

Exploring the Unique Challenges Faced by Female University Athletes Experiencing Prolonged Concussion Symptoms

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The present study explored female university athletes' experiences with protracted concussion symptoms, including the factors that impeded or facilitated their recovery. Five female athletes who competed in 4 different university sports in Canada participated in this study. All participants suffered concussion symptoms that lasted from 10 weeks to 14 months. An interpretative phenomenological analysis was used to inductively analyze the interview data. The participants discussed the unique challenges that stemmed from suffering a prolonged concussion while competing in university sport, which included serious emotional responses (depression, attempted suicide) and reduced academic performances. Participants also alluded to the types of emotional and informational support from their coaches, doctors, athletic therapists, and parents that facilitated their recovery. Overall, the detailed descriptions provided by the participants in this study offer a rare look into their lived experiences of university athletes suffering from protracted concussion symptoms. Given the serious emotional responses reported in this study, the present findings highlight the need to monitor concussed university athletes' psychological health and academic performance. These results provide individuals such as coaches, medical professionals, and sport psychology specialists with detailed information about the impact of protracted symptomatology on an athlete from a personal (social), athletic, and academic perspective, which may enhance their applied work with this population. The present findings also highlight the need for social support for concussed university athletes throughout their recoveries to help them cope during this important and challenging time of their lives.

Keywords: collegiate athletes, concussions, qualitative research, injury recovery, social support

Sport-related concussions have received a great deal of attention both inside and outside of the academic domain (Wiebe, Comstock, & Nance, 2011). Researchers have estimated that 1.6 to 3.8 million concussions occur each year (Langlois, Rutland-Brown, & Wald, 2006), with the majority of these injuries occurring in sport. According to McCrory and colleagues (2017), a concussion is a traumatic brain injury that results from biomechanical forces incurred through direct or indirect contact to the head, face, neck, or elsewhere on the body. Often, the

neurological impairment that accompanies a concussion is transient, and physical signs of trauma (e.g., loss of consciousness) are rarely apparent following acute injury (McCrory et al., 2017).

Some of the most commonly reported concussion symptoms include headache, dizziness, fatigue, and sensitivity to light and sound (McCrory et al., 2017). Although the majority of symptoms resolve within 10–14 days among adults, ~10% to 20% of athletes experience protracted concussion symptoms¹ that can last for days, weeks, or in the most severe cases, for months to years (Stein, Alvarez, & McKee, 2015). For example, Caron, Bloom, Johnston, and Sabiston (2013) studied the effects of mul-

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¹ We used McCrory and colleagues' (2017) description of protracted concussion symptoms, which refer to concussion-related impairments among adults (>18 years old) that persist for longer than 10 to 14 days.

tiple concussions on the lives of five retired professional ice hockey athletes. The men explained that their protracted concussion symptoms impacted them physically (e.g., daily headaches), psychologically (e.g., depression), and socially (e.g., marital problems), which adversely impacted their personal lives and professional careers. Given the severity of symptoms reported by the professional athletes in these studies, it appears important to continue investigating other athlete populations who have experienced protracted concussion symptoms.

Although athletes of all ages are susceptible to concussions, data have revealed that collegiate² athletes have higher rates of diagnosed concussions compared with other athlete populations (Covassin, Elbin, Crutcher, & Burkhart, 2013; Kroshus, Kubzansky, Goldman, & Austin, 2015), evidence that has undoubtedly fueled research efforts on university athletes in recent years. Research on North American collegiate athletes has generally focused on the epidemiology of the injury (e.g., Wasserman, Kerr, Zuckerman, & Covassin, 2016), diagnostic issues (e.g., Baugh et al., 2016), and predictors of recovery (e.g., Williams, Puetz, Giza, & Broglio, 2015).

A great deal of research has focused on male collegiate athletes, particularly in American football, where concussions are commonplace (Wasserman, Kerr, et al., 2016). This is unfortunate, given that females have experienced concussion rates that are 1.4 times higher than males in sex-comparable sports (Covassin, Moran, & Elbin, 2016). Additionally, female athletes have experienced concussions differently than males (Covassin, Elbin, Harris, Parker, & Kontos, 2012). For example, Covassin and colleagues' (2012) examination of NCAA collegiate athletes found that females had greater visual memory impairments and slower reaction times (RTs) compared with males. Although these findings appear to suggest that female collegiate athletes suffer more severe concussions than males, experts have been cautious when interpreting data about gender differences. More precisely, McCrory and colleagues (2013) addressed this issue in the consensus statement of the 4th meeting of the Concussion in Sport group.

The role of female gender as a possible modifier in the management of concussion was discussed at length by the panel. There was no unanimous agreement that the current published research evidence is conclusive enough for this to be included as a modifying factor, although it was accepted that gender may be a risk factor for injury and/or influence injury severity. (p. 253)

Evidently, more research is needed to understand the factors that make concussions particularly challenging for female collegiate athletes, as well as ways to improve their recovery.

Certain contextual factors associated with being a university student-athlete could exacerbate the overall impact of a concussion. Most North American university athletes attend 12–15 credit hours (or 4–5 courses) per week, in addition to the time they spend studying, traveling, training, and competing. Given the amount of time collegiate athletes dedicate toward academic- and sport-related activities, it is not surprising they develop a strong identity that revolves around being a “student-athlete” (Burns, Jasinski, Dunn, & Fletcher, 2012). Consequently, concussion recovery could be particularly problematic for university student-athletes because the first stage of existing graduated return-to-play protocols³ stipulated that athletes cease sport- and academic-related activities until they were no longer symptomatic of a concussion at rest (cf. McCrory et al., 2013).

Researchers have found that university athletes who were removed from their daily routines as a result of suffering a concussion reported emotional disturbances such as feelings of confusion, anger, and isolation (Bloom, Horton, McCrory, & Johnston, 2004; Kontos, Covassin, Elbin, & Parker, 2012), and a significant increase in depression symptoms (Vargas, Rabinowitz, Meyer, & Arnett, 2015). Taken together, it is possible that the combined stress of attempting to recover from prolonged concussion symptoms, being socially isolated from

² The terms “college” and “university” are used synonymously throughout the article.

³ The 5th consensus statement on concussions advocated for “symptom-limited activity” in stage one of the return-to-play protocol (cf. McCrory et al., 2017). We note this difference because our participants would have received advice that was consistent with earlier consensus statements (i.e., no activity until symptom resolution; McCrory et al., 2013).

teammates and family members, and trying to cope both academically and athletically could lead to a particularly turbulent and difficult recovery for university student-athletes. Therefore, the objective of the present study was to explore female university athletes' experiences with protracted concussion symptoms, including their perceptions of the factors that impeded or facilitated their recovery.

Method

Study Design

The present study was purposefully not situated within a theoretical framework or model. Instead, we made a decision to ground this study in the philosophical assumptions of epistemological constructionism (that knowledge is both constructed and subjective) and ontological relativism (that there are multiple mind-dependent realities). It was our intention to make sure the findings were grounded in participants' realities and the socially constructed meanings and knowledge attached to them.

Phenomenology is a qualitative research methodology used to provide a composite description of the essence of human experience (Smith, Flowers, & Larkin, 2009). One type of phenomenology, interpretative phenomenological analysis (IPA), is an inductive approach that involves a detailed examination of a small number of cases (Smith et al., 2009). IPA involves the researchers interpreting the participants' interpretations of their experiences. Researchers' interpretations can involve making observations during data collection or by reflecting on their own past experiences in relation to the phenomenon under investigation (Larkin, Watts, & Clifton, 2006; Smith et al., 2009). The current study used IPA to better understand the experiences of female collegiate athletes who suffered from protracted concussion symptoms, which was a fitting design, given that the lead author of this study experienced protracted concussion symptoms during her university athletic career.

Participants

Upon receiving approval from our research ethics board, university team-sport coaches were contacted by email and asked to forward a recruitment script to individuals who had suffered protracted

concussion symptoms (cf. McCrory et al., 2017). Consistent with Smith's (2016) recommendations for IPA research, purposive homogenous sampling was used in the present study because "if one is looking at the psychological experience of a small sample of participants, it makes sense for that sample to be uniform, as far as possible, in terms of obvious variables, commonly: age, gender, and level of experience" (p. 222). Inclusion criteria for this study required that participants: (a) were a female university athlete, (b) suffered a medically diagnosed concussion while competing in university sports, (c) had concussion symptoms that persisted for >2 weeks, and (d) had received medical clearance to resume academic and athletic activities. Five female university athletes agreed to participate in this study. The athletes competed at four different Canadian institutions and played rugby, volleyball, and ice hockey. Each participant suffered a medically diagnosed concussion and experienced protracted concussion symptoms for 10 weeks to 14 months (two athletes had symptoms for 10 weeks, two for 12 weeks, and one for 14 months). Each participant received medical clearance to return to sport before the start of the study. A brief player profile was created for each of the participants, who were also assigned a pseudonym to protect their confidentiality.

Julie was a hockey player who suffered a concussion during a training camp in her first-year of university. Her symptoms lasted for 10 weeks. Despite being new to the team, Julie felt social support from her coaches and teammates "was the biggest thing" that helped her recovery. In particular, Julie said her coach was "like a parent" to her during her rehabilitation, which was important to her because her family lived on the other side of the country.

Marie was a rugby player who suffered a concussion in her second season. Marie described herself as an aggressive and competitive player who "jumped at the opportunity" of playing a contact sport in university. Her concussion symptoms persisted for 10 weeks. Marie explained the types of academic struggles she faced following her concussion and recommended "small doses" of studying as a way of coping with her academic workload. She emphasized the importance of educating varsity athletes about concussions because she often had to Google concussion information to understand her thoughts, symptoms, and behaviors.

Chantal was a hockey player who suffered a concussion that lasted 12 weeks in her final year of eligibility. Chantal provided vivid descriptions of her postconcussion symptoms. She described feeling “stale” and “stuck” as opposed to being her usual optimistic self. She felt that her symptoms worsened by being isolated from the team environment, by the lack of a return date, and by the unexpected return of her symptoms after being asymptomatic for several days. Chantal indicated that she wanted to share her story to help other athletes better understand the types of issues athletes can face after suffering a concussion.

Rebecca was a volleyball player who suffered a concussion during a training session at the beginning of her third season. Her concussion symptoms lasted for 12 weeks. Rebecca’s concussion had several negative repercussions, which included “getting kicked out” of her academic program owing to poor grades. According to Rebecca, the combination of her protracted concussion symptoms and her academic decline led to an attempted suicide 3 months following her concussion. At the time of the interview, it had been 2 years since Rebecca sustained her concussion. She noted that she was no longer having suicidal thoughts and that her concussion experiences influenced her to pursue a career as a youth worker where she could help other young people.

Sonia was a hockey player who suffered a season-ending concussion during a game in the middle of her rookie year. Her concussion symptoms persisted for 14 months, which was longer than any other participant. Following her concussion, Sonia noted that her mood was severely altered as she became “a different person,” and that she could not “think properly.” She also described how her academic life was negatively affected by her concussion, as she went from being an honor student to failing several classes and having to withdraw from university for one semester as a result of her ongoing symptoms.

Data Collection

Face-to-face, semistructured interviews were conducted with each participant, and the conversations were audio recorded. Semistructured interviews have been a commonly used method of data collection in IPA studies (Smith, 2016).

Moreover, interviewing is a particularly well-suited method for IPA studies, given that it inherently involves the coconstruction of knowledge and experience by the two (or more) people who are involved in the conversation (Smith & Sparkes, 2016). Although we are aware that some individuals have noted that interviews have become a default option for qualitative researchers (Potter & Hepburn, 2005; Smith & Sparkes, 2016), we feel that interviews were appropriate, given the epistemological and ontological assumptions that underpinned this IPA investigation.

Interview guide. We created an interview guide to gather an in-depth understanding of participants’ experiences with protracted concussion symptoms. The interview guide was divided into demographic, key, summary, and concluding questions. The demographic questions helped create the participant profiles. The key questions included: “How did the concussion impact your daily life while you were symptomatic?”; “What were you thinking and feeling a month after being diagnosed with a concussion?”; “What factors do you think helped (i.e., facilitated) or worsened (i.e., impeded) your concussion recovery?”; “Did you feel that you were supported during the initial stages of and throughout your recovery?”; and “Who were the individuals who assisted you during your recovery?”. The interview questions allowed for a natural flow of dialogue between the participant and the interviewer, and helped focus on participants’ constructions of their own experiences with the injury. Finally, participants were asked summary and concluding questions (e.g., “Which factors make for a good or bad concussion recovery?”, and “Do you have any final questions or comments you would like to share?”).

Interviewer. Daphnée, the first author and interviewer, was a university and national-level volleyball player who experienced a career-ending concussion. Her experience with protracted concussion symptoms sparked her interest in carrying out this study and also allowed her to effectively build rapport with the participants. A pilot interview was video recorded and observed by all members of the research team. The pilot interview provided Daphnée with an opportunity to refine her interviewing skills, and it also helped test the interview guide. In line with IPA guidelines (Smith et al.,

2009), Daphnée also kept a detailed journal that included notes taken during and after each interview. During the interview, Daphnée made notes about participants' body language, tone, facial expressions, and so forth. She also wrote in her journal after each interview, where she provided context and descriptions of her perceptions of the interview. More information about the use of the reflective journal is provided in the quality standards section.

Data Analysis

According to Larkin and colleagues (2006), IPA has a flexible approach with respect to analyzing qualitative data. The primary interest of IPA's analytic focus is to direct the researchers' attention toward each participant's attempt to make sense of their experiences (Smith et al., 2009). Data analysis followed Smith and colleagues' (2009) guidelines for IPA analysis. That is, we began with an individual-level analysis (steps 1–3) for each participant's interview transcript before proceeding to a group-level analysis (steps 4–5) that looked at the participants' experiences across transcripts. Members of the research team had different roles in the analytic process and will be described in more detail below.

Individual-level analysis. The individual-level data analysis comprised steps one, two, and three of Smith and colleagues' (2009) guidelines for IPA analysis, and were performed by the lead author. After the audio recordings of the interviews were transcribed verbatim, the first step was to read each transcript in its entirety. Daphnée identified what she felt was the most thorough and detailed transcript as a case document, and reread it several times to get a sense of the athlete's story.

The second step involved initial note-taking regarding thoughts and impressions about events contained within the transcript. The notes included Daphnée's impressions of participants' body language and emphasis during the interview. Furthermore, Daphnée also noted her initial interpretations of athletes' experiences. For example, after reading Sonia's transcript, Daphnée noted that Sonia felt the social support she received from her athletic therapist was critically important for her concussion recovery. In the margins of the transcript, Daphnée made a note that she recalled Sonia break-

ing down in tears when she shared how thankful she was for her therapist's support.

The third step of the analysis was to perform a line-by-line analysis of the events, situations, and experiences discussed in the interview. This process involved combining the participant's comments and Daphnée's interpretations of those comments in relation to her past experiences and what she observed during the interviews (with the assistance of her reflective journal). Following Smith and colleagues' guidelines, the data were analyzed at three levels during the second part of the analysis: (a) descriptive experiences, (b) the manner in which the participant described their experiences (i.e., linguistics, body language), and (c) Daphnée's interpretations about how the participant understood the experiences they described. Upon completion of the analysis of the first transcript, the same process was repeated for the other four transcripts.

Group-level analysis. The group-level analysis involved the fourth and fifth steps of Smith and colleagues' (2009) guidelines. These steps were conducted simultaneously and involved a collaborative effort between the first, second, and third authors to look for patterns across cases. We also used the Daphnée's reflective journal and analysis notes to help identify themes (Smith et al., 2009). Beginning with the case document (same as described above), initial codes were generated by Daphnée and then mapped onto a list. Following this, all three of us worked together to develop a list of initial codes. After several iterations of the list for the case document, the same process was repeated for the remaining four transcripts. Themes from the other interviews were mapped onto the original list of initial codes, resulting in a final master list of 27 initial codes across the five transcripts. Subsequently, the initial codes were grouped into lower- and higher-order themes. The higher-order themes will be elaborated on in the results section.

Quality Standards

In line with our epistemological and ontological assumptions, we followed a relativist approach for selecting measures to demonstrate the quality of our findings (Smith & McGannon, 2017). The present study implemented bracketing and the use of critical friends. Bracketing was accomplished by having Daphnée use a

reflective journal throughout data collection and analysis, which allowed her to reflect on her dual role as a researcher and interpreter (Smith, 1996). This allowed Daphnée to consider how her personal values and rehabilitation experiences might influence her analysis of the data. More precisely, owing to Daphnée's history with concussions, excerpts in her reflective journal occasionally focused too heavily on her own experiences. It was at these times that Daphnée's critical friends, authors 2 and 3, encouraged her to be mindful about giving voice to and reflecting upon the participants' experiences. The role of critical friends extended to the fourth and fifth steps of the IPA analysis, whereby they continued to challenge the interpretation of the findings in the hopes of providing the most accurate depiction of the participants' experiences with concussions.

Results

An inductive analysis of the interview data yielded three higher-order themes: *challenges of being a concussed student-athlete*, *emotional and behavioral concussion responses*, and *network of support*. This section will provide quotes from the participants to illustrate the three higher-order themes, along with our interpretations of the participants' experiences.

Challenges of Being a Concussed Student-Athlete: "I Failed Everything"

In this theme, participants described the impact of suffering protracted concussion symptoms in a university setting. The athletes felt their own lack of knowledge about concussions—as well as from friends, teammates, and family members—adversely impacted their recovery. Additionally, the participants revealed that their persistent postconcussion symptoms affected their academic progression, including their class attendance, study habits, and grades. The academic difficulties the athletes encountered appeared to be a particularly challenging aspect of their recovery.

Four of the athletes revealed the difficulties that stemmed from a lack of knowledge regarding concussions. Some of the athletes talked about their own lack of knowledge about concussions and especially the dangers about returning to play while symptomatic.

Marie. I knew about concussion symptoms from the [preseason concussion] test I had to take, but I learned about concussions by Googling them. So, a little bit of both.

Daphnée. Why did you Google concussions? What made you do that?

Marie. Because I wanted to know what was happening to me. No one had given me any information regarding the injury. The information is not out there. It's the physical symptoms that we are aware of, not the mental stuff.

Listening to Marie's lack of knowledge about concussions and how it negatively affected her concussion recovery was noted in Daphnée's journal as being an important moment. Daphnée remembered feeling surprised to hear university athletes admit that they lacked knowledge and understanding about concussions. Moreover, Daphnée noted that she could not help thinking about her own concussion experiences and how fortunate she was to have access to information about the injury from her research supervisor and colleagues in graduate school.

In addition to their own lack of knowledge about concussions, four of the athletes revealed that their friends, teammates, and family members were also uninformed about the injury. More specifically, when asked about the types of support provided by coaches, teammates, or family members, Julie noted that her teammates did not understand the return-to-play process.

I felt pressured by my teammates to get back to hockey during my recovery. Sometimes I would just throw the skates on and my teammates would just assume that I was going to practice, and it was hard to tell them that I would only be practicing by myself. My teammates were always asking when I would come back.

It was clear from Julie's tone of voice that her teammates' lack of understanding surrounding concussion recovery frustrated her and worsened her ability to cope with and manage her protracted concussion symptoms.

In addition to issues surrounding a lack of knowledge about concussions, all of the athletes said they encountered academic issues, which included reduced class attendance, study habits, and poor grades. All five of the athletes said they did not feel well enough to attend class the first week following their concussion. Some of the athletes also spoke about the difficulties they faced when they returned to class.

Daphnée. I know you mentioned that you still had symptoms about one month after your concussion. Could you describe how you were feeling at that time?

Rebecca. I tried to go to school, but at times I could only go to half of a class because my symptoms worsened so quickly. I could see my semester failing and volleyball slipping away from me.

Rebecca's comments were particularly poignant for Daphnée because she was also a volleyball player who encountered academic issues during her recovery from concussion.

Most of these athletes revealed their daily struggles studying and attending class once they returned to school. For example, Julie described her concentration in class as "just not being there" and admitted, "When you're a concussed student-athlete, it's really tough to keep up with your classes." Moreover, Marie also described the ways in which her study habits changed as a result of her concussion, "I would do work for an hour at a time and take breaks in between. Things were done slower. I couldn't just sit down and work on a lab report for six hours."

Managing protracted concussion symptoms while being a full-time university student negatively affected four of the athletes' academic trajectories. For example, Julie and Sonia said they "failed several classes," which forced them to "stay at school during the summer to take classes." Furthermore, as Julie shared her personal experiences, Daphnée noted she could sense the disappointment in her voice and witnessed her frustration when she shook her head and added—

Julie. I seriously thought about withdrawing from school that semester after I suffered my concussion. I tried to stick it out, but it didn't work out so well . . . I will need to do some catching up with my academics because of the concussion I suffered my first year. I am now behind one semester. I will probably have to add another year onto my program and be here for six years.

As athletes spoke about missing class time and their struggles studying during their concussion rehabilitation, it is not surprising that their grades were also adversely affected during this time period. For example, Rebecca shared—

Rebecca. The semester I got my concussion, I had a "D" average. I even dropped one of my classes because I felt overwhelmed. I failed two of my three classes, so I felt the pressure of having to get top grades the following semester.

It was evident that discussing her poor grades was a challenging topic for Rebecca, as she appeared to be embarrassed to share information in regard to her weak academic performance. Rebecca also shared a very frightening experience that she said resulted from her academic struggles. That is, Rebecca disclosed that she attempted suicide three months after being diagnosed with a concussion—

Daphnée. I can appreciate that it was a challenging time for you . . . , and I know it's not pleasant topic to talk about but . . .

Rebecca. I know. But it happened. A few months after my concussion, I attempted to commit suicide because I had just failed my fall semester. I didn't fail out of school, but I knew that I would never be able to make-up for my poor grades. I had never gotten such bad grades. Getting those grades also led to me getting kicked out of my program of study, which I had been working hard to get into . . . Things were horrible. School. My boyfriend. Volleyball. Nothing was going well.

During the interview, Rebecca revealed to Daphnée that she was no longer experiencing suicidal thoughts. Nonetheless, Daphnée noted in her journal that she could sense the fear and hopelessness in Rebecca's voice while discussing her suicide attempt. Rebecca credited her concussion experience for leading her toward becoming a youth worker in hopes of "giving a second chance" to others in need.

To summarize, the athletes shared the types of challenges they faced while recovering from a concussion in the university setting. In particular, the athletes noted that the lack of concussion knowledge (others and themselves) adversely impacted their recovery. Additionally, the athletes discussed how their lengthy recovery adversely impacted their academic progress in a number of ways.

Emotional and Behavioral Concussion Responses: "I Was a Different Person"

The athletes described the types of responses they experienced as a result of their protracted concussion symptoms, which included heightened emotions, such as feelings of frustration, mood swings, and depression, as well as changes in their behavior that led to concerns about their weight.

All five participants commented on the various emotional responses they experienced throughout their concussion recovery. Many of

the athletes experienced mood swings about one month after their concussion diagnosis. For example, Rebecca said, "One day I would tell myself that I would heal quickly, then the next day I would be crying. I would cry for hours because I couldn't see myself healing anytime soon. My morale wasn't very strong." Seeing Rebecca roll her eyes and shake her head during the interview made it apparent to Daphnée that Rebecca realized her emotions were altered by her concussion and not a reflection of her usual temperament. Additionally, Chantal said, "I started to realize that everything around me was still happening and that I was still in the same state. I was upset that I was still symptomatic because I felt as though I couldn't do anything."

Three of the athletes also talked about the types of emotions they experienced while recovering from their concussions, which included depression.

Daphnée. Do you feel that your concussion impacted your life emotionally? If so, how?

Chantal. I found that my concussion took the biggest toll on me emotionally . . . All the things that I knew would usually make me happy and put a smile on my face didn't work . . . Nothing worked. I couldn't have goals or plan to return to play. Not being able to see the end of my concussion was tough. I was so stale . . . Everything was kind of gray.

The athletes' demeanor changed drastically as they began sharing symptoms of depression. The conversation shifted from occasional joking and laughing to sad, reflective, and emotional reactions. For example, Chantal's vulnerability and uneasiness was apparent during the interviews as she began to speak quietly and as her natural smile vanished.

In addition to the emotional issues, three participants talked about the behavioral responses they experienced. In particular, some of the athletes discussed having weight concerns as a result of the activity limitations placed on them during their lengthy recovery.

Daphnée. You talked about how the concussion impacted you emotionally, but I am also wondering if you feel it impacted you physically?

Sonia. I gained a lot of weight during my concussion recovery, which was hard because I felt like I was losing control. I was not eating right since my appetite changed during that time. Everything gets back to how I was feeling emotionally.

Rebecca. I lost a lot of weight after my concussion. I was not eating or sleeping well. Once I returned to play, I tried to compensate for not being able to train for several months and worked out all time. I lost 30 pounds! A few months later, I was selected on the national volleyball team. The coach was very pleased with my physical shape. When I rejoined the national team program next year, I had gained the 30 pounds, and the coach told me I was not in shape. I gained weight because I felt better! It was so frustrating.

The emotional and behavioral responses described by the participants appeared to be exacerbated by unique factors associated with concussion recovery, such as being removed from their respective teams for significant amounts of time.

Daphnée. So, you got a concussion during a preseason tournament before the start of the first semester at [name of university]. Could you describe what that was like?

Julie. I was pretty upset because I was really excited to start my rookie season. I was not around the team for probably three weeks, which is an important time because it's an opportunity to get to know everyone. Eight weeks or so after my concussion, it was extremely hard for me to still be out because I wanted to be with the team and do everything my teammates were doing.

Daphnée noted in her reflective journal that Julie spoke about being disconnected and isolated from her team with an aggravated tone and a look of despair. Additionally, Rebecca explained the feelings of loss she experienced as a result of being sidelined by a concussion while still in the university. Specifically, she noted that "Volleyball was my motivation to go to university" and, a month after being diagnosed with a concussion that, "Not having volleyball in my life was enough to bring my morale to a complete zero." Rebecca's comments about the sorrow and guilt she experienced made Daphnée reflect on her own concussion recovery. Daphnée also remembered feeling as though she had lost the most important aspect of her life, volleyball, and that she couldn't help but feel responsible for the injury.

Further complicating participants' feelings of loss were many of the unique recovery elements of a concussion, such as being unable to play or practice and having no fixed return date.

Chantal. I am normally a strong mental person, but not being able to see an end to my concussion was tough . . . I couldn't have any goals or plan my return. There

was nothing I could do, look forward to, or plan for during my recovery.

For these university athletes, being inactive and isolated from their sport appeared to be a very challenging aspect of their recovery.

To conclude, this theme highlighted some of the participants' emotional (i.e., frustration, mood swings, depression) and behavioral (i.e., weight concerns) responses following their concussions and throughout their prolonged recoveries. Additionally, their responses were influenced by their isolation from athletic and social environments as well as a lack of a definitive return-to-play date.

Network of Support: "Support Was the Biggest Thing for Me"

Athletes spoke about the importance of and need for social support throughout their concussion recovery. In particular, the participants indicated that coaches, doctors and athletic therapists, and parents facilitated their recovery by providing emotional and informational social support.

Several players explained how their coaches provided emotional support to them by "sending me text messages on a daily basis" to see how "I was feeling" and "asking me questions concerning my sleeping patterns and symptoms." Rebecca explained her relationship with her coach throughout her rehabilitation: "He was like a close friend to me during my recovery. He was always there for me." In addition, Julie also described some of the ways in which her coach supported her, including appointment follow-ups and making sure she followed the concussion recovery protocol.

Daphnée. You talked a little bit about your teammates, but I was also wondering if you could tell me about your coach's role throughout your recovery.

Julie. I would come back to the athletics complex every time I would have a doctor's appointment because my coach wanted to know everything that was going on. My coach talked to our athletic therapist on a daily basis to see how I was doing. He was really helpful and was really like a "parent" to me.

Aside from coaches, athletes also highly valued the social support they received from doctors and athletic therapists. For example, two of the athletes appreciated the informational support they received from doctors regarding the

importance of complete cognitive and physical rest following their concussion.

Chantal. My doctor wrote me a note telling me not to go to practices because I needed to fully rest. He explained that for the next two weeks, I needed to stay home and only do things that didn't bother my symptoms.

Correspondingly, some athletes discussed being very thankful for the informational and emotional support provided by their athletic therapists. Marie provided an example of the informational support she received.

Marie. My athletic therapist showed me graphs that explained how I might feel better one day but that I might drop back down the next. She made me understand what I needed to do to get better. After my appointments, I felt great! I felt so much better.

Marie also explained that her limited concussion knowledge left her feeling ill-prepared to handle the emotional sequelae of concussions and appreciated the information provided by her athletic therapist throughout her recovery. When asked to detail the types of interactions she had with her athletic therapist following her concussion, Sonia talked about the types of emotional support she received.

Sonia. I became really close to my athletic therapist. We became family. She was the only person who supported me and took care of me throughout my whole concussion recovery. If I didn't have her during that time, I would have been completely lost.

Daphnée noted that the above comment from Sonia was a turning point in the interview, and it allowed her to fully understand Sonia's recovery, especially after she broke down in tears. As Sonia apologized and attempted to gather herself, her feelings of compassion and gratitude for her athletic therapist continued to overwhelm her.

Athletes also discussed how helpful it was to keep in touch with their parents during their recovery process. For example, Julie explained, "It was hard because I lived quite far from home, but I would talk to my mom every other day and she would ask about my concussion and how everything was going." Julie emphasized how valuable and relieving it was to be understood by her parents and to have their continuous support throughout the different phases of her concussion recovery and during the return-to-play process.

In sum, the athletes in this study felt that having a strong network of support was an important part of their recovery from protracted concussion symptoms. The participants specifically identified the types of emotional and informational support they received from coaches, doctors, athletic therapists, and parents, which appeared to positively impact their recovery.

Discussion

The objective of the present study was to explore female university athletes' experiences with protracted concussion symptoms, including their perceptions of the factors that impeded or facilitated their recovery. Participants in this study discussed how their lengthy concussion symptoms severely hindered their academic standing. Researchers previously reported that concussed collegiate athletes demonstrated impaired visual and verbal memory and motor processing speeds, which led to a number of academic challenges (Moreau, Langdon, & Buckley, 2014; Wasserman, Bazarian, Mapstone, Block, & van Wijngaarden, 2016). For example, athletes in Moreau and colleagues' (2014) study reported lower test scores and difficulty focusing in class during the semester they suffered their concussion. Building on Moreau and colleagues' findings, participants in the present study articulated *how* their protracted concussion symptoms impacted their grades (e.g., "I had a 'D' average . . ."), progress (e.g., "I failed several classes . . ."), and overall self-efficacy as a student (e.g., "I could see my semester slipping away . . .").

In response to the growing concern over the effects of concussions on athletes' academic progress, experts have called for secondary and postsecondary institutions to implement protocols that immediately remove students from classes while they are suffering concussion symptoms and only gradually reintegrating them back into the learning environment (Broglia et al., 2014). Unfortunately, all the athletes in our study indicated they returned to class before fully recovering from their concussion symptoms. Our findings support previous research that found "return-to-learn" protocols (i.e., monitoring gradual increases in athletes' school-related cognitive activities) have not been adopted to the same extent as "return-to-

play" protocols (Broglia et al., 2014; Kasamatsu, Cleary, Bennett, Howard, & McLeod, 2016). As a result, we assert that it is time for school administrators to take meaningful steps toward developing protocols designed to ensure concussed student-athletes are appropriately supported when they gradually return to the classroom in a way that does not impede their current or future academic progression and success.

Participants in this study also reported serious emotional and behavioral responses as a result of their lengthy concussion recoveries, which aligns with Wiese-Bjornstal, White, Russell, and Smith's (2015) conceptual framework. Participants in the present study reported symptoms of depression, and one athlete said she attempted suicide. Researchers have previously reported that depressive symptoms were a possible outcome of concussions among youth (e.g., Chrisman & Richardson, 2014), collegiate (e.g., Kontos et al., 2012), and professional (e.g., Caron et al., 2013) athlete populations. Unique from these previous findings, the methodology used in the present study allowed participants to articulate the factors they felt impeded or even worsened their depressive symptoms. More specifically, the female collegiate athletes reported feeling hopeless and isolated because of their uncertain timeline for recovery (cf. McCrory et al., 2017), factors they felt were exacerbated by being separated from their academic and sport environments.

Additionally, one athlete experienced such extreme emotional distress that she attempted suicide. Although she did not clearly articulate the factors she felt caused or contributed to her suicide attempt, these frightening experiences underscore the potential severity and depth of emotions that collegiate athletes may encounter after suffering a concussion. This appears to coincide with other empirical studies that found that concussed adults were at an increased long-term risk of suicide compared with nonconcussed adults (Fralick, Thiruchelvam, Tien, & Redelmeier, 2016). When considering the high rates of diagnosed concussions among university athletes (Wasserman, Kerr, et al., 2016), it is surprising and unfortunate that relatively little is known about the relationship between concussions and suicide in this vulnerable population—especially given the recent evidence highlighting mental health issues among concussed collegiate athletes (Kontos, Deitrick, & Reynolds, 2015; Putukian, 2016). Our results sug-

gest there is a need for more research on this topic and for concussed collegiate athletes to be monitored closely by health professionals, including clinical or counseling psychologists, to ensure they are receiving appropriate care throughout their recovery and reintegration into academic and athletic settings (Kontos & Elbin, 2016).

The female collegiate athletes in this study also stated that their recovery was facilitated by the social support they received from their coaches and athletic therapists (Bianco, 2001), which appeared to be particularly important, given that most of the collegiate athletes lived away from home. Participants said their athletic therapists offered emotional and informational support, while their coaches provided emotional support by adopting a caring, parental role. Researchers have found that athletic therapists play a primary role in concussion baseline testing, injury diagnosis, and return-to-sport decisions (Williams, Welch, Weber, Parsons, & McLeod, 2014), as well as with the provision of social support for athletes with musculoskeletal injuries (Bianco, 2001; Clement & Shannon, 2011). Results from the present study appear to build on Clement and Shannon's (2011) findings by providing preliminary evidence about the role athletic therapists play in the provision of social support for concussed collegiate athletes.

With respect to coaches, our results align with research that found coaches created safe and supportive sport environment with athletes who were suffering from concussions (Caron, Bloom, & Bennie, 2015; McGuckin, Law, McAuliffe, Rickwood, & Bruner, 2016). For example, female youth ice hockey athletes in McGuckin and colleagues' (2016) study reported that their coaches exhibited supportive (i.e., did not rush them to return to play) and protective (i.e., reinforced gradual return-to-play concussion protocols) behaviors after they sustained a concussion. Similarly, Caron and colleagues (2015) found that high school coaches created positive sport environments by teaching preventative measures such as safe checking and tackling techniques and by supporting and adhering to athletic therapists' decisions about concussion return-to-play protocols. On the other hand, Baugh, Kroshus, Daneshvar, and Stern (2014) noted that some collegiate coaches might have a disincentive to encourage their athletes to report concussions,

given the implications it might have on team success (and their livelihood). Even though all five female athletes in our study reported receiving a great deal of emotional support from their male coaches, it would be premature and beyond the scope of our study to postulate that our athletes were merely fortunate to have played for supportive coaches, or to suggest that male coaches might be more likely to provide support for their female athletes. However, we can conclude that the female collegiate athletes in our study benefitted greatly from the emotional and informational support they received from both their coaches and athletic therapists. Given that many collegiate athletes are living away from home for the first time, it appears important to further investigate the impact of having both coaches and athletic therapists who are (or are not) socially supportive and its impact on facilitating (or impeding) their recovery.

Limitations

As with any study, a number of limitations should be considered when interpreting our findings. First, the length of time participants experienced concussion symptoms varied from 10 weeks to 14 months. We advise future studies to consider the homogeneity or heterogeneity of their sample as well as how such discrepancies could influence the outcomes of their research. Second, athletes in our study had between 1 to 5 years of experience as a university student-athlete. It is possible that athletes with more years of experience may have had stronger ties to their team, and thus greater feelings of athletic identity, which could impact their recovery. Along the same line, more experienced athletes might also have stronger ties to the collective group or to the coaching staff, factors which also could have impacted their recoveries. As a result, future studies may consider stratifying or separately analyzing data based on years of university experience.

Third, findings from this study were based on one data source. Some researchers have questioned how accurately people can report on their own life events (Schacter, 1999). Several participants indicated that the provision of social support (e.g., from coaches, athletic therapists) facilitated their recovery, which implies that these individuals may also have important insights on athletes' experiences with concus-

sions. Given that previous experimental work has shown that people are not always accurate judges of social support (Girme, Overall, & Simpson, 2013), we encourage future studies to collect multiple sources of data to gain a deeper understanding of factors that facilitate or impede collegiate athletes' recovery from concussions.

Fourth, future researchers may also consider longitudinal qualitative approaches to study the ongoing effects of protracted concussion symptoms on athletes' physical and psychosocial responses, including how these symptoms continue to impact their personal and professional lives. Fifth, the current study was exploratory in nature and gathered the perceptions of five collegiate athletes in Canada. Other studies may want to explore a greater number of university athletes' experiences in other countries and on other continents. These studies may also consider using quantitative designs with larger sample sizes to obtain generalizable findings. Sixth, participants in this study noted that they struggled with behavioral responses that involved either significant weight gain or loss during their concussion recovery. Although behavioral concerns such as weight and body image have received attention among collegiate athlete populations (Varnes et al., 2013), results from our study suggest that we need to better understand how these health concerns could be intensified during concussion recovery.

Finally, although our study was purposefully not situated within a theoretical framework, there appear to be some parallels between our findings and existing sport injury appraisal models (Wiese-Bjornstal et al., 2015). Given that we conducted a qualitative study with a relatively small sample size and because some sport injury appraisal models have either not been empirically validated or remain in the early stages of development, we can only suggest that future researchers consider integrating various models or theories in their work to further understand athletes' psychosocial, emotional, and behavioral responses to concussions. For example, researchers have begun implementing theories from other domains to better understand concussion-reporting behaviors (i.e., theory of planned behavior; Register-Mihalik et al., 2013) as well as concussion education efforts (i.e., social norms theory; Kroshus, Garnett, Baugh, & Calzo, 2015). The findings from

these studies have contributed to our understanding of concussion knowledge and prevalence. As such, researchers are encouraged to continue to use these and other theories in their concussion research. More specifically, the health action process approach model (Schwarzer, 2008) and the theoretical domains framework (Cane, O'Connor, & Michie, 2012) could help us continue advancing our understanding of this important health-related topic.

Conclusions

The present findings contribute to ongoing discussions among concussion experts about the severity of symptoms experienced by female athletes (McCrorry et al., 2013). The use of qualitative interviews in this study provided a rare and in-depth look into the experiences of university athletes suffering from protracted concussion symptoms. The present findings highlight the need to monitor the psychological well-being of athletes following concussion—particularly in the case of protracted injury. Athletes experiencing psychological distress must be referred to specialists with training in counseling and clinical psychology (Kontos & Elbin, 2016). The present findings also indicate a pressing need for academic guidance and social support for concussed university athletes. Recovering from protracted concussions is a challenging and multifaceted process for anyone; however, recovery may be complicated by the unique combination of personal, athletic, and academic stressors that come with being a university student-athlete. We hope these findings will encourage researchers to continue investigating psychosocial aspects of concussions in hopes of better understanding how to provide an optimal recovery environment that is supportive of student-athletes' needs for successful cognitive, physical, and psychosocial recovery.

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