures that athletes may encounter when returning to sport following a SRC:

> *"[If it's] a professional athlete who has sponsors, teammates, or a contract year coming up, they're driven by performance goals so they can make money and support their family. You've got media, fans, coaches, their reputation [to consider]. You have all these things that are going to be driving them… and I think that that can really be difficult to kind of isolate out from the athlete's ability to say, 'Yeah, I'm fully ready.'"* (SMP2).

Discussion

The objective of this study was to explore the factors that are involved in athletes being ready, or not, to RTS following SRC. Based on interviews conducted with 22 individuals (athletes, coaches, health care professionals), participants identified physical, behavioral, psychological, and social factors involved in being ready to RTS following SRC, which is consistent with the biopsychosocial model of RTS following musculoskeletal injury published in the consensus statement of the first World Congress in Physical Therapy.[17] In the model, psychological factors are hypothesized to have a central, mediating role on physical and social/contextual factors, functional performance (skill execution) and, ultimately, returning to sport. Additionally, injury characteristics (cause, severity, type) and sociodemographic factors (age, sex, ethnicity, and socioeconomic status) are hypothesized to indirectly influence RTS due to their effect on physical, psychological, and social/contextual factors. The results of the present study lend preliminary support for the application of the biopsychosocial model of RTS following SRC. This could be useful in informing future iterations of the RTS strategy[2] to more comprehensively address the entirety of factors related to returning to sport following SRC. Our discussion focuses on the behavioral, psychological and social factors identified by participants, given that physical preparedness has been the focus of much empirical attention in relation to SRCs.[19]

Participants—and, more specifically, the 13 health care professionals interviewed for this study—described instances when they observed athletes modifying their behaviours when returning to sport following SRC.[3] Our findings mirrored previous research,[20] whereby participants discussed instances where athletes malingered (defined as prolonging their absence from sport), a greater number of participants highlighted occasions when athletes changed their behaviours when returning to sport in the form of avoiding contact/collision (e.g., with

opponents) or by playing more passively upon RTS.[10,21] One recent study investigated whether a group of previously concussed athletes exhibited collision avoidance behaviours during a laboratory walking task when compared to non-concussed athletes.[21] Results indicated that previously concussed athletes demonstrated altered collision avoidance behaviours, even after receiving medical clearance to RTS.[21] Taken a step further, it is possible that the concussed athletes' poor performances during the walking task could have resulted from feeling they were underprepared (or not ready) to resume sport participation, despite progressing through the current RTS strategy. Given that the health care professionals in our study, who, on average, had 10 years of experience working with concussed athletes, indicated that behavioural factors are a consideration when returning athletes to sport following SRC, more research appears warranted to understand how to facilitate behavioral preparedness.

Consistent with two recent reviews[4], our findings highlight the relevance of psychological factors in returning to sport following SRC. Specifically, Podlog et al. conducted a state-of-the-art review to examine psychological factors involved in returning to sport following musculoskeletal injury, and van Ierssel et al.[4] used a systematic review to explore psychosocial factors associated with returning to sport following SRC. Both reviews discussed "psychological readiness", a concept that refers broadly to an athlete's mental state of preparedness to resume sport-specific activities, which has received some empirical attention related to musculoskeletal injuries[23] and SRC.[9] However, there are key limitations with research on psychological readiness, including the lack of a clear definition and conceptualization and, relatedly, measurement issues.[4,22] Results from the present study help to address some of the gaps in knowledge identified in previous reviews by sharing insights from athletes, coaches, and health care professionals involved in contact and collision sports about the types of psychological

factors they believe are relevant for RTS following SRC (i.e., confidence, motivation, emotions, pressures, and anxiety/stress). More research is needed to better understand how these, and potentially other, psychological factors are involved in facilitating athlete readiness to RTS following SRC.

All but one participant in this study described social factors that they believed are relevant for athletes returning to RTS following SRC, which included external pressures,[24] interactions with members of the sport environment,[25] isolation,[26] and social support.[27] In particular, our findings on external pressures align with Kroshus et al.[24] who surveyed 328 collegiate athletes and determined they were more likely to not disclose symptoms of SRC in order to continue playing when they perceived pressure from teammates, coaches, parents, and spectators. Although the results of the Kroshus et al.[24] study highlight the potential impact of social factors on concussed athletes, limited empirical attention has investigated social processes during RTS[4] and social factors are not mentioned in the RTS strategy[2]. Evidently, there is a need to continue to investigate the impact of social factors on SRCs, and specifically during RTS.

Limitations and Future Directions

A first limitation of this study is participants' level of education (all were enrolled in or had completed university degrees) and many were involved in Canadian ice hockey. As a result, it is unclear the extent to which these findings will be relevant for other participant populations. Future research is needed to understand if the biopsychosocial factors identified in this study are also germane among larger and more representative samples of athletes, coaches, and health care professionals. A second key limitation is that the interviews were conducted via videoconference (because of physical distancing mandates during the COVID-19 pandemic) and that Authors 1 (16 interviews) and 3 (6 interviews) led the conversations with participants. Although steps were

taken to ensure consistency between our interviews (outlined in the quality standards section), it is possible that differences between the interviewers and their interviewing styles (or the specific follow-up/probe questions asked) could have unintentionally influenced the results.

Conclusions

Based on interviews conducted with a group of athletes, coaches, and health care professionals, physical, behavioral, psychological, and social factors may be key factors associated with athletes being ready to RTS following SRC. Clinicians involved in the management and RTS decision-making of concussed athletes are encouraged to broaden their conceptualization of what constitutes being ready to RTS following SRC, as the factors articulated by the participants in this study go beyond the physical factors emphasized in the current RTS strategy (see Table 1). Results from this study provide the foundation for future research to encompass biopsychosocial models, as highlighted by key stakeholders in the sport environment.

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