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Exploring Subjective Experiences of Sport-Related Concussions in Swedish Elite Athletes

A phenomenological study

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Abstract

The present study explored elite athletes experiences of a sport-related concussion (SRC), i.e. cognitive, emotional and behavioral responses in rehabilitation. The participants were four elite athletes, 2 men and 2 women (23-25 years old), from cycling and martial arts, all suffering protracted concussion symptoms. A semi-structured interview guide was used, and data was analyzed through thematic analysis, with inductive reasoning. The findings suggest that emotional, cognitive and behavioral responses, such as uncertainty, stress, motivation and depression were present in the recovery from SRC, represented by six themes (1) Identity Loss, (2) Invisibility of the Injury, (3) Being In Charge of Recovery and Return to Sport, (4) Social Support and Pressure, (5) Uncertainty of Recovery Prognosis and (6) Depression and Substance Use. The findings also highlight the risk for mental illness following SRC and the importance of learning more about the psychological perspectives of SRC. Suggestions for practical implications and future research proposals are given.

Keywords: concussion; elite athletes; thematic analysis; injury recovery; psychological responses.

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Abstrakt

Studien syftade till att undersöka elitidrottares kognitiva, emotionella och beteendemässiga responser i rehabilitering från en idrottsrelaterad hjärnskakning. Deltagarna bestod av 4 elitidrottare, 2 män och 2 kvinnor (23–25 år gamla), från cykling och kampsport, där alla deltagare hade lidit av långdragna hjärnskakningsrelaterade symptom. En semi-strukturerad intervjuguide användes och data analyserades genom tematisk analys, med induktivt resonemang. Resultatet föreslog att emotionella, kognitiva och beteendemässiga responser kopplade till osäkerhet, stress, motivation och depression förekom under tillfrisknandet från idrottsrelaterad hjärnskakning, representerade av sex teman; (1) Förlorad Identitet, (2) Skadans Osynlighet, (3) Ansvar för Tillfrisknande och Återgång till Idrott, (4) Socialt Stöd och Press, (5) Osäker Prognos för Tillfrisknande och (6) Depression och medicinering. Ett viktigt fynd var att det förefaller finnas en ökad risk för psykisk ohälsa i samband med idrottsrelaterade hjärnskakningar, vilket antyder vikten av att ökad kunskap inom forskningsområdet har potential att tydligare kunna bistå idrottare med bättre behandlingsstöd. Förslag på praktiska implikationer och fortsatt forskning medföljer.

Nyckelord: hjärnskakning; elitidrottare; tematisk analys; rehabilitering; psykologiska responser.

Introduction

A sport-related concussion (SRC) is a traumatic brain injury, induced by biomechanical force (McCrory et al., 2017), a head trauma that can occur in high contact sports as well as within collision risk sports (Nagahiro & Mizobuchi, 2014). The US estimate that approximately 1.6-3.8 million sport-related concussions occur annually, representing nearly 10% of all sport-related injuries, and in Europe there are approximately 300 000 reported head injuries within sport context annually (Beverly et al., 2018). Swedish statistics on SRC is scarce, especially within individual sports, but researchers have estimated an incidence of 100 concussions in 1 000 played game-hours in the Swedish National Hockey League (Tegner, Gustafsson, Forsblad, Lundgren, & Sölveborn, 2007). The Swedish injury database from the 'Social Board' (Socialstyrelsen, 2010) also estimated that the number of men who sought medical care for SRC was approximately 2 500 and women 2 100, which corresponds to 4,4% of all sport-related injuries, registered at Swedish hospitals the year 2010. Worth noting is that SRC is also known to be an underreported injury and Davies, and Bird (2015) suggest that motivation to report SRC varies from one athlete to another. At the same time concussive injuries during adolescence and early adulthood could have serious medical repercussions for a developing brain, being most notable in the subacute phase of injury (Borich, Makan, & Boyd, 2012; Miller et al., 2012).

Clacy, Sharman, and Lovell (2018) suggest considering a biopsychosocial model, as a SRC is a multifaceted issue, containing biological, psychological and sociocultural factors. The biopsychosocial models of health was originally constructed as a critics of the medical model (Engel, 1977) and has in recent years been used as a potential model to understand the complexity in rehabilitation of long-term injured athletes (Brewer, Andersen, & Van Raalte, 2002). Brewer (2010) suggest factors such as personality, cognitions, and emotions to be influencing the outcomes of rehabilitation, where intermediate 'biopsychological outcomes' as well as 'sport injury rehabilitation outcomes' both directly and in a 'mediating fashion', through their relationship with biological factors relate to rehabilitation outcomes. The possible impacts of personality, cognitions and emotions on rehabilitation outcomes drives the interest in exploring experiences of con-

cussed elite athletes, in their transition from a SCR to returning to sport and life in general.

A SRC has been described as one of the most complex sport-related injuries, with a tendency to rapidly change in symptomatology through the acute phase of the injury, associated with both physical, cognitive and emotional symptoms (McCrory et al., 2017). Accordingly, an integrative model such as the biopsychosocial model (Brewer, 2010) seems especially useful to apply as an 'optical lens' when looking to more thoroughly understand the complexity of the psychological reactions that may result from an SRC. In the present study the biopsychosocial model should be viewed as a construction to understand the combination of biological, psychological and social factors, where the psychological (and to some extent the sociological) factors are the focal points, i.e. cognitive, emotional and behavioral responses.

Some of the most common physical symptoms of concussions are headache, light and sound sensitivity, dizziness and fatigue (McCrory et al., 2017). In addition to the physical symptoms negative psychological consequences has been reported among youth and collegiate athletes within sport and recreational injury-contexts. The negative psychological responses include, but are not limited to; mood fluctuations, depression and anxiety, suicide, and negative coping behaviors (Covassin, Elbin, Beidler, LaFevor, & Kontos, 2017) and emotional disturbances such as feeling confused, angry and isolated were found in university athletes who were removed from their usual daily routines as a result of SRC (Bloom, Horton, McCrory, & Johnson, 2004; Kontos, Covassin, Elbin, & Parker, 2012). A link between SRC and mental illness outcomes in elite athletes, such as depression has also been suggested in a review article by Rice, Parker, Rosenbaum, Bailey, Mawren, and Purcell (2018). The majority of concussion symptoms seem to resolve within 10-14 days from time of injury among adults, but there may be as much as 10% to 20% of athletes that will experience protracted concussion symptoms (Stein, Alvarez, & McKee, 2015). Protracted symptoms have been described by McCrory et al., (2017) as concussion-related impairments among adults (18 years old) persisting longer than 10 to 14 days.

The majority of studies examining psychological perspectives of sport related injuries to date, have mainly focused on musculoskeletal injuries (Ardern, Taylor, Feller, &

Webster, 2012; Langford, Webster, & Feller, 2009; Lu, & Hsu, 2013; Quinn & Fallon, 1999), and to some extent in more recent years also overuse injuries (Ivarsson, Tranaeus, & Johnson, 2020). Research on concussion in sport on the other hand, for a long time mostly focused on neuro-cognitive effects, such as memory, attention, 'mental speed' and reaction time (Broglio & Puetz, 2008), leaving cognitive, emotional and behavioral factors open for further exploration.

Only recently have qualitative approaches started to be used to investigate various aspects of SRC, where the majority have focused on the underreporting of concussive symptoms. Chrisman, Quitiquit, and Rivara (2013) for example found several barriers for high school athletes, that seemed to explain why they were not reporting the injury, some of these being; wanting to keep playing and being afraid they (the athletes) would be removed from the game, concussive symptoms being non-specific and therefore could be mistaken for something else, or the athletes were hesitant to report symptoms if they did not perceive the symptoms as significantly painful or disabling. Others have investigated younger athletes (11-15 years old) underreporting behavior (Cusimano, Tropolovec-Vranic, Zhang, Mulen, Wong, & Ilie, 2016), identifying amongst other findings an over emphasis on winning games, as a 'hockey culture'. Psychological factors such as optimism bias, invisibility of the injury, diagnostic barriers, desire to play, external support and pressures, uncertainty of recovery prognosis and generational factors also seem to affect reporting behavior of the injury and symptoms, in a population of collegiate student athletes (Oddo, O'Connor, Shore, Piraino, Gibney, Tsao, & Grimes Stanfill, 2019). Clinical diagnosis of concussions have earlier been highlighted as a barrier, since it is still highly dependent on symptoms being self-reported, and in addition athlete's current understanding of concussions does not always coincide with the medical definition currently accepted, some of these being headaches, amnesias and confusion (Robbins et al., 2014; Leitch, Ayers, & Andrews, 2015). While research on the issue of underreporting has recently risen, little is still known about cognitive, emotional and behavioral responses in rehabilitation from SRC in elite sports. How athletes experience their symptoms, and rehabilitation can potentially affect recovery behavior, making them return to sport earlier than they should, competing while still symptomatic or in other ways affect recovery (Oddo et al., 2019; Chinn, & Porter, 2016). Caron, Bloom,

Johnston, and Sabiston (2013) investigated retired national hockey league players, experiences of multiple concussions, using interpretative phenomenological analysis, and found that physical and psychological symptoms experienced by the participants, both affected their professional careers, personal relationships and quality of life, suggesting the importance of a biopsychosocial perspective while investigating these kind of injuries. In light of the psychological effects a SRC may bring to athletes, it seems warrant to more closely study the interplay between cognitive, emotional and behavioral responses in rehabilitation. Consequently, the purpose of this study was to explore the experiences of four elite athletes' cognitive, emotional and behavioral responses in the transition from a SRC to their return to sport and life (school, work, social etc.), with a phenomenological approach.

Method

With a phenomenological approach, participants experiences were heard from first-person perspective through semi-structured interviews, as a personal experience. Athletes were able to share their individual experiences in-depth, which was of great importance as we sought to explore elite athletes' experiences of SRC from a psychological perspective. Gaining insight and understanding through a post-positivist approach suited the research question as it allowed for an explorative and interpretive approach, focusing on elite athletes' lived experiences of SRC, return to sport(s) and life.

Participants

Four elite athletes (two men and two women), with prolonged concussive symptoms (>2 months) participated in the study, all of whom were current or previous Swedish National Team-level athletes from individual sports. The participants were in their early to mid-twenties (23-25 years old), with experience of one or multiple SRC. The inclusion criteria were that the participants were elite athletes, current or previous members of the Swedish National Team in their respective sport, with experience of a SRC from 1 month to 5 years prior to participation in the study. The reason for the 1 month minimum was to be respectful of the healing process. To preserve participants' confidentiality, each athlete was identified by a pseudonym throughout the study; Anna, Eric, Josephine and Dan, currently or recently involved in cycling or martial arts.

Anna was a cyclist that suffered a SRC 1,5 years ago during a training session, right before a big competition. She had multiple injuries from the crash and didn't recognize the concussion before the day after, when the symptoms got worse. She began training 4-5 weeks post injury, but met several setbacks during rehabilitation, and experienced protracted concussion symptoms for more than six months. *Eric* was a cyclist that suffered a SRC in a training session before a big competition, 4 years ago. He started training and riding his bike three days post concussion, and then went to a competition and had to pull out due to the concussive symptoms making it impossible to ride safe and fast. Eric suffered protracted concussive symptoms for over a year and also became depressed. He reported that he had experienced multiple SRC during his career as a cyclist. *Josephine* was a cyclist that suffered a SRC 5-6 months prior to the study during a competition. She had also experienced a previous concussion four years ago. Josephine had protracted concussive symptoms for over six months and expressed feeling depressed during the recovery time. *Dan* was competing in martial arts and suffered an injury during competition 3 years ago. He had experienced multiple concussions prior, but non with protracted concussion symptoms. Dan had to withdraw from competitive sports due to his most recent concussion and has since suffered with symptoms recurrently coming back when for example sparing in training.

Interview Guide

We created a semi-structured interview guide (Appendix 1), primarily informed by the study's research question, to gather an in-depth understanding of how the elite athletes experienced suffering a SRC and the transition period from becoming symptomatic to getting through the months post injury. The interview consisted of two parts, where the first part focused on when and how the injury occurred, if the participant had multiple SRC, at what level the athlete was competing at and what their situation/season looked like up until the injury. The first part of the interview allowed for 'easier conversation' as it was quite deductive in its' fashion, staying descriptive in 'what', 'when' and 'how', to initiate conversation. It also gave the researcher a better understanding of background and the context in which the athlete was at the time of injury, making it easier to build reasoning around personal experiences later in the second part of the interview. The researcher was understanding and validating throughout the first part of the

interview to build a good interviewer-interviewee-relationship, making headway for deeper conversation through the second part. The second part of the interview focused on the acute/sub-acute phase, and transition period of return to sport and life. It was constructed to capture the athlete's personal experiences of SRC rehabilitation/transition (cognitive, emotional and behavioral responses). The researcher made sure to give time and space for the interviewee to elaborate on personal experiences, guiding the interviewee and ensuring that both interviewer and interviewee were discussing the same construct. Some of the key questions included: 'Were you given any information about your concussion and potentially also a rehabilitation plan (concussion protocol) the days following injury?'; 'Can you tell me about what your days looked like during the recovery? What did you do? What was difficult for you?'; 'What changed in your life as a result of the injury?'; 'If you had a return-to-sport protocol, how did you use and interpret it?'; 'Did you report the injury to a coach/trainer/team manager? Were you comfortable with doing so? Why/why not?' and 'Can you tell me about how it was when you made progress or experienced setbacks?'.

The interview guide was piloted twice, to test the procedure and the interview guide itself, by the author via one-on-one interviews. Both pilots were current or former members of the Swedish National Team in Mountainbike (one male and one female, 26 and 25 years old) and had experienced a SRC within less than a years' time. One of them was still symptomatic and the other one was non-symptomatic. Both had been dealing with prolonged concussive symptoms (>2 months). The interviewees provided feedback about content, delivery and construction, including timing and order of questions. Changes were made in the interview guide in accordance with suggestions (swapping questions around for a more natural conversational flow). Examples of added questions can be seen in the interview guide (Appendix 1), written in italics. One example of the added questions was; 'Can you tell me about how it was when you made progress or experienced setbacks?'. The two pilot interviews also gave other valuable insights, as both pilots struggled with memory loss/depleted memory after the injury and also pinpointing recall bias as potential problem for the study.

The semi-structured interview allowed for a natural flow of conversation and for the participants to explicitly tell his/her own story and highlight what was most important

for him/herself. With this procedure, the athletes were encouraged to express their own experiences, less bound by rigid questions (structured interview). The researcher was responsive, giving space for reflection during all interviews.

Procedure

After ethical approval was obtained from the University of Halmstad, Department of Health and Welfare Ethics Board, UI2019/754, recruitment e-mails and phone-calls to Swedish national sport-federations were made. Seven athletes were contacted by the author, for potential participation. After an initial and informative dialogue with the potential participants, one was excluded as she had not been competing at national team level. The second athlete received a new concussion during the time of study, and thus was withdrawn from the study. The third participant was also in an accident with multiple injuries, including a suspected concussion, leading to withdrawal as the inclusion criteria stated that the participants needed at least one month between concussion and study participation. Written informed consent was obtained prior to interviews. Semi-structured in-depth interviews, in a one-on-one format (60-90 min) was then conducted with the 4 participants by the author. Each interview-session began with an audit of the content form, where consideration of ethical limits of confidentiality was highlighted. The researcher also gave a rational of the upcoming interview. Member checking of transcripts where conducted post interviews, where the participants had the opportunity to read through their own transcript to reflect, give consent to use material, add additional comments and/or make changes and clarify meanings.

Data Analysis

Transcription was made verbatim while listening and re-listening to the audio recordings and resulted in 73 pages of single-spaced transcripts. Transcripts were then read and re-read by the researcher to familiarize with the data. While re-reading the data specific attention was payed to patterns that could be of interest for the research, resulting in preliminary start-codes. Following Braun and Clarke's (2006) six suggested phases of performing the analysis. Initial codes where then generated as data was reduced. Codes were combined to generate overarching themes, where meanings were constructed through latent interpretation. Through the process of analysis, the focus was narrowed

down to the rehabilitation-period and coming back to sport and life, from the interviews initial wider ’leading up to injury’, ’recovery-phase’ and ’when returned to sport’.

The researcher played an active role in identifying patterns and generating themes, making way for inductive reasoning in the analysis. Themes were identified at latent level, going beyond semantic content of the data, although consideration was given to possible semantic concepts, directly communicated by the participants, to be of value.

Trustworthiness

Trustworthiness is important for research to be considered ’well done’ and to deal with the question of enhancing trustworthiness, a number of different procedures suggested by Tracy (2010), were selected by the author. The data corpus was recurrently read through throughout the process of analysis as themes were generated, to make sure that nothing of importance was missed. This was also done to make sure that the themes would be representative for data corpus and research question, in accordance with Braun and Clarkes (2006) guidelines in thematic analysis, 15-point ”checklist” for a good TA (Braun & Clarke, 2006, p. 96). The author and the supervisor also independently read through the findings several times and made comments on a thematic level as the results were compared (three times in total), making some adjustments of the results. After discussions different suggestions were recommended and resulted in the collapsing of two themes. The previous theme ’Motivational Factors in Rehabilitation’ and the current theme ’Being in Charge of Recovery and Return to Sport’, to *one* theme with the later name. The research was considered to have a ’worthy topic’ (Tracy, 2010) as it was previously marginally investigated, and also considered to be a significant health concern in sport (Kontos, 2017).

Purposeful sampling, through national sport federations or via direct contact with the author, resulted in four elite athletes at National Team level who had experienced SRC, volunteering to share their experiences. Guidelines around sample constitution and size in TA are not very strict, but should be based on research question, purpose, method and data collection (Smith & Sparkes, 2019). To best develop themes and patterns from the data Smith, and Sparkes (2019) suggest that the sample need to be large enough, to carry meaning and weight, and have also suggested a minimum of six interviews. But this is also stated as a general suggestion, and not a rule of thumb. Smaller sample sizes can

also be found within TA such as Cedervall, and Åberg (2010), a qualitative case study on two men with dementia and their spouses. Further, Braun, and Clarke (2019a) argue that theoretical sufficiency and/or conceptual depth is of greater importance than data saturation, working with thematic analysis, as the meaning is not seen as inherent or self-evident in data, but require interpretation (Braun & Clarke 2006; 2019b).

A reflexivity journal was also used throughout the whole process of the study. The journal consisted of reflective notes from the interviews, how codes and themes were developed, collapsed, or removed and decisions to narrow down data from ’before injury’, ’recovery period’ and ’coming back to sport’ to ’recovery and return’. The purpose of the reflexivity journal was to consider the researchers own beliefs, values and attitudes that may have affected the study, for example; questions asked, interpretations and findings.

As the study dealt with potential traumatic memories for the participants, and they also shared personal and disclosing information, ethical considerations were of great importance. The participants were informed that participation was voluntary, and that they would be anonymous in the study, given pseudonyms. Participants were also given the opportunity to read through and confirm their own interview transcripts. They were also offered therapy/sport psychology consultation after participating in the study (5 h each) with the author who is also a trained sport psychology consultant and cognitive behavioral therapist. If traumas or other psychological issues connected to the SRC and interview situation would come to surface the participants would also receive help in contacting a reception for ’Elite Sport and Health’.

Results

Six latent lateral themes representing participants SRC-experiences was formed; (1) Identity Loss, (2) Invisibility of the Injury, (3) Social Support and Pressure, (4) Being In Charge of Recovery and Return to Sport, (5) Uncertainty of Recovery Prognosis and (6) Depression and Substance Use. Some of the themes were constructed with bidirectional relationships (*Social Support and Pressure; Being in Charge of Recovery and Return to Sport)*, meaning both adaptive and maladaptive elements are embedded within the same themes.

Identity Loss

Losing identity as 'the athlete' was hard for the participants, having put so much time and effort into every training and every race/match for a substantial part of their lives. The 'identity' as an athlete suggest everything from setting and receiving short and long term goals to having friends and family (but also media and others) look at them as 'the athlete', so the world seemed to crumble when the participants did no longer appear to see themselves as the athlete they use to be, when not being able to train or compete.

> I remember. It was that I had no 'why'. I had always been connected with my sport, that I am Er.. Eric the cyclist. I was always, 'yea but he's good at riding bikes. It is what he's good at'. I didn't know what I was without sport. Eh, it became a huge void around it, eh at the same time, together with the depression, it created these thoughts… That I don't feel worth anything. (Eric)

Some athletes reported that it was hard to recognize oneself in day-to-day life, when social gatherings were not the same anymore. The physical symptoms of headache, nausea, light- and sound sensitivity, together with neurocognitive symptoms of having a hard time to form sentences, and other emotional and cognitive symptoms made it difficult to participate in social situations, and the athletes many times needed to 'go home' or chose not to participate at all. Not recognizing their own behaviors, emotions and thoughts as to what they once were (who they saw themselves as) was stressful and left emotions of guilt and could also be strenuous on relationships.

> They are the biggest parts in my life, training and social… And not just feel that you eh, but… It snowballs. I can not be the person I am, I get performance anxiety for not delivering as a friend, as a girlfriend, as a daughter. I do not have the energy to be eh, the person I was before and I feel guilt and anxiety over it. A lot of guilt has permeated these last six months, of not being on call for everyone, all the time. Not having energy to make contact, or answering when contacted. And I had a really hard time just being on the phone. It's like, I get a real bad headache from it and so I've avoided it, and I never used to do that before. I usually talk a lot on the phone, so the contrasts were huge. (Josephine)

The participants recurrently voiced that many things changed during the period of the injury and recovery, and that the fear of a new injury, the stressful thoughts and emo-

tions of not getting better and having prolonged concussion symptoms was hard to accept and also hard to explain to friends, family and people around. This also related to wanting to be a good partner and friend but not being able to, or just being caught in getting better and trying to find answers, sometimes forgetting about others.

> I just became a whole other person, from being someone very… From being very active and very daring, taking extreme risks, both with my health and my body, eh, I became very cautious and obsessed with figuring out this problem… [concussion symptoms]… Ehm, it's more that this behavior… That this attitude to different things inhibited my then relationship very much. And that is something that has stayed with me… Eh, that this led to… To that everything would end. I was that much changed. (Dan)

Participants described themselves in situations where they didn't feel like they reacted or behaved in the same way that they 'usually did' and that they were 'changed'. For some it was intentional and due to concussion symptoms, such as deciding not to participate in social activities. For others it meant that the emotional reactions could come sudden and with force, such as sadness or frustration. But it did not matter if it was intentional, semi-intentional or not intentional at all. Commonly the athletes still described it as being very hard, to not feel and be like themselves.

> Eh, ok. The easiest is to call it frustration, when something does not work… When small things does not work. I was, I was mounting a tire and did not get it to work, and I just… It's a brand new tire, on a brand new rim. I just take the rim and throw it with all the power I've got, out the garage door and onto the rock hard driveway, so I destroy the rim… Take my phone and throw it on the ground. And then I remember, I smashed the glass window in the door. Eh, those kind of things I had never experienced before… I mean, there is nothing today that would make me want to smash a glas window. (Eric)

The participants cognitive, emotional and behavioral responses were voiced as hard to grasp. Sometimes the athletes described it like they were afraid of the change and wondered if this was 'how it was going to be from now on' and that this was what they had 'become'. Even as the participants were talking about how it was to be symptomatic and recovering from SRC, frustration or dampened mood seemed to be present, ex-

pressed in words as wanting so badly for everything to go back to normal life, go back to sport. Wanting to be themselves again, asymptomatic.

> You get so [swear word] mad with yourself, because I felt that I lost myself after the crash, for a very long time, when I walked around just being scared. Since my strength as a cyclist is that I'm technical, and I know that. And it just made it so much worse when I just lost it… Not only because it's my strength, it's just that it's my style that identifies me as a cyclist, and then it's just not me anymore… I mean, 'where am I'? Please come back to me! (Anna)

Invisibility of the Injury

The absence of a physically observable injury, or the *invisibility of the injury*, made it hard for the participants to understand and accept the injury for themselves, and also to be understood by others, such as friends, family, coaches, doctors or other members of medical teams. The participants could feel the injury, and feel that something was wrong, but it was sometimes hard to put words on what it was, exactly. It was as if they wished that the physical symptoms could be read on the outside, that it would be obvious enough to get understanding and support from others, but also make it clearer for themselves.

> But there is not a lot, we have no evidence for what is wrong, or we cannot pinpoint that there is anything wrong with me, so it's just like, ok this is how it is… It took a long time before I accepted that. (Eric)

The participants emotions of frustration, dejection and sometimes also fear or anxiety were present when recalling the many times wanting the medical examinations to show something, anything to back up what they physically and emotionally felt during the recovery period. Both to gain understanding, help and support. 'It is not supposed to have to go that far, that you wish you had like a brain bleed, to get support. Like answers and understanding… That it is not like a broken collarbone, where you have, like a picture… It is not possible to feel it on the outside, but, but I could… [feel something was wrong]' - Josephine.

It also became problematic when athletes were either pushed to train and compete, or when they themselves neglected the injury and pushed on with training or competition while still symptomatic. The invisibility of the injury was a problem for all participants

throughout the whole process of recovery, in getting understood, receiving help, and understanding and accepting their own symptoms and situation. ’Eric’ described a situation during a competition, where the team manager knew of his injury, but did not ’accept’ it as a big enough problem, as Eric could still hold on to his handlebars and that nothing was really showing on the outside. ’Because he [team manager] was just like… ”Nothing is broken, I can’t see anything. Ride your bike and stay quiet. Do what you’re supposed to”.’ - Eric.

When the participants had a hard time understanding the injury themselves, it also made an impact on recovery behaviors, sometimes making it hard to resist training or competition. A potential risk factor for coming back to training or competition too soon. The participants also voiced cognitive challenges of forming explanations to others why they were not training or competing as usual. This challenge was made more difficult by the lack of understanding in the social surroundings, of what a concussion is, and what it means to be a concussed athlete, as commonly described among the participants.

> … If I had a broken leg I could have said, ’I cannot run, because as you can see I have a broken leg’. But, I didn’t really have the ability to describe or say that: ’I have a concussion, and that is why I am a bit low, that is why I don’t have any energy’. (Josephine)

Social Support and Pressure

Social support and social pressure seemed to have an effect on overall wellbeing and choices made in rehabilitation. Social support made the participants feel safe and taken care of. It was important in day-to-day activities and on an emotional level. Participants described support from coaches stepping in and saying ’you should not race, you are injured’ when the athlete him/herself was not fully aware of the extent of the injury yet, feeling grateful when the decision felt hard to make on their own. Commonly the participants also expressed appreciation for friends and family being there to help and listen. ’My friends came here to shower my hair because my face was all beaten up, and I was glued and taped up so I could not wet my face.’ - Anna. ’Eh, then, my parents were truly gold… and I could stay with them right before my school semester started… Eh, the friends and the sport club were also very supportive.’ - Dan.

When doctors could not help, the participants sometimes also found comfort in talking with friends or other athletes that had experienced similar symptoms/recoveries. The support could be soothing but could also in some cases create emotions of shame and stress as the athlete didn't experience her/himself as a 'good friend' or partner, not having the energy to live up to 'good friend standards'. Social support therefor had two sides. Where shame and guilt were related to the theme *'Identity Loss'* (where the participants no longer perceived themselves as the persons they were before the injury). The social support could come from friends, family, medical staff or sponsors/sport teams. Social pressure or external pressure mainly came from team-mates or coaches/team managers, not understanding the severity of the injury, urging on to keep on pushing, competing and training. 'He [the team manager] didn't care. He actually wanted me to ride the day after… It would look good for the rest of the team.' - Eric.

The pressure made athletes feel like they were not being listened to, seen or believed in, and also stressed them to pursue competition and training even when symptomatic, or they would feel bad about themselves because they did not pursue it.

Being In Charge of Recovery and Return to Sport

Not all participants had the help of concussion protocols in their recovery and rehabilitation. Protocols or not, the questions 'how much?', 'how hard?' and 'when?' was still described by the participants as very hard to answer. The participants expressed dissatisfaction with doctors giving different advices from one-another, creating uncertainty, and some of the participant did not know what or who they should listen to. Some of the participants also chose to start training (too early), and experienced tough setbacks in terms of increased concussive symptoms, wondering if they had 'made it worse' and prolonged recovery. Others decided to rest longer, due to the symptoms and then got questioned by doctors why they didn't start to train more/earlier, all of which made the stress and uncertainty grow even bigger.

For the participants to have the decision in their own hands as when to train, compete or rest seemed to be a heavy load to carry, putting a tremendous amount of pressure on the athlete in the recovery process. If the concussive symptoms were a guiding light in the recovery behaviors around when and how to train/compete, so was motivation.

> … Looking back, I think I should have had company of a friend when I was out training. I think it would have been better, to have someone say 'It's one short lap, and then nothing more. And I will be keeping an eye on your speed'. But I snuck out on my own, I could not… And I never really listened for the symptoms when I was already out on my bike, I guess. Or… I mostly thought that the first twenty minutes were good and I was overwhelmed with happiness, I was so happy when I was out riding, because it worked, but then there was this 'wall' that always came after twenty minutes. It hit me and then came this horrible headache. I was thrown between hope and despair during those sessions. Sometimes I went home, but sometimes I got frustrated and like… I don't care(!) I'm continuing until I'm done with this session.' - Josephine.

Mainly being in charge of their own recovery was described as frustrating, and by only having (physical) symptoms as a guideline, it also made the participants sometimes question both their own, behaviors, emotions and thoughts. 'When can I like start training? No one can answer that. It is only yourself. But you yourself don't know.' - Anna.

The diagnostic barriers of not being able to measure in an objective way what was going on and how recovery was going, related to the theme *'Invisibility of the Injury'*, put pressure on the athletes to make own decisions. 'How careful do I have to be, what limits can I be pushing after five months and what limits can I absolutely not pass? That, I never had a clue of.' - Josephine. It was commonly described as emotionally stressful not knowing if they (the participants) were behaving in 'the right way' during rehabilitation. And if the decisions they were making were for the better or making the concussion symptoms worse.

Motivational factors also seemed to play a big role in how and when the participants approached training and competition when still in rehabilitation. It was described as something nice (a drive); 'I had so much drive. I had so much motivation… The only thing I was longing for was to get insanely tired [on the bike]' - Josephine. Having a strong motivation to perform well at a big competition like the World Championships or the European Championships sometimes made the participants 'hide' how they really felt from people around them, or to ignore symptoms for themselves, pretending they were fine, when they were not. Motivation could also be described as something that

made the participants feel symptom-free, or simply be in denial of their symptoms. ’I pretendent that everything was all good. Because if it had not been, I would not have been riding my bike.’ - Eric. A reason to hide what they were feeling and experiencing with the concussion was to not miss out on competitions, being taken out of the national team or missing a chance to secure a spot in a professional team or gain sponsors. ’… They can always find someone new. You are replaceable.' - Eric.

> I had to refine the truth many times to not shut any doors on myself. Had I been fully honest with how I felt, and what the crash looked like, and how extremely painful my headache was, I would have been scared to be taken out of the national team for the rest of the season. So I didn’t want to go out on a limb and say anything. Also, I was very optimistic with myself. I thought that I would get back to… Like even to the European championships. (Josephine)

Uncertainty of Recovery Prognosis

The participants all had experience of concussions prior to the most recent injury, but had never experienced prolonged concussion symptoms before. When they reasoned with themselves in the recovery from the most recent injury, they were many times comparing recovery to previous injuries, or what they had heard about concussions in general. The comparisons were mostly about how long it *should* take to recover, how serious a concussion is and how it *should* feel during recovery. ’I felt all the time that it should soon get better for every week that pass, but then it was just the same all along.’ - Dan.

The participants physical symptoms came and went… but always seemed to come back, and that created uncertainty in the recovery prognosis, together with doctors not being able to give clear answers. ’It is always like this when you don’t know, when you cannot see the light at the end of the tunnel, you cannot see an end to anything.’ - Josephine. Together with the participants uncertainty and thoughts about the recovery process came emotions of fear and destress of not knowing when they could get back to being ’themselves’, when and if the symptoms would go away or when and if they would be able to compete or do sport again. ’Not the pain in the neck… but this headache like came back several months after, and I got scared. Like how many days will I have this pain in my head this time?’ - Anna. Physical symptoms also kept trigger-

ing negative emotions and thoughts. '… It was a lot of tears with this headache… A lot. You were frustrated, I think I was mad at the whole situation. It's enough. It is November, not May. [Swearword] this!' - Anna).

Depression and Substance Use

As opposed to social support, the participants described social isolation, not being able to train, a need to rest a lot, the loneliness and boredom that came with recovery from SRC. The athletes were many times mellow when describing how they had felt and what they had experienced during the rehabilitation. Negative emotions such as stress, sadness, feeling depressed and full of questions and uncertainty/anxiety were common. The physical symptoms of headache, nausea, light and sound sensitivity together with not recognizing oneself in sport context or in life in general was like the curtains had been pulled shut, dark and depressive.

> … it was off course very, very hard and I couldn't train, I couldn't get the satisfaction of a job well done and I had a bunch of races left of the season, and big championships that I had to turn down, and that was very hard in itself, and then not to be able to get that, I mean, it's chemical to train, and I've truly noticed that it is like a drug and a strong power to get this dopamine… and all those other things that are released during training all the time, and then all of a sudden it's not there anymore. It… You get depressed. (Josephine)

Since the symptoms often came back intermittently and the participants did not know when they would hit, setbacks were hard. They could suspect when symptoms could come, but they were not sure. And as time went by it became even harder to accept, that the symptoms still kept coming back.

> I had to step out of my first competition after two laps, because of the headache and the heat and I just started crying and walked over to my dad, and just 'I have a headache, this does not work'. Eh, I have to quit this race. And I think it was even more mentally challenging. Or, that's what the tears were about. Can it please just be over? Can I just feel fine? Or, can the body just please pull itself together? I like just want to train, the nationals are in a month or what ever it was. (Anna)

The participants prolonged symptoms made it hard to live life ’normally’, to train, work, go to school and be with friends, making the will to feel and be better even stronger. During the time of recovery, it was common to use paracetamol as a painkiller. But it didn’t make it easier to concentrate, it didn’t make anxiety or depression go away and it didn’t take away all the diffuse symptoms stopping the participants from feeling and behaving ’normal’. ’I had, eh anxiolytics, and then for depression, and then something for sleeping. Not a sleeping pill, but it helps to still the brain a little. And I [laughs] ate very many pills.’ - Eric.

Depression or feeling down was commonly described by all participants at some point of recovery, and one of the participants was depressed for a long time and described how he tried to feel better but couldn’t, after losing identity, losing sport (happiness) and not finding any self-worth.

> I had a prescription that I should take ’this many’ pills a day, but I… When it was really hard I thought ’well it is probably better to eat some more’. So I ate more.
>
> … And then eh, even more, without the doctors knowledge, because I guess I was hoping things would get better and it was after that, I was home for a while. And after that I realized that, no I don’t want to live any longer.
>
> … Eh and then I know that I sat in my best friends’ home and eh, said ’good bye’. Eh… and had made my decision… I pass that place every day… I know exactl… I know exactly where I would have done it [exhales looking sorrowful]. (Eric)

The desire for things to go back to normal, for depression to go away or for physical symptoms to go away was expressed by all participants, but one mentioned game changers that he was aware were controversial but that had made a world of difference for him. Just being able to feel ’free’, to feel life returning, if only for a while to normal, and then bit by bit being able to have a ’normal life’.

> … Alcohol has dulled the symptoms, exceptionally well. Eh, which has scared me a bit, but it is like… an abuse during the first part of the school semester, because there are tons of college parties and opportunities for it, and even if it felt worse the day after, it was nice to have an evening where you could have fun

> and the symptoms just disappeared, which was quite awesome, it was very nice. Like eh, you had a scab that stopped itching, that had been itching for months. (Dan)

> Eh, and then there was a friend that smoked cannabis. Eh and I never tried that before. I never even smoked a cigarette. But I tested it. And the day after, it was as if everything was crystal clear when I woke up. Eh, that this fog had disappeared before my eyes. Eh, but I didn't like the hallucinogenic… Being high. It was absolutely not what I wanted. But then… It does not have any scientific evidence, but I bought a couple of bottles of CBD-oil. (Dan)

Discussion

The aim of the present study was to explore the experiences of four elite athletes' cognitive, emotional and behavioral responses in the transition from an SRC to their return to sports and life (school, work, social etc.), with a phenomenological approach. The results of the inductively interpreted thematic analysis included participants voicing the tough reality of having a built-up *identity* as an elite athlete scattered to pieces by the injury. Through rehabilitation from SRC the participants sometimes felt out of context and out of themselves. Participants also had trouble with what used to be their identity outside of sport as well (as a friend or partner etc.), leading to negative emotions such as stress, feelings of sadness, frustration, depression and confusion. Stephan, and Brewer (2005) found that Olympic elite athletes perceived that their relations to other elite athletes were helping to maintain 'self-definition' as an elite athlete. By not being able to participate in training or social gatherings with other elite athletes this might have contributed to the sense of identity loss. The identity loss was described as tough, as it was confusing and depressing.

The participants in this study also reported problems of having an *invisible injury* and how it affected their recovery behaviors and emotions, when they themselves and people around could not see the injury. While most musculoskeletal injuries are somewhat observable by for example inflammation, bracing or crutches, that provides visible evidence of injury (Covassin et al., 2017), a concussion is not. Problems would occur

when people around would not 'see' the injury, making the participants feel like they were not always understood or supported enough, and the invisibility would also hinder 'getting help' from e.g. doctors, triggering emotions of dejection and frustration as expressed by one of the participants; 'It is not supposed to have to go that far, that you wish you had like a brain bleed, to get support. Like answers and understanding…' - Josephine. Athletes in previous studies have also reported the struggles of the outward perception; to appear healthy despite being injured (Bloom, Horton, McCrory, & Johnston, 2004; Kontos et al., 2012). As this could be potentially problematic both in diagnosis, getting support from coaches, peers, doctors and athletic therapists, and also for the injured athlete to cognitively understand and accept the injury for him/herself, it is important to consider the issue of the invisible injury when treating or working with concussed athletes. Other 'invisible injuries' are microtrauma injuries in sport, where a study on the narratives of microtrauma injured runners revealed psychosocial distress and behavioral tendencies post-injury that may have important implications for athletes, coaches, and healthcare professionals (Russel, 2015). Our findings also support previous research by Oddo et al., (2019) describing collegiate student athletes' problems with not only diagnosis but in post-injury recovery settings, such as coaches and peers not understanding the severity of the injury, due to the invisibility.

Our findings further suggest that participants were feeling a tremendous amount of pressure and confusion, when they had to oversee their own recovery (*Being In Charge of Recovery and Return to Sport*), making decisions based solely on symptoms, that at times were very diffuse, and came intermittently. Since a key component in concussion evaluation is still the athlete's perception of the concussive symptoms, though methods for more objective measurements might be emerging (Harmon et al., 2013), this puts a lot of responsibility on the athlete in his or her own recovery. A potential reason to why the participants were expressing uncertainty, stress and frustration was the lack of clear guidance, as most described doctors and athletic therapists offering non-coherent advice, as opposed to the findings of André-Morin, Caron and Bloom (2017) that suggested strong support from doctors and medical staff. If participants had concussion recovery protocols these were still described as hard to follow. As adherence is dependent on for example personal factors such as pain-tolerance, sport-identity, and self-motivation,

together with cognitive factors such as trust in the rehabilitation programs effectiveness, and emotional factors, such as acceptance of injury, and behavioral factors (instrumental coping) this may have affected the recovery behaviors in following recovery protocols or not (Brewer & Redmond, 2017). The non-coherent advice as described above, might have lowered the trust and adherence in the rehabilitation program. Rehabilitation outcomes were in earlier biopsychosocial models hypothesized to be mediated through behaviors such as adherence to rehabilitation and 'use of social support, risk taking and effort in rehabilitation', but the most recent model does not mention specific factors or mechanisms (Brewer, 2010).

Participants in the present study also described motivation as a sort of non-self-selected guiding star in the rehabilitation from SRC, that could potentially affect recovery behaviors and decisions on training and competition, a reason to ignore symptoms, or notice less of them;'… Sometimes I went home, but sometimes I got frustrated and like… I don't care(!) I'm continuing until I'm done with this session.' - Josephine. Chrisman, Quitiquit and Rivara (2013) also suggested that 'wanting to keep playing and being afraid to be removed from the game' was a potential reason to not report concussive symptoms. This does not imply that the participants in Chrisman, Quitiqut, and Rivaras' (2013) study 'felt less of their symptoms', but that they potentially ignored them and kept playing. These findings suggest that there is a major risk that athletes won't report concussive symptoms due to motivational factors, potentially affecting their recovery behavior and making them return to sport too soon, or not even be taken out of sport in the first place. These findings also support Oddo et al., (2019) themes 'desire to play' and 'optimism bias', and Chinn, and Porter (2016) where participants described the most common reason for not reporting concussive symptoms as being so much in the game/practice that they did not realize that they had a concussion in the place.

Social support from peers, family members, other athletes (and sometimes doctors) was at the same time described as very important in the recovery process. When the participants were feeling stressed, confused, sad or having other negative emotions and thoughts, the social support helped by offering emotional support and sometimes also information on concussion and recovery. Covassin et al., (2017) explained that athletes may rely on and seek further social support to help with coping and assist with recovery

efforts. Brewer (2001) also reported that social support may provide an important coping resource for athletes with injuries. The participants expressed gratitude for the social support they received in rehabilitation. Although some participants also expressed that social support at some points could be maladaptive, when they didn't feel like they 'were themselves' and could 'perform as a friend or partner'. Iadevaia, Roiger, and Zwart (2015) found that concussed adolescent student-athletes reported emotional frustration and irritability toward immediate family members, suggesting that not all social support is adaptive all the time, such as when one of the parents in the study described her daughter's frustration as having a negative impact on their interpersonal relationship, and the student-athlete would describe herself as emotional and upset when not getting the 'answers' that she wanted. Frustration was also evident in other adolescent participant's family relationships, at the same time as teammate relationships generally were described as supportive during the process of recovery (Iadevaia, Roiger, & Zwart, 2015). *Social pressure* was on the other hand described as stressful, when mostly coaches or team managers urged the participants to keep on training and competing, not understanding the severity of the injury. André-Morin, Caron and Bloom (2017) also described female university athletes with prolonged concussion symptoms positive experiences of social support and guidance, but in contrast to the present study they also found that participants experienced a highly valued social support from doctors and athletic therapists. This might be because of the difference of being a collegiate team-athlete with close contact to team-doctors as opposed to being an individual athlete (in a less economically resourceful sport), where the medical-team setup might be of a different character or non-existent. Medical staff need to acknowledge the amount of pressure athletes may be under in seeing themselves as the decision-makers in recovery, in need of social support. As the brain injury in itself may affect cognitive ability to cope with being an injured athlete (Covassin et al., 2017), decisions might not be made by the 'most fit' brain if everything is in the hands of the injured athlete, linking back to why the biopsychosocial approach should be considered in these types of injuries.

Concussions are complex to time-wise predict full recovery from, even if most concussion symptoms disappear after 10-14 days, some will experience prolonged symptoms (Stein, Alvarez, & McKee, 2015). The *uncertainty of recovery prognosis* meant

that athletes were experiencing emotional and cognitive stress and wanted to have their unsolvable questions answered at the same time as physical symptoms also kept triggering negative emotions and cognitions; ’I felt all the time that it should soon get better for every week that pass, but then it was just the same all along.’ - Dan. Russel (2015) described a ’fear of not recovering’ within a group of runners experiencing microtrauma injuries, and a frustration of the uncertainty and ambiguity associated with the micro trauma injury. The participants in the present study also expressed feeling emotionally distressed and frustrated by the ’unknown’. Psychological factors have also been suggested to influence recovery from injury. Brewer, and Redmond (2017) present some of the psychological factors that may influence the results of injury recovery; self-confidence, self-efficacy, attributions for recovery, health control-locus, coping, and goal setting, that are related to recovery-speed and subjective assessment of physical symptoms and functions. As ’stress’ was a common cognitive and emotional response in recovery from SRC in the present study, it must also be highlighted that stress in itself can affect recovery and well-being, as stress for example can inhibit good sleep (length and quality) and ability to take care of oneself (Brewer & Redmond, 2017). Sleep disorders has also been described as common post SRC (Morse & Kothare, 2018). From a biopsychosocial perspective it is possible that the above mentioned factors that may influence recovery also may be influencing each other through biopsychosocial pathways (Wiese-Bjornstal, 2010).

A link between SRC and mental illness outcomes in elite athletes, such as depression has also been suggested in a review article by Rice et al., (2018), in alignment with the present study findings, also shedding light on participants experiencing *depression* related to SRC. As the participants in the present study suffered prolonged concussion symptoms, one being troubles with persistent headache, this may also be linked to findings of Nicholl et al., (2014), where people living with chronic pain, reported high levels of depression. Rice et al., (2018) point out that causation between SRC and depression cannot yet be determined and that more well-designed prospective studies would be necessary. The present study also suggests that there may be a risk for substance abuse, with e.g. anxiolytics and anti-depressants, or for athletes to turn to opioids such as cannabis or other symptom inhibiting drugs.

The present study found that elite athletes experiencing prolonged concussive symptoms, cognitive, emotional and behavioral responses were especially dependent on six unique themes; (1) *Identity Loss,* (2) *Invisibility of the Injury,* (3) *Being in Charge of Recovery and Return to Sport,* (4) *Social Support and Pressure,* (5) *Uncertainty of Long Time Prognosis and* (5) *Depression and Substance Use.* The multi-faceted nature of SRC, captured by the six themes, advocate for the use of a biopsychosocial 'optical lens' when looking at SRC, to understand the complexity and take into consideration the biological, psychological and sociocultural factors possibly influencing recovery and outcome (Clacy, Sharman, & Lovell, 2018). Wiese-Bjornstal (2010) suggest in a review article on themes relevant to psychology and socioculture of sport injury that the psychological response is 'inter-related, cyclic, spiraling, dynamic, and recursive' in processes surrounding cognition, affect and behavior post-injury. These responses may also be influencing each other and short- and long-term outcomes through biopsychosocial pathways (Wiese-Bjornstal, 2010).

The findings in the present study suggest that the above-mentioned themes had an influence on overall well-being, cognitive (e.g., uncertainty, wanting answers to how the recovery was going), emotional (e.g., stress, frustration, dejection, depression), physical (e.g., headache) and recovery behaviors (e.g., resting, returning to training/competition too soon). Brewer (2010) proposed that cognitive appraisals, emotional and behavioral responses to sport injuries advocate to affect recovery outcomes, though specific mechanisms and factors behind rehabilitation outcomes are not explicitly explained in the integrated biopsychosocial model. Wiese-Bjornstal (2010) also suggested that athletes post-injury make many conscious assessments about e.g. sense of self, identity loss and burnout that may influence affect-related psychological, emotional and behavioral responses, as well as physical recovery. The findings also highlight the risk for mental illness following SRC and the importance of learning more about the psychological perspectives of SRC, to better understand how people working with elite athletes can provide stronger support for future concussed athletes.

Strengths and Limitations

Although the current study provided interesting results it does have limitations. Firstly the participants time of injury differed from 1 month to 5 years prior to the study,

making it a quite heterogenous sample in that sense, with risk for recall bias increasing as time passed. The recall bias could be diminished by exploring psychological perspectives of SRC during the athlete's recovery period, through cross sectional or longitudinal studies, following concussed athletes with prolonged concussive symptoms. To be able to do research on such an exclusive population as within the present study's inclusion criteria, the wider spectrum of 1 month to 5 years was considered necessary. Narrowing down to athletes being in the middle of their recovery process could have potentially made the study problematic to conduct.

Secondly the sample consisted of three cyclists and one martial arts' athlete, and even though the cyclists were competing in different disciplines it would have been interesting for the study to have a wider set of sports represented, e.g. equestrian. Equestrian activities are for example known to have the highest mortality of all sports, and report comparatively high rates of severe brain injury (as well as body injuries), higher than both skiing, football, rugby and automobile racing combined (Macnab & Cadman, 1996; Muniz Fontan, Moure Gonzalez, & Miras Veiga, 2009; Paix, 1999; Sorli, 2000).

For this specific study having a sample of participants with similar backgrounds, age and level of sport made sense, with a smaller number of participants and with the purpose to explore in-depth, what psychological experiences this specific group had with SRC. Interviews have been described as a 'default option' for qualitative research (Smith & Sparkes, 2019), but the interview option was regarded as appropriate for the present study, given the epistemological and ontological assumptions that underpinned the study-design. As the interviews were conducted face-to-face the researcher was also able to pick up on subtleties of body language and other social cues during the interview, something that is hard to do in for example online interviews on platforms like 'Skype' (Smith & Sparkes, 2019).

Turning to some of the strengths in the study, firstly the interview guide was piloted twice, representing 50% av the study's total participant number, allowing for revision of the interview guide, to better capture the experiences of SRC-recovery, and the cognitive, emotional and behavioral responses connected to it. Secondly a great deal of research has looked at male collegiate athletes from team-sports such as American football (Wasserman, Kerr, Zucherman, & Covassin, 2016) and a strength with the present

study is also that it explores the SRC-experiences of women and men from individual sports, making up for a minority of researched groups.

Practical Implications

From the study we learn that psychological responses (cognitive, emotional and behavioral) to SRC may be of importance for athletes (with prolonged concussive symptoms) psychological well-being and rehabilitation-behavior choices possibly affecting recovery. A potential practical challenge when working with athletes that have suffered a SRC is the absence of a physically observable injury. This is an issue that needs to be attended to by coaches, trainers and medical professionals, as the athletes brain injury in itself may affect cognitive ability to cope with the injury (Covassin et al., 2017), possibly making it hard for them to feel or know if they are ’fine or not’. For a trainer or coach it is important to acknowledge that asking an elite athlete with a brain injury (concussion) to give a clear answer to if he or she is feeling well enough to go competing/training, the answer may be influenced by social pressure, motivation or other psychological factors making the athlete potentially ’hide’ symptoms they might be feeling. Noticing a concussed athlete competing will not be as easy as recognizing an athlete with a broken leg running a hurdle sprint either, but consequences might be fatal in running the risk of ’second impact syndrome’ (having a new concussion before a complete recovery from an initial injury) and even if it is rare, it is deadly (May, Foris, & Chester, 2020). Therefor wearing the biopsychosocial ’goggles’ as a member of a support team around athletes may be beneficial, as it allows to better understand the multitude of biological, psychological and social aspects that may affect SRC recovery. As for sports psychology consultants working with concussed elite athletes is is important to acknowledge the potential increased risk of mental illness, e.g. depression and substance abuse. Closely related to mental illness are stress and sleep disorders, so looking at sleeping patterns and stress levels might be useful, as for e.g. sleep disorders are common following SRC (Morse & Kothare, 2018). Hopefully research findings can be useful to develop educational projects and/or enhance concussion recovery protocols, that to date only focus on the physical recovery. When athletes are expecting headaches, nausea and light/sound sensitivity for 10-14 days but then find themselves in identity loss, uncertainty, prolonged concussive symptoms and with the enormous pressure of being in charge of their

own recovery and return to sport, sport psychology consultants, trainers, coaches, doctors and athletic therapists should sees the opportunity to educate and maybe normalize these experiences.

Future Research

The present study examined subjective experiences of SCR through cognitive, emotional and behavioral aspects of SRC-recovery, and found possible connections with mental illness and substance use. Further research is therefore recommended to examine possible relationships between SRC, depression, suicide and substance use/abuse. Since the loss of identity was also highlighted as a problem, potentially also leading to mental illness, further research on how athletes, coaches and trainers may benefit from working with widening identity-perspectives from only ’being the elite athlete’ to see other values in life, would be recommended, as Miller and Kerr (2002) suggest over-identification with being just ’the athlete’ as a potential problem. It would also be suggested to investigate if cognitive behavioral therapy, mindfulness, acceptance commitment therapy or other psychological interventions may be potentially helpful to better cope with uncertainty and stress during the recovery after SRC.

Overall little research has been done on female athletes that have experienced concussions and it has been suggested that there might be a gender difference in how men and women experience concussions (McCrory et al., 2017), where for example Covassin, Elbin, Harris, Parker, and Kontos (2012) found that females had greater visual impairment and slower reaction times, compared with men. Therefore, it would be suggested to research even this topic further. Other studies may also want to explore a greater number of athletes from different sports, team or individual, from other countries and with different demographics to obtain generalizable findings.

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APPENDIX 1

INTERVJUGUIDE

Vilka omständigheter uppkom skadan i:

1. Hur länge sedan är det som du fick din hjärnskakning (vilket år)?
   Har du flera dokumenterade hjärnskakningar? Hur många?
   Har du flera hjärnskakningar som inte dokumenterats? Varför? Hur många?
2. Hur medveten var du om riskerna att drabbas av hjärnskakning i din idrott (innan skadan)?
3. Skulle du själv gradera din idrott som en låg-, medel- eller högrisk-idrott för hjärnskakning? *Vad baserar du det på?*
4. Berätta om ditt idrottande före hjärnskakningen:

- På vilken nivå tränade och tävlade du? Hur mycket av din tid tog idrotten?
- Hur såg det ut med ekonomisk uppbackning kring ditt idrottande? Sponsorer, klubbar mm. Berätta inte namnet på någon av dina sponsorer, men gärna omfattningen.

5. Vad var det som hände när du fick din hjärnskakning?
6. *Hur såg närmsta tiden fram till skadan ut?*
7. Berätta om förloppet direkt efter skadan. Fick du en bedömning direkt i samband med skadan *(när och hur visste du att det var en hjärnskakning)*?

Tillfrisknande/tid efter hjärnskakningen:

1. Fick du någon medicinsk vård eller annan specialutredning dagarna som följde efter hjärnskakningen?
2. Hur såg informationen ut, fick du veta någonting om din hjärnskakning *och eventuell rehabilitering/vårdplan* dagarna som följde efter skadan?
3. *Berätta om hur dina dagar såg ut under återgången. Vad gjorde du? Vad fanns det för svårigheter?*
4. *Vad förändrades i ditt liv i och med skadan?*
5. Rapporterade du skadan till coach/tränare/landslagsledning? Var du komfortabel att göra det? Tror du att andra tränings-/tävlingskompisar skulle känna likadant? Varför/varför inte?
6. Upplevde du att det fanns någon negativ reaktion från din tränare/coach på grund av din skada?
7. Vilka symtom hade du? Hur länge höll de i sig och hur besvärande var de i ditt dagliga liv?
8. *Följde du ett ”återgångsprogram” som t.ex ”Hjärntrappan”? Hur använde du det?*
9. *Berätta om hur det var när du gjorde framsteg eller inte gjorde framsteg*
10. När kunde du återgå *helt* till träningen efter din skada? Fanns det några restriktioner, när du väl fick återgå till träning och tävling?

11. *Hur var det när du väl fick gå tillbaka till idrotten? Hade du några men som påverkade hur du idrottade? Vad var i så fall problematiskt?*
12. Hur lång tid tog det innan du kände dig fullt återhämtad?
13. *Hade din rehabilitering och återgång sett likadan ut om du vetat allt som du vet nu? Vad hade varit lika/skillnad?*
14. *Hur tänker du kring hjärnskakningar och risk för liknande skador framöver?*

APPENDIX 2

Information till forskningsdeltagare

Vi vill fråga Dig om Du vill delta i ett forskningsprojekt. I det här dokumentet får du information om projektet och om vad det innebär att delta.

Vad är det för projekt och varför vill ni att jag ska delta?

Idrottsrelaterad hjärnskakning (SRC) är en traumatisk hjärnskada inducerad av biomkanisk kraft. Skadan är vanligt förekommande inom idrotten, där idrottsskadestatistik som förs av Folksam visar att skador mot huvudet är en av de tre vanligast rapporterade skadorna i 14 av 17 idrotter för både män och kvinnor.

Trots att hjärnskakningar är en relativt vanlig form av idrottsskada är elitidrottares upplevelser av skadan, tiden efter och återgång till idrotten ett förhållandevis obefolkat område.

Syftet med studien är att ge en ökad förståelse för hur elitidrottare upplever hjärnskakning och återgång till idrotten, vilket i sin tur kan bidra till bättre omhändertagande och stöd av/till idrottare med hjärnskakningar.

Vi vill att Du deltar för att vi tror att Du sitter på värdefull erfarenhet som elitidrottare med tidigare hjärnskakning(ar). Vi har antingen fått kontakt via ditt specialidrottsförbund, Svenska Riksidrottsförbundet eller via direktkontakt, förmedling via bekant, eller att du kontaktat oss.

Forskningshuvudman för projektet är Halmstad Högskola. Med forskningshuvudman menas den organisation som är ansvarig för studien.

Hur går studien till?

Som deltagare i forskningsprojektet bidrar du till en ökad förståelse för hur elitidrottare upp- lever hjärnskakning(ar) inom idrotten och tiden efter skadan. Du genomför en intervju vid **ett enskilt tillfälle**. Intervjun är ett samtal mellan dig och Annie Söderberg, som är ansvarig för projektet. Tidsåtgången beräknas vara **cirka 60-90 minuter**.

Du behöver inte förbereda någonting speciellt inför intervjun.

Efter intervjun kommer samtalet att transkriberas, dvs. skrivas ned i text, ordagrannt. Detta görs för att en analys senare ska kunna genomföras. Du har som deltagare i studien rätt till att läsa både transkriberingen och den färdiga analysen för godkännande, innan offentliggörande av projektet.

Möjliga följder och risker med att delta i studien

Det finns en risk att ”obehagliga minnen” kommer upp i samband med intervjun. Om det skulle visa sig att det finns behov av stöd, kommer du att få hjälp att ta kontakt med en mot- tagning för elitidrott och hälsa.

Om din hjärnskakning har uppmärksammats i media finns en risk att någon kan ”räkna ut” att det är just du som är med i studien. Som deltagare ska du kunna känna dig trygg i att du är anonym och därför kommer inte ditt namn att användas (utan byts ut mot en pseudonym, ett ”låtsas-namn”), platsen där skadan uppstått, din klubb/ditt team eller liknande kommer inte heller att framgå. Du kommer att kunna bekräfta och godkänna detta när du läser igenom delen om dig innan offentliggörande.

Vad händer med mina uppgifter?

Projektet kommer att samla in och registrera information om dig.

Information som samlas in om dig kommer att spelas in genom ljudupptagning och sedan transkriberas. Ljudfilen sparas på ett krypterat USB-minne och kommer att finnas inlåst i dokumentskåp tillsammans med transkriberingen så länge forskningsprojektet pågår. När projektet är avslutat raderas ljudfilen och transkriberingen förstörs.

Insamlad data kommer att vara tillgänglig för forskningsansvarig, Annie Söderberg samt handledare Urban Johansson, som båda skrivit under ett tystnadspliktsavtal.

Dina svar och dina resultat kommer att behandlas så att inte obehöriga kan ta del av dem.

Ansvarig för dina personuppgifter är Halmstad Högskola. Enligt EU:s dataskyddsförordning har du rätt att kostnadsfritt få ta del av de uppgifter om dig som hanteras i studien, och vid behov få eventuella fel rättade. Du kan också begära att uppgifter om dig raderas samt att be- handlingen av dina personuppgifter begränsas. Om du vill ta del av uppgifterna ska du kontakta Annie Söderberg, tel 0730278277, Phragménsvägen 20, 703 68 Örebro. Dataskyddsombud nås på dataskydd@hh.se. Om du är missnöjd med hur dina personuppgifter behandlas har du rätt att ge in klagomål till Datainspektionen, som är tillsynsmyndighet.

Hur får jag information om resultatet av studien?

När forskningsprojektet avslutats kommer du att bli kontaktad via mail. Du kommer då att kunna välja om du vill ta del av ditt bidrag till projektet eller om du vill ta del av hela studien. Du kan också välja att inte ta del av resultatet alls.

Försäkring och ersättning

Som deltagare av forskningsprojektet har du möjlighet att utnyttja 3 timmar idrottspsykologisk rådgivning efter avslutat projekt. Du kommer då att jobba tillsammans med Annie Söderberg som är idrottspsykologisk rådgivare med grundläggande psykoterapeututbildning med inriktning KBT och elitidrott. Ta kontakt via anniesoderberg@gmail.com för vidare planering.

Vi tror att du är försäkrad genom din tävlingslicens eller genom Folksams Elitidrottsförsäkring. Forskningsprojektet medför i sig inga risker för din hälsa, men vi är måna om dig ändå! Har du frågor får du gärna kontakta anniesoderberg@gmail.com.

Deltagandet är frivilligt

Ditt deltagande är helt frivilligt och du kan när som helst välja att avbryta deltagandet. Om du väljer att inte delta eller vill avbryta ditt deltagande behöver du inte uppge varför.

Om du vill avbryta ditt deltagande ska du kontakta den ansvariga för studien (se nedan).

Ansvariga för studien

Ansvarig för studien är

Annie Söderberg

0730-278 277

Phragménsvägen 20

703 68 Örebro

anniesoderberg@gmail.com

Samtycke till att delta i studien

Jag har fått muntlig och skriftlig informationen om studien och har haft möjlighet att ställa frågor. Jag får behålla den skriftliga informationen.

☐ Jag samtycker till att delta i studien *Stories of Concussed Elite Athletes*

☐ Jag samtycker till att uppgifter om mig behandlas på det sätt som beskrivs i forsknings- personsinformationen.

Plats och datum	**Underskrift**
_____	_____

Annie Söderberg arbetar som idrottspsykologisk rådgivare på uppdrag av Riksidrottsförbundet och har tidigare arbetat som förbundskapten på Svenska Cykelförbundet.

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