SOCIAL SUPPORT AND RETURN TO SPORT IN CONCUSSED UNIVERSITY ATHLETES

CARLEY JEWELL
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CARLEY JEWELL

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Dr. S. Rathwell Thesis Supervisor	Associate Professor	Ph.D.
Dr. J. P. Pope Thesis Examination Committee Member	Associate Professor	Ph.D.
Dr. J. G. Caron Thesis Examination Committee Member Université de Montréal Montreal, Quebec	Associate Professor	Ph.D.
Dr. C. Gonzalez Chair, Thesis Examination Committee	Professor	Ph.D.

DEDICATION

To everyone who helped me recover from my concussions and to the athletes that have shared their concussion experiences with me, thank you for being the drivers behind my passion to pursue this research path.

ABSTRACT

The Return to Sport (RTS) strategy is the pervasive rehabilitation strategy for concussed athletes (Patricios et al., 2023). While this strategy is valuable, limited attention is dedicated to psychosocial factors (Bloom et al., 2022) that may influence athletes' recovery from sport-related concussion (SRC). Social support is a psychosocial factor that may benefit athletes' SRC rehabilitation (Kita et al., 2020; van Ierssel et al., 2022) and athletes' psychological readiness to RTS (Caron et al., 2022; Lassman et al., 2022). Understanding athletes' perceptions of social support and its influence on their readiness during the Return to Sport (RTS) strategy may be beneficial. The purpose of this prospective explanatory-sequential mixed methods study was to explore university athletes' lived experiences and perceptions of social support during the SRC RTS strategy, and whether this social support impacts (i.e., helps and/or hinders) the athletes' return to sport. Nine concussed Canadian university athletes (n = 7 females, n = 2 males) completed a combination of concentric circles mapping (Van Waes & Van den Bossche, 2019), the Perceived Available Support in Sport Questionnaire (Freeman et al., 2011), and two semi-structured interviews. The number, frequency of occurrence, and importance of athletes' social support agents were identified across athletes' RTS. Social support types (i.e., emotional, esteem, informational, and tangible) provided by agents were identified across athletes' RTS. Four higher-order themes (i.e., social support behaviours, contextual factors, concussion and RTS specific factors, and psychological readiness factors) were generated from athletes' experience of social support across the RTS strategy. Our results suggest social support fluctuates throughout SRC rehabilitation by agent, support type, support behaviours, and RTS stage. Further, support decreases as athletes progress throughout the RTS strategy. Together, our findings provide preliminary

evidence of complex contextual, concussion, and sport specific factors that influence concussed athletes' perceptions of social support and its subsequent impact on their feelings of readiness to RTS.

PREFACE

The entirety of the work presented in this thesis was conducted through the Psychology for Active Living and Sport (PALS) laboratory at the University of Lethbridge. This project and the methods within were approved by the University of Alberta Research and Ethics Office [Pro00122528]. I, Carley Jewell was the primary investigator and bore the responsibilities of reviewing the literature, study design, recruiting participants, data collection and analysis, interpreting the results, as well as manuscript composition. I proposed the idea to examine athletes' social support prospectively during the concussion Return to Sport (RTS) strategy and to adapt the concentric circles map social network analysis tool from Van Waes and Van den Bossche (2019) for use throughout the RTS strategy. Rathwell., S. was the supervisor for this project and provided guidance from the inception of the project to thesis completion. Both Caron., J. G., and Pope, J. P., were committee members who helped assess and direct the theoretical and methodological components for this study to improve the strength of the project prior to data collection.

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List of Abbreviations

SRC	Sport-related concussion
RTS	Return-to-Sport
SIS	Second Impact Syndrome
CTE	Chronic Traumatic Encephalopathy
CISG	Concussion in Sport Group
SCAT5	Sport Concussion Assessment Tool – 5th Edition
ImPACT	Immediate Post-Concussion Assessment and Cognitive Testing
SSQ	Social Support Questionnaire
CR	Critical realism
PASS-Q	Perceived Available Support in Sport Questionnaire
TA	Thematic analysis
AT	Athletic therapist
ST	Student trainer
HC	Head coach
AC	Assistant coach
SO	Significant other
TF	Teammates/friends
T	Teammates
TR	Teammates/roommates
TSP	Teammates with similar positions
M	Mother
S	Sister
F	Father
B	Brother
FOT	Friends outside of team
CS	Concussion specialist
HPS	High performance staff
M	Mean
SD	Standard deviation
S1	Stage one
S2	Stage two
S3	Stage three
S4	Stage four
S5	Stage five
S6	Stage six
S1B	Second stage one
S2B	Second stage two
S3B	Second stage three
mTBI	Mild traumatic brain injury

Chapter 1: Introduction

Sport-related concussion (SRC) is a significant health concern (Gordon et al., 2022; Pfister et al., 2016; Walton et al., 2022) amongst university athletes (Caron et al., 2021; Steins et al., 2022) because of its idiosyncratic recovery (Kenzie et al., 2018) and the multitude of related adverse consequences (Covassin et al., 2017). Although cognitive (e.g., memory function), somatic (e.g., headaches), and physiological SRC outcomes garner most of the research, media, and public attention (Johnson et al., 2015; Patricios et al., 2023), university athletes also experience a host of psychosocial challenges (i.e., anxiety, depression, suicidal ideation; Caron, Schaefer et al., 2017; Kontos et al., 2016).

The Return-to-Sport (RTS) strategy (Patricios et al., 2023) is often used to assist allied health professionals (e.g., athletic therapists) in guiding athletes through their SRC recovery, although it has been criticized for underplaying the risk of concussion (Casper et al., 2021) and failing to sufficiently assess athletes' psychosocial recovery (Bloom et al., 2022). As a result, the RTS relies primarily on physiological and cognitive assessment (i.e., The Sport Concussion Assessment Tool; Echemendia et al., 2017, 2023) to progress athletes through their rehabilitation. This 'one size fits all' approach to progression (Bloom et al., 2022) also fails to account for contextual factors (e.g., social isolation; Kita et al., 2020) during SRC rehabilitation. This is problematic because socio-cultural factors involved in concussion recovery (i.e., social support, lived experiences) are important for understanding athletes' psychosocial recovery (Dean, 2020; van Ierssel et al., 2022).

Social support is an important contextual factor for athletes' SRC recovery (André-Morin et al., 2017; Caron et al., 2021; Kita et al., 2020; Steins et al., 2022; van Ierssel et al., 2022). Under the umbrella of sport injury, social support is defined as a multidimensional construct that includes both who provides support (e.g., coaches,

teammates etc.) and how support is provided (Freeman, 2020; Rees, 2007). With respect to SRC rehabilitation, social support has been found to improve athletes' outcomes such as social isolation (Kita et al., 2020), yet this body of literature is limited by both methodological design (e.g., social support assessment tools; Sarason et al., 1983; Yang et al., 2014) and the lack of focus on the RTS strategy explicitly.

One athlete population that utilizes the SRC RTS strategy (USPORTS, 2019) and has access to a variety of social supports (Hatteberg, 2020) are university athletes. Social support has been shown to improve aspects of university athletes' SRC rehabilitation (Caron et al., 2021; Covassin et al., 2014; Yang et al., 2014). However, the influence of social support during university athletes' RTS strategy has not been explored exclusively. Moreover, concussion management strategies can vary across Canadian university sport (USPORTS, 2019; Wiebe et al., 2022). Thus, the purpose of this thesis was to explore Canadian university athletes' lived experiences and perceptions of social support during the SRC RTS strategy, and whether/how social support impacted their return to sport.

Chapter 2: Literature Review

The purpose of Chapter 2 is to review the literature pertaining to sport-related concussion (SRC) and its outcomes (i.e., physiological and psychosocial) as it relates to university athletes, the Return-to-Sport (RTS) strategy (i.e., application and limitations), and social support (i.e., conceptualizations and theoretical models related to sport injury). In this section, results from previous studies will be reviewed and limitations will be outlined.

Sport-Related Concussion (SRC)

In recent decades, SRC has received considerable research attention in Canada (Gordon et al., 2022), given that nearly 200,000 Canadians sustain a concussion each year (Subcommittee on Sports-Related Concussions in Canada, 2019). For SRC explicitly, nearly 46,000 Canadians aged 5-19 experienced a diagnosed SRC in 2016-2017 (Public Health Agency of Canada, 2020); however, the number of SRCs is likely higher due to the under-reporting of concussion symptoms and issues with diagnoses (Kroshus, Garnett et al., 2015).

A SRC is defined as a "traumatic brain injury that can result from a transfer of mechanical energy to the brain from external forces resulting from the (a) head being struck with an object; (b) head striking a hard object or surface; (c) brain undergoing an acceleration/deceleration movement without direct contact between the head and an object or surface; and/or (d) forces generated from a blast or explosion," (Silverberg et al., 2023, p. 1349) during participation in non-contact, contact, or collision sports (Bloom & Caron, 2019; Patricios et al., 2023; Silverberg et al., 2023). This injury adversely and disproportionally affects individuals involved in contact and collision sports (Bloom & Caron, 2019; Gordon et al., 2022; Patricios et al., 2023).

Collision sports involve “frequent, purposeful hits or collisions [with the environment] at high levels of force,” whereby contact sports are those with “routine low-force contact” (Eckner et al., 2020 p. 1029; Rice et al., 2008). Specifically, collision sports such as women’s rugby (Black et al., 2017; Putukian et al., 2019), men’s football, and men’s ice hockey (Kerr et al., 2017; Pfister et al., 2016; Putukian et al., 2019; West et al., 2022) have high incidence rates of SRCs. However, athletes who participate in some contact sports such as women’s ice hockey (Chandran et al., 2021; Putukian et al., 2019), and both men’s and women’s basketball and soccer also experience SRC at high rates (Black et al., 2017; Kerr et al., 2017; Pfister et al., 2016; Putukian et al., 2019).

Given the high incidence rates and the debilitating nature of the injury (Gordon et al., 2022), SRC is a significant Canadian health concern. For instance, SRC is an invisible injury (i.e., no swelling or bruising) and thus concussed athletes risk returning to sport before recovering fully (Chrisman et al., 2013). Premature return to sport may exacerbate symptoms and increase the risk of second impact syndrome (SIS). SIS can occur when a second concussion happens before recovering from the first and can lead to disability or even death (Donaldson et al., 2017). Athletes with SRC are also at risk for experiencing a host of cognitive, somatic, and/or psychosocial concerns (Caron, Schaefer et al., 2017; Patricios et al., 2023). On the extreme end of cognitive conditions, there is proliferating evidence that associates multiple or repetitive SRCs with chronic cognitive impairment, such as dementia or Chronic Traumatic Encephalopathy (CTE; McKee, 2020; McKee et al., 2013; Stern et al., 2013). CTE changes the composition of the brain by progressively degenerating the brain’s neurons and is characterized by memory loss, movement disorders, aggressive and violent behaviours, and potential early dementia (McKee et al., 2013; Stern et al., 2013).

Related to SRC somatic outcomes, the frequency of SRC is particularly concerning because its associated deleterious symptoms that can negatively impact athletes' quality of life (Ellis et al., 2016; Patricios et al., 2023). SRC injured athletes will likely encounter one or more of the following outcomes: sleep/wake disturbance, balance and cognitive impairment, behavioural changes, physical signs, and somatic (e.g., headaches), cognitive (e.g., recall difficulties), and/or emotional (e.g., more irritable) symptoms (Patricios et al., 2023; Silverberg et al., 2023). These signs and symptoms typically represent the acute presentation of SRC and can result in detrimental cognitive and/or psychosocial impairments (Caron, Schaefer et al., 2017; Patricios et al., 2023).

Due to several inherent aspects of SRC (e.g., invisibility of injury), that can contribute to a complex rehabilitation which extends beyond somatic and cognitive symptoms, recent research has explored the psychological and psychosocial implications of SRC (Bloom et al., 2022; van Ierssel et al., 2022). Athletes who experience SRC are at risk for several psychological implications such as anxiety, depression, and suicidal ideation (Caron, Schaefer, et al., 2017). For athletes, these more severe psychological outcomes have been linked with different psychosocial phenomena during recovery, rehabilitation, and/or return to sport (André-Morin et al., 2017; Bloom et al., 2022; Cassilo & Sanderson, 2019; Covassin et al., 2015; Kontos, 2017). For instance, athletes with SRC have reported increased feelings of social isolation due to the nature of their injury and SRC management strategy (i.e., Return-to-Sport strategy), such as strictly prescribed rest periods (Cassilo & Sanderson, 2019; Kita et al., 2020).

SRC is also far less visible than other sport injuries (i.e., musculoskeletal injury), which are reliably signaled by crutches, casts, braces, limps, and the like (Bloom et al., 2022). This has implications for the psychosocial components of SRC recovery as it may

influence how agents involved with athletes' SRC management interact with them. Specifically, Covassin and colleagues (2014) found that those with orthopedic injuries received support from several individuals (i.e., family, teammates, and athletic therapists) and were significantly more satisfied with their support when compared to SRC injured athletes. Further, athletes with SRC are more likely to experience maladaptive reactions from others, such as invalidation from support agents (e.g., healthcare providers) due to the invisible nature of SRC (Todd et al., 2018).

SRC treatment approaches are also unique from orthopedic injuries due to the diversity and uniqueness of individual SRCs and their associated symptoms (Bloom et al., 2022; Collins et al., 2016). This presents an added challenge for developing treatment plans, as standardized and prescribed approaches are not conducive for SRC recovery (Bloom et al., 2022). Moreover, due to the uncertainty of treatment (i.e., prognosis, treatment strategy), athletes may experience exacerbated psychological symptoms (i.e., anxiety), which further emphasizes the complexity of the SRC recovery process (van Ierssel et al., 2021).

SRC symptom resolution patterns present a unique challenge as well. Adults, adolescents, and children typically experience symptom resolution within one month of injury (Patricios et al., 2023). However, approximately 30% of children (Zemek et al., 2016) and 10% of high school and collegiate athletes (McCrea et al., 2013) experience SRC symptoms that last longer than the anticipated timeframe. Symptoms that last longer than one month are conceptualized as persisting post-concussion symptoms and are indicative of a failure to recover from the physical, cognitive, psychological, social, and/or emotional SRC symptoms within the expected timeframe (Kontos, Elbin et al., 2019; Patricios et al., 2023; Ontario Neurotrauma Foundation, 2018).

Although nuances of persistent SRC recovery exist and can adversely impact athletes' physical, psychological, and social well-being (André-Morin et al., 2017; Caron et al., 2013), most athletes (i.e., 90%) will experience symptom resolution within one-month post-injury (Patricios et al., 2023). It is likely that those with typical recovery trajectories will need less social support than those with persistent concussion symptoms (André-Morin et al., 2017), but we cannot assume support is not important for typical recoveries. Thus, the examination of social support for university athletes who participate in the SRC Return-to-Sport strategy with typical clinical recovery timelines is worthwhile (i.e., approximately one month; Patricios et al., 2023).

SRC in University Athletes

One population of athletes who frequently experience SRC, its deleterious outcomes, and participate in the RTS strategy are university athletes (Black et al., 2017; USPORTS, 2019; Zuckerman et al., 2015). A university athlete is an individual who competes within a post-secondary institution sponsored athletic program, whilst pursuing an academic career at the host institution (Kroshus, 2019). Markedly, all athletes who participate in sport are at risk for experiencing SRC, no matter their age or level; however, evidence demonstrates that university athletes experience higher rates of diagnosed SRC than other sport populations (i.e., high school athletes; André-Morin et al., 2017; Gessel et al., 2007; Kroshus, Kubzansky et al., 2015) and may experience unique consequences of SRC because of their university athlete status.

With respect to incidence rates, Zuckerman et al. (2015) demonstrated that 10,560 SRCs occur annually in university sport in the United States, which is likely an underestimate, since it is common for athletes to avoid reporting SRC symptoms (Kroshus, Garnett et al., 2015). Putukian and colleagues (2019) prospectively examined

student-athletes with SRC at 15 universities across five seasons (i.e., 2013-2018) and found that nearly 2000 SRCs occurred. More recently, Baugh and colleagues (2020) found that SRC makes up approximately 6% of all collegiate athlete injuries in a sample of 141 universities. Epidemiology studies specific to Canadian university athletes are scarce; however, one study by Black and colleagues (2017) demonstrated similar SRC incidence rates to that of American university sport. Specifically, they observed athletes from 20 Canadian university sports over three seasons and found that one in ten athletes suffered a SRC. As demonstrated, SRCs frequently occur within university sport and due to unique contextual aspects of university sport participation, university athletes who experience SRC are at risk for several adverse psychosocial outcomes such as diminished academic performance, mental health concerns, and early retirement from sport.

In Canadian university sport, athletes must maintain an academic course load of nine credit hours per semester (i.e., three courses) and retain good academic standing as dictated by both the Canadian university sport-governing body (i.e., USPORTS) and institutional regulations (University of Lethbridge, 2022; USPORTS, 2021). Since SRC can impact cognition, SRCs can negatively influence university athletes' academic status. In a sample of American collegiate athletes, Walter et al. (2020) compared student-athletes' grade point averages between pre-, during, and post-concussion semesters and found a decrease in student-athletes' grade point averages in the academic semester during their concussion injury. Likewise, Weber Rawlins and colleagues (2022) found that academic members (i.e., university educators) have reported a lack of knowledge and confidence to apply academic accommodations for athletes, and nearly 65% of university educators reported experiencing a situation where student-athletes academic performance decreased as a result of concussion. In addition, André-Morin et al. (2017) qualitatively

examined university athletes' experience with SRC and found that several athletes described academic struggles such as diminished grades, failed classes, and removal from academic programs.

There is also mounting evidence to suggest that SRC can have an impact on university athletes' mental health. Mental health concerns can include sadness, anxiety/nervousness, depression, irritability, personality and/or behavioural changes, and/or sleep disturbances (Covassin et al., 2017; Kontos, 2017). Kontos, Covassin et al. (2012) found that American university athletes experienced a significant increase in depression 14 days after their concussion compared to high school athletes, and the authors suggested this could be due to a host of factors that exclusively affect collegiate athletes (i.e., higher competition levels, scholarships, and isolation from social support). In addition, Yang and colleagues (2015) found that during the course of athletes' return to sport, nearly 35% of SRC injured collegiate athletes experienced state anxiety, nearly 20% experienced depression symptoms, and nearly 15% experienced both depression and anxiety. More recently, Hoyle and colleagues (2020) found that Canadian university athletes experienced a short-term (i.e., 24-48 hour) increase in anxiety and depression related symptoms after sustaining an SRC.

Athletes who experience SRC may also be at risk for early retirement from their sport (Caron et al., 2013; Caron, Schaefer, et al. 2017; Seguin & Culver, 2021). For university athletes, lengthy SRC symptom resolution (Caron, Schaefer et al., 2017; Seguin & Culver, 2021) and social isolation (Seguin & Culver, 2021) can contribute to athletes' involuntary retirement from university sport. Early retirement from university sport because of SRC may pose a threat to athletes' identity (Seguin & Culver, 2021), which is problematic because a loss of athletic identity due to early sport retirement from

injury is linked to psychological distress (Menke & Germany, 2019). Taken together, the literature on SRC injured university athletes' experiences with diminished academic performance, mental health concerns, and early retirement from sport further emphasizes the unique adverse experiences SRC injured university athletes may encounter during rehabilitation and warrants further research on this populations' experience with SRC rehabilitation strategies.

Return-to-Sport (RTS) Strategy

During musculoskeletal injury rehabilitation, Ardern and colleagues (2016) highlighted that an athlete's rehabilitation consists of three continuum-oriented phases: (a) return to participation, (b) Return-to-Sport (RTS), and (c) return to performance. Return to participation involves participation in sport at levels that are either reduced or similar to pre-injury; however, the athlete has not reached their RTS goal, and is not ready (i.e., physically, medically, and/or psychologically) to return to sport. The RTS stage involves a return to the athlete's respective sport, yet their performance is not at the level they desire. Importantly, some athletes are content here, whereas others extend RTS within the return to performance phase. Within the RTS phase, there are a variety of injury-specific tests to determine benchmarks and aid in return to sport decisions. Return to performance involves performing at levels that are the same or better than pre-injury. Notably, Ardern and colleagues (2016) highlight that decisions within this continual phasing can be used within the context of removal from play situations, and that RTS decisions involve all participants (i.e., athlete, allied health professionals etc.).

With regard to SRC, the Concussion in Sport Group (CISG) developed a Return-to-Sport strategy that is similar to the RTS phase in the rehabilitation continuum outlined by Ardern and colleagues (2016). The most recent SRC RTS strategy (for full strategy see

Table 1) is a graduated and symptom-limited procedure that requires athletes to progress through six stages in a stepwise fashion (Patricios et al., 2023). By progressing athletes through these stages, the aim of the RTS strategy is to provide allied health professionals a guideline to lead athletes through gradual increases in cognitive and physical exertion until they reach their pre-SRC state (Bloom et al., 2022; Patricios et al., 2023). According to the CISG's RTS strategy, when an athlete sustains a SRC they may begin daily living activities within 24 hours of injury (Patricios et al., 2023). Next, athletes are guided through the following six stages by an allied health professional (i.e., athletic therapist; Black et al., 2017; Patricios et al., 2023): (a) symptom-limited activity, (b) aerobic exercise (i.e., light then moderate), (c) individual sport-specific exercise, (d) non-contact training drills, (e) full-contact practice, and (f) return to sport (Patricios et al., 2023).

Symptom-limited activity consists of normal daily activities, with the goal of gradually returning to school or work without exacerbating symptoms. Light aerobic exercise (i.e., stage 2A) involves increasing athletes' heart rate to 55% maxHR (i.e., 220 – age) with walking or stationary cycling, while moderate aerobic exercise (i.e., stage 2B) involves increasing heart rates to approximately 70% maxHR, resistance training can be included at stage two. The goal of individual sport-specific exercise is to incorporate movement with increased heart rate by performing running drills. Non-contact training aims to involve thinking and coordination with usual exercise intensities via more challenging training drills, such as passing or multiplayer drills. Further, full-contact practice aims to restore athletes' confidence and assess functional skills by participating in normal training activities. The last stage of the RTS strategy, (i.e., return to sport) involves returning to normal game play.

If at stages 1-3 during the strategy an athlete's SRC-related symptoms are exacerbated beyond mild (i.e., more than two points on a 0 - 10-point scale) or brief (i.e., more than one hour) at baseline, the athlete should stop and try and exercise the next day. For stages 4-6, if an athlete experiences symptoms they should return to stage 3 until symptoms are fully resolved with exertion. In addition, the CISG indicates that if there are no setbacks, each stage should take 24 hours to complete, and thus the minimum timeframe for completion of the strategy is one week.

Table 1

Return-to-Sport (RTS) Strategy

Stage	Exercise strategy	Activity at each step	Goal
1	Symptom-limited activity	Daily activities that do not exacerbate symptoms	Gradual reintroduction of work/school activities
2	Aerobic exercise 2A-Light (up to approximately 55% max heart rate) then 2B-Moderate (up to approximately 70% max heart rate [a])	Walking or stationary cycling at slow to medium pace. May start light resistance training that does not result in more than mild and brief [b] symptom exacerbation	Increase heart rate
3	Individual sport-specific exercises	Sport-specific training away from the team environment (e.g., running). No activities with risk of head impact.	Add movement, change of direction
	Stages 4-6 should begin after the resolution of any symptoms including and after physical exertion.		
4	Non-contact training drills	Exercise to high intensity including more challenging training drills (e.g., passing drills). Can integrate into team environment.	Resume usual intensity of exercise, coordination, and increased thinking
5	Full-contact practice	Participate in normal training activities	Restore confidence and assess functional skills by coaching staff
6	Return to sport	Normal game play [c]	

Note. This table was adapted from the Return-to-Sport strategy outlined by the Concussion in Sport Group in Patricios et al. 2023. Athletes may begin stage one within the first 24 hours of injury. There should be at least 24 hours (or longer) for each

step of the progression. If during stages 1-3 an athlete experiences symptoms that exceed mild and brief exacerbation, the athlete should cease physical activity and try the stage again the next day. If an athlete experiences symptoms during stages 4 to 6 they should return to stage 3 until symptoms fully resolve with exertion prior to participating in activities that risk head contact. If symptoms are persistent (i.e., exceed one month), the athlete should be referred to a healthcare professional who is an expert in the management of concussion.

[a] maxHR = 220 – age

[b] Mild and brief exacerbation of symptoms is conceptualized as symptoms that do not exceed 2 points on a 0 - 10-point scale and do not last longer than an hour when compared to baseline symptoms at no physical activity.

[c] Readiness to RTS should be indicated from a health care professional in written documentation before unrestricted RTS.

However, several scholars have articulated the necessity to consider athletes' individual differences and needs during SRC rehabilitation, and thus the RTS strategy should be used as a guide for individualized care (Bloom et al., 2022; Broglio et al., 2014; Patricios et al., 2023).

Importantly, variations of the CISG's RTS guideline exist (e.g., National Athletic Trainers' Association position statement; Broglio et al., 2014) and the application of the RTS strategy for SRC in university/collegiate sport varies between countries, sport-governing bodies, and institutions (Wiebe et al., 2022). For this study, the RTS strategy was examined in the Canadian context with USPORTS as the governing body, and findings are tied to the parameters of the host institution's (i.e., the University of Lethbridge athletic department) RTS guidelines.

USPORTS has provided a concussion statement that emulates the CISG's 2016 Berlin consensus statement (McCrory et al., 2017) to assist member institutions in managing athletes' SRC (USPORTS, 2019). Notably, the RTS strategy is commonly used across Canadian institutions (USPORTS, 2019); however, USPORTS does not mandate member institutions to adhere to this statement and leaves the responsibility of concussion management to each institution. The University of Lethbridge is a USPORTS member and the concussion management team includes sport-medicine physicians, athletic therapists, student trainers, and a concussion specialist if necessary (M. Merrill, personal communication, September 1, 2022). To date, this team adheres to the 2016 CISG consensus statement, which includes the use of the RTS strategy (M. Merrill, personal communication, September 1, 2022).

The goal of each stage of the RTS strategy is to increase athletes' physical and cognitive exertion and assess if SRC symptoms worsen (Patricios et al., 2023).

Importantly, progression through the stages is symptom-limited, such that within the 24-hour period of stage completion the athlete cannot experience symptoms that surpass mild and brief exacerbation (Patricios et al., 2023). Relatedly, there are three notable limitations when discussing the RTS strategy. First, the shortest timeframe for completion of the RTS strategy is one week; however, this timeline is uncommon due to the potential of symptom exacerbation above mild and brief and the assumption of linear progression through the stages for all athletes (Patricios et al., 2023). Second, advancement to stages with the risk of head contact (i.e., full-contact practice) is dependent on clearance from an allied health professional (Patricios et al., 2023). This clearance process often exclusively includes assessment of cognitive (e.g., memory, concentration) and physical SRC symptoms (e.g., headaches, dizziness) and largely ignores psychological (e.g., anxiety) experiences (Bloom et al., 2022; Patricios et al., 2023). Third, Bloom et al. (2022) articulated that although concepts within the RTS strategy (i.e., symptom-limited activity) are empirically supported, the RTS strategy overall is not evidence-based. This limitation combined with the lack of psychological assessment emphasizes the fallibility of the RTS strategy to effectively assist in SRC rehabilitation, and more specifically psychosocial rehabilitation (Bloom et al., 2022).

Since a typical SRC assessment in Canadian university sport follows the CISG's 2016 consensus recommendations (USPORTS, 2019), it often includes the use of available assessment tools such as the Sport Concussion Assessment Tool – 5th Edition (SCAT5; Echemendia et al., 2017) and/or the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT; ImPACT Applications Inc., 2022). The SCAT5 is a standardized set of tests designed for allied healthcare professionals to use at baseline (i.e., prior to university sport participation), at the time of suspected SRC, and throughout

the RTS strategy. The tests assess athlete background (e.g., previous concussion history), observable signs (e.g., loss of consciousness, disorientation), symptoms of SRC (e.g., headache, sensitivity to light), cognitive function (e.g., orientation, memory, concentration), neurological function (e.g., balance), and delayed recall (Echemendia et al., 2017). Upon completion of the SCAT5, allied health professionals can make a concussion diagnosis. With respect to return to sport, it is clearly outlined in the SCAT5 that it is not to be used as a "stand alone method to diagnose concussion, measure recovery, or make decisions about an athlete's readiness to return to competition after concussion" (Echemendia et al., 2017, p. 855). Although this statement is clear, the CISG does not provide tangible methods in either the SCAT5 or newly updated SCAT6 to determine an athlete's readiness to return after the completion of the RTS strategy (Echemendia et al., 2017, 2023).

The ImPACT is a computerized neurocognitive test that is also used to assess post-concussion symptoms. The ImPACT includes six neurocognitive subtests measuring memory, reaction time, non-verbal problem solving, response variability, sustained and selective attention time, and attention span (Elbin et al., 2019). From these tests, the ImPACT allows allied health professionals to assess overall symptoms, visual and verbal memory, processing speed, and reaction time. With respect to symptoms, the ImPACT uses the Post-Concussion Symptom Scale (Kontos, Elbin et al., 2012), which is similar to the symptom evaluation tool of the SCAT5. Overall, the ImPACT is applied similarly to the SCAT5, such that allied health professionals will typically administer a baseline test and subsequent tests during the initial suspicion of SRC and during recovery (Covassin et al., 2009), yet it seems they are less likely to rely on ImPACT scores for return to sport decisions.

Covassin and colleagues (2009) examined how the ImPACT was applied by allied health professionals (i.e., athletic therapists). In their survey of 399 athletic therapists, Covassin et al. (2009) found that these healthcare professionals administered baseline tests to nearly 95% of athletes. However, when making return to sport decisions, the athletic therapists relied on athletes' symptoms as opposed to ImPACT scores – as nearly 96% of athletic therapists stated that they would not return an athlete whose ImPACT scores had returned to baseline if they were still symptomatic. Taken together, the SCAT5 and ImPACT offer allied health professionals different avenues for assessing athletes' progression during the RTS strategy. Importantly, these tests mainly assess athletes' physiological symptoms as well as cognitive, somatic, and neurological function and fail to examine psychosocial experiences during SRC recovery.

As Bloom and colleagues (2022) highlight, the only mention of psychological constructs in the RTS strategy is of increased thinking and restoring confidence in stages four and five respectively, and there is no explicit mention of social constructs within the RTS strategy (Patricios et al., 2023). Furthermore, although thinking and confidence are included in the goals of the RTS strategy (Patricios et al., 2023), the strategy does not articulate how to comprehensively assess these outcomes during SRC rehabilitation; rather, the CISG describes that increasing cognitive and physical exertion through exacerbation are sufficient enough to promote confidence to RTS (Patricios et al., 2023).

The lack of psychological constructs is also evident in our assessment tools. The only mention of psychosocial constructs within the SCAT5 and SCAT6 assessment tool is in the symptom checklist that asks athletes to self-report their levels of feeling "more emotional, irritability, sadness, and nervous or anxious" (Echemendia et al., 2017 p. 853). Similarly, the ImPACT uses the Post-Concussion Symptom Scale (Kontos, Elbin et al.,

2012), which uses identical self-report items as the SCAT5 related to psychological experiences (i.e., irritability, sadness, nervous/anxious, and feeling more emotional; ImPACT Applications, Inc, 2022). This is problematic because injured athletes may experience a host of psychosocial implications not found in these assessment tools, such as stress, feelings of guilt, and social isolation (Covassin et al., 2015) that may require assessment and intervention during the strategy. Further, the self-report nature of the assessment of psychological outcomes within the SCAT5 and ImPACT may be insufficient compared to the extensive battery of cognitive and neurological tests that are not self-report in nature.

Another issue with the RTS strategy, is that it assumes similar symptom progression through the stages (Bloom et al., 2022). This is atypical for psychological symptoms during the recovery of musculoskeletal sport injury (Ardern et al., 2012; Podlog et al., 2014), as athletes tend to display a U-shaped pattern of change, with receipt of medical clearance (i.e., stage five) leading to heightened psychological concerns (Morrey et al., 1999). Thus, the assumed linearity of the SRC RTS strategy may not be conducive to incorporating psychological intervention if needed given that psychological symptom recovery is often not linear. Additionally, Caron, Bloom and colleagues (2017) found that some athletes who have received medical clearance through the SRC RTS strategy do not feel psychologically ready to return to sport. This may indicate that the SRC RTS strategy is not a useful tool to progress athletes through concussion rehabilitation if they experience psychological recovery challenges.

While the RTS strategy articulates that athletes are “ready” to return after completing all stages, Podlog et al. (2015) found that social support may also act as an antecedent for several RTS components such as confidence and motivation, whereby

confidence and motivation are precursors to athletes feeling psychologically ready to return to sport (Podlog et al., 2022). Importantly, psychological readiness is understood as an ever-changing construct in contemporary research and has recently been defined as "an individual's state of mental preparedness to resume sport-specific activities and likely comprises three dimensions, including cognitive appraisals, affective and behavioural components" (Podlog et al., 2022, p. 7). Regarding psychological readiness, Podlog et al. (2015) found that when physiotherapists and coaches provided positive feedback, reassurance, and informational support (i.e., providing advice or guidance; Cutrona & Russell, 1990) athletes' felt more confident returning to sport. Social support also improves athletes' motivation to achieve pre-injury performance standards. For instance, Podlog and colleagues (2015) noted that when athletes "felt wanted" by coaches and teammates their motivation was enhanced. They also found when athletes had an "injury buddy" (i.e., an individual with a similar injury), they were more motivated and confident to return to sport. The injury buddy was valuable because they provided sympathy, hope, and personal experience to the injured athlete.

The RTS strategy is also limited because it does not consider the impact of psychosocial interventions in the rehabilitation process. Several scholars have identified that athletes experience psychosocial challenges during SRC recovery (Caron, Schaefer et al., 2017; Covassin et al., 2017); however, there is no mention of psychosocial resources during the RTS strategy explicitly (Patricios et al., 2023). Seguin and Culver (2021) highlighted that the absence of focus on psychosocial outcomes (i.e., psychological, social, emotional etc.) and the fixation on physical and cognitive outcomes may be due to the Concussion in Sport Group's (i.e., creators of the RTS strategy) composition, which mainly consists of medical and specialized health professionals.

To help ameliorate athletes' psychosocial concerns during other (i.e., musculoskeletal) sport injury rehabilitation, psychosocial intervention has been used (e.g., imagery, goal setting, relaxation etc.; Ardern et al., 2022; Arvinen-Barrow et al., 2015); yet there is a paucity in the application of similar strategies for SRC (Seguin & Durand-Bush, 2019). Within the sport injury rehabilitation literature there is extensive evidence that social support is important for recovery (Arvinen-Barrow & Pack, 2013; Freeman, 2020; Rees, 2007). In the context of sport injury, social support has been defined as a multidimensional construct that involves general care from a network of support (i.e., social support agents) that entails both received support and an individuals' perception of support available to them (Arvinen-Barrow & Pack, 2013; Freeman, 2020; Rees, 2007). Social support has been considered a resource, or coping currency, whereby social support providers can afford athletes several types of support (i.e., emotional, esteem, informational and/or tangible support; Rees & Hardy, 2000) that may help the athlete if they perceive it as beneficial (Arvinen-Barrow & Pack, 2013).

Conceptualization of Social Support

Social support has been studied in several sport psychology domains such as leadership, burnout, performance, and sport injury (Freeman, 2020; Rees, 2007). The literature demonstrates that social support is important during times of need, such as the rehabilitation process for sport injury (Arvinen-Barrow & Pack, 2013; Bianco, 2001; Rees, 2007). Generally, social support can be understood according to two definitions. The first by Shumaker and Brownell (1984) defines social support as, "an exchange of resources between at least two individuals perceived by the provider or the recipient to be intended to enhance the well-being of the recipient" (p. 13). The second by Sarason and colleagues (1990) identified social support as, "knowing that one is loved and that others

will do all they can when a problem arises" (p. 138). Together these definitions elucidate that social support is a mechanism whereby the provision of various resources from a supporter demonstrates care and an attempt to help another (Arvinen-Barrow & Pack, 2013; Freeman, 2020; Rees, 2007).

Social Support as a Multi-Dimensional Construct

Social support provided to athletes within the sport injury context has been conceptualized as a multidimensional construct composed of both structural and functional dimensions (Freeman, 2020; Griffin et al., 2021; Rees & Hardy, 2000; Rees, 2007). The structural dimension encompasses the amount and the different types of individuals who provide support (Freeman, 2020; Griffin et al., 2021). Sport-related injury support providers can include, but are not limited to coaches, teammates, athletic therapists, sports medicine professionals, family, and friends (Bianco, 2001; Caron et al., 2021; Freeman, 2020; Yang et al., 2010). From a structural perspective, researchers have noted that the specific individual(s) that provide(s) support can impact athletes' perceptions of the efficacy of social support (Caron et al., 2021; Yang et al., 2010).

The functional dimension of social support refers to how the structural relationships and resources serve the injured athlete and is further broken down into received and perceived support (Freeman, 2020; Gottlieb & Bergen, 2010; Griffin et al., 2021). Received support has been defined as the frequency of support offered during a time frame as well as the objective exchange of resources (i.e., types of support like emotional support); whereas, perceived support is the athlete's belief in the access and availability of supportive resources from support providers (Freeman, 2020; Gottlieb & Bergen, 2010; Griffin et al., 2021). Importantly, literature demonstrates that perceived support has a greater impact on athletes' sport injury rehabilitation than received support,

and that an athlete's perception of the support may vary depending on several factors (e.g., timing of support, type of support provider; Bianco, 2001; Gottlieb & Bergen, 2010; Mitchell et al., 2014; Yang et al., 2010). However, the functional dimension of social support cannot exist without the structural, as the presence of supportive networks are necessary for the support to function (Freeman, 2020). Thus, it is also crucial to understand the structural dimension of social support within a sport injury setting prior to reviewing the functional dimension (Freeman, 2020).

Structural Dimension of Social Support: Support Providers

When concerning university athletes and sport injury, support providers are most often coaches, teammates, and athletic therapists (Caron et al., 2021; Yang et al., 2010). The research on the efficacy of coach support is mixed, as several studies have highlighted that coaches are seen as important in the rehabilitation process, yet athletes are often unsatisfied with the support provided by coaches (Robbins & Rosenfeld, 2001; Yang et al., 2010). Yang and colleagues (2010) found that athletes relied on their coaches for injury support, alongside athletic trainers, and physicians. However, Robbins and Rosenfeld (2001) found athletes were more satisfied with support from athletic trainers than coaches and that the coaches' level (i.e., head or assistant) did not influence satisfaction. Further, athletes stated that their coaches expected their social support to come from trainers, even though athletes wanted coach support (Robbins & Rosenfeld, 2001).

Seguin and Culver (2021) demonstrated that coaches' capacity to support SRC injured athletes may be limited. Athletes described that coaches were skeptical about their athletes' disclosure of SRC related symptoms and athletes feared discussing symptoms with coaches because it could negatively influence their sport participation. In another

study, Abgarov et al. (2012) found coaches were resistant to acknowledge injuries, which led athletes to feel pressure to compete to avoid loss of team status or out of fear of being forgotten. More recently, Caron and colleagues (2021) demonstrated that coaches and concussed athletes differentially interpret how to best support the concussed athlete. For instance, one athlete in this study described his coaches as unsupportive, while the coach felt their actions were supportive. This incongruency may be a product of a lack of awareness of how support providers can best support SRC injured athletes (Caron et al., 2021). Taken together, this literature demonstrates a misalignment of social support perceptions between athletes and coaches, such that athletes and coaches view social support differently, which may impact the efficacy of the support from this agent (Caron et al., 2021; Malinauskas, 2008).

With respect to teammates, athletes have differing perceptions of the efficacy of support from this agent. Bianco (2001) found that teammates of elite athletes provided both tangible assistance (e.g., carrying equipment) and emotional support (e.g., sharing experiences). Athletes in Bianco's study appreciated both forms of support, while other authors have noted that injured university athletes were generally more satisfied with emotional support from teammates (Corbillon et al., 2008; Yang et al., 2010). Contrarily, not all athletes have had positive perceptions about support provided by teammates. For instance, Abgarov et al. (2012) found that injured university athletes felt judgement from teammates for being injured, which stunted their relationships. Furthermore, Caron and colleagues (2021) demonstrated that SRC injured athletes' perceptions of the efficacy of support from teammates contradicted the support providers' perceptions of what they were offering. Specifically, concussed athletes did not view supports provided by teammates as beneficial, whereas their teammates perceived their support attempts to be

helpful. Collectively, these studies highlight a similar discrepancy to that of coaches, whereby social support efficacy varies depending on individual perception.

When examining support from athletic therapists, athletes' perceptions are generally positive. Clement and Shannon (2011) found that when compared to coaches and teammates, collegiate athletes were more satisfied with support from athletic therapists. In addition, Yang and colleagues (2014) found that athletic therapists provided satisfactory support to injured collegiate athletes and the effectiveness of their support was attributed to their expertise in injury management, as well as their willingness to recognize and offer coping help with the psychological components of injury. Taken together, the literature on the structural component of social support (i.e., support provider) is mixed and requires further attention.

Functional Dimension of Social Support: Support Types and Perception of Social Support

The functional dimension of social support is conceptualized as the specific resources (e.g., tangible support) utilized by social supporters, as well as both received support and the perceptions of these supports from the individuals being supported (Freeman, 2020; Griffin et al., 2021). Within social support literature, there is debate on the exact number of social support types, and several scholars have highlighted different types of social support that overlap extensively. For example, Cutrona and Russell (1990) have argued for five support dimensions: emotional support, esteem support, informational support, network support, and tangible aid. Emotional support involves providing comfort and security that allows the recipient to feel cared for (Cutrona & Russell, 1990). Esteem support is the supporter's ability to strengthen the injured athletes' competence or self-esteem (Cutrona & Russell, 1990). Informational support refers to

provision of guidance and feedback toward rehabilitation goals (Cutrona & Russell, 1990). Network support is an individual's feelings that they are part of a group that shares their interests and concerns (Cutrona & Russell, 1990). Lastly, tangible aid is defined as providing assistance and resources that aid coping, such as providing transport or financial support directly related to athletes' goals (Cutrona & Russell, 1990). In Cutrona and Russell's (1990) review of social support models, they found a convergence on these five main support types.

Another early conceptualization by Richman and colleagues (1993) identified eight social support dimensions within three categories. The first category is emotional support, which encompasses listening support, emotional support, and emotional challenge. Listening support is defined as unjudgmentally listening or giving advice (Richman et al., 1993). Emotional support is described as providing comfort and demonstrating caring behaviours (Richman et al., 1993). Emotional challenge is the act of highlighting the injured individual's attitudes, values, and feelings and providing the opportunity for the individual to evaluate these (Richman et al. 1993). The second category is informational support, this contains reality confirmation, task appreciation, and task challenge. Reality confirmation refers to likeminded individuals who see the world similarly to the injured individual, and thus confirm the injured individual's beliefs (Richman et al. 1993). Task appreciation is described as the provider recognizing the injured individual's efforts and appreciating what they do (Richman et al. 1993). Task challenge is defined as support provided that promotes motivation, excitement, and involvement by challenging the current way of thinking about a task (Richman et al., 1993). The third category under this model is tangible support and includes tangible assistance and personal assistance. Tangible assistance is the explicit provision of

financial or quantifiable assistance (e.g., gifts), and personal assistance is help with services (e.g., driving the injured individual to an appointment; Richman et al., 1993). Together Cutrona and Russell (1990) and Richman and colleagues (1993) laid the groundwork for understanding the diversity of social support types.

Rees and Hardy (2000) later found that with respect to high-level sports performers, there are four dimensions of social support: emotional, esteem, tangible, and informational. Rees and Hardy (2000) used a grounded theory approach, where the participants competed in a variety of team and individual sports at the international level. Rees and Hardy (2000) argue that although their dimensions are like that of Richman et al. (1993), that the eight dimensions and their sub-dimensions can be condensed into four. Furthermore, with respect to injury specifically, Rees and Hardy (2000) found that tangible, emotional, and esteem support were commonly utilized.

More recently, Arvinen-Barrow and Pack (2013) proposed that there are five broad types of social support: emotional, technical, informational, tangible, and motivational. Within their conceptualization, emotional, technical, informational, and tangible support are composed of several sub-dimensions. Emotional social support encompasses esteem support, listening, emotional support, and emotional challenge. Technical support contains technical appreciation and technical challenge. Informational support involves personal assistance and technical assistance. Tangible support entails material assistance and technical challenge (Arvinen-Barrow & Pack, 2013).

The social support dimensions described by Arvinen-Barrow and Pack (2013) are similar to the dimensions described by Richman et al. (1993). However, Richman and colleagues (1993) identified three overarching domains: emotional, informational, and tangible support. Comparatively, Arvinen-Barrow and Pack (2013) identified five

dimensions, where three of these five are the same as Richman et al's (1993) dimensions (i.e., emotional, informational, and tangible), with the addition of the technical and motivational dimensions of social support.

Clearly, there is overlap within the conceptualization of social support types. However, within the sport injury literature, the models appear to converge on four main types of social support: emotional, esteem, informational, and tangible (Bianco, 2001; Mitchell et al., 2014; Rees & Hardy, 2000; Yang et al., 2010). Thus, for this study the focus will be on these four types.

Perception of Social Support. Perceived social support has been shown to influence athletes' psychological responses to injury (Mitchell et al., 2014). Notably, when examining athletes' perceptions of social support for sport injury, there are several factors that influence the perception of support, namely the timing of social support and the quality of the supportive relationship. With respect to the timing of support, athletes' perception of the efficacy of the support can be influenced by the period of time during their rehabilitation they receive support. For example, Bianco (2001) examined elite skiers' perceptions on social support and found that in early phases of the injury, athletes demonstrated a need for emotional support to facilitate acceptance of the injury; whereas, later in rehabilitation, athletes desired informational support to assist in rehabilitation adherence.

Bianco (2001) also found that athletes' needs for social support increased at 'crisis points', specifically those where rehabilitation progression was not favourable. For instance, athletes may experience setbacks and boredom, where informational support and guidance from those implementing rehabilitation steps (i.e., athletic therapists) may increase rehabilitation adherence and foster better understanding of the injury (Griffin et

al., 2021). Similarly, in Yang and colleagues' (2014) study, they found that injured collegiate athletes needed emotional support from their athletic therapists at certain time points such as immediately after injury, upon return to play, and if rehabilitation was not progressing in a timely manner.

Regarding the return to sport stage, Podlog and colleagues (2015) demonstrated that musculoskeletal injured athletes strongly desired social support from sport medicine providers and coaches when restoring their confidence to return. Notably, restoring confidence is one of two goals within stage five of the concussion RTS strategy. Thus, it is interesting that social support has not been specifically integrated at this stage, which further highlights the need to examine the efficacy of social support during specific stages of the SRC RTS strategy.

Athletes' perceptions regarding the efficacy of support also differ depending on the quality of relationship they have with the supporter. With respect to coaches, Bianco (2001) found that elite skiing athletes described support to be ineffective or unwanted when they had a poor relationship with their coach, yet the support was desired and helpful when their relationship was positive. Similarly, Malinauskas (2008) demonstrated that coaches may have withheld support from injured athletes, as they did not want their authority undermined and that coaches could maintain their relationships with injured athletes by checking in on them. In contrast, Podlog et al. (2015) found that when elite athletes felt valued by their coaches it increased their perceptions of psychological readiness to return to sport.

Athletes' relationship quality with athletic therapists may also impact their perception of support's efficacy. Specifically, Yang and colleagues (2014) found that nearly 80% of injured athletes felt that athletic therapists were someone they could

depend on for social support during their recovery; however, there is minimal research on athlete-athletic therapists' relationships and its impact on social support perceptions. The above studies highlight that no matter the type of support provider (i.e., coach, athletic therapist), the quality of the relationship with the athlete can influence athletes' perceptions of the support.

Social Support and the SRC RTS Strategy

Research on the influence of social support during the SRC RTS strategy is scarce; yet, several authors have articulated the utility of social support for non-concussion injuries (i.e., musculoskeletal; Ardern et al., 2022; Bianco, 2001; Clement et al., 2015; Podlog et al., 2015) during return to sport. Clement and colleagues (2015) explored collegiate athletes' psychosocial responses to sport-injury rehabilitation and found athletes sought social support early in their injury recovery from family members, teammates, coaches, and sometimes from athletic therapists. As their rehabilitation progressed, athletes wanted support from athletic therapists and family. Bianco (2001) interviewed elite (i.e., national and/or international competition) level skiers about their perceptions of social support from individuals present during their injury recovery. They found several agents (i.e., physicians, physiotherapists, other patients, ski team administrators, coaches, teammates, family, and friends) provided social support and that athletes needed support at various injury-related time points (i.e., injury, rehabilitation, and return to full activity phases), and that athletes relied primarily on emotional and informational support from those providing treatment (i.e., physicians and physiotherapist) as well as their coaches and teammates when returning to sport. However, this study failed to assess SRC and the RTS strategy explicitly.

Recent research has also highlighted that social support may be an effective tool for SRC injured athletes prior to and/or upon experiencing psychosocial concerns that are unique to their SRC rehabilitation (Caron et al., 2021, 2022; Kita et al., 2020; Lassman et al., 2022; Steins et al., 2022; van Ierssel et al., 2022). Kita and colleagues (2020) demonstrated that when athletes experienced social isolation, that social support (i.e., home visits) from close friends promoted feelings of inclusion and thwarted those of isolation. However, Steins et al. (2022) demonstrated that certain agents' support attempts (i.e., constantly asking about the athlete's feelings) were frustrating and ill-perceived as they served as reminders of athletes' psychosocial concerns that their persistent SRC symptoms would not go away. Together, these studies demonstrate a limitation to contemporary SRC rehabilitation literature in our understanding of how to support SRC injured athletes in a way that complements athletes' psychosocial concerns (Caron et al., 2021; Kita et al., 2020; Steins et al., 2022).

Other scholars have highlighted the importance of social support during specific phases of SRC rehabilitation (Engström et al., 2020; van Ierssel et al., 2022). Engström and colleagues (2020) explored the experiences of former professional hockey players upon retirement from sport due to SRC. They found that support from agents in formal roles (e.g., coaches, social workers) was not effective while they were still experiencing SRC symptoms. Moreover, they discovered that during athletes' transition away from hockey, support from family, fans, and former teammates was important.

Notably, the importance of social support during SRC recovery is often recognized in the literature, but concerns about how, from who, and when to provide support are often neglected. For instance, in van Ierssel and colleagues' (2022) systematic review of the psychosocial factors related to RTS, they emphasized the positive role that

social support had as a contextual factor for athletes who participate in the concussion RTS strategy. However, no specific recommendations for how to best incorporate social support into the RTS strategy were made. Relatedly, both Caron et al. (2022) and Lassman et al. (2022) explored factors related to athletes' psychological readiness to return to sport following SRC, and although they used different qualitative approaches (i.e., biopsychosocial model and life-story interviews), their exploratory research highlighted athletes' need for social support during SRC recovery but did not comprehensively articulate how to best support athletes (i.e., who, how, and when) during their SRC RTS strategy.

Evidently, consistent calls for the implementation of social support that matches athletes' SRC related psychosocial concerns (e.g., social isolation; Bloom et al., 2022), social support from various agents (e.g., coaches, close friends etc.; Kita et al., 2020), and social support during several aspects of SRC rehabilitation (e.g., setbacks; Engström et al., 2020) are found within the literature. However, little attention has been afforded to understanding what aspects of social support benefit or thwart athletes' psychosocial recovery from SRC during the RTS strategy. As this strategy is differentiated from general SRC rehabilitation, and has its own unique structures (i.e., setbacks, removal from play; Patricios et al., 2023) that can cause psychosocial consequences on their own, it may be advantageous to explore what aspects of social support help and/or hinder athletes' psychosocial recovery during the RTS strategy more explicitly.

In sum, the literature demonstrates that athletes' perceptions of social support during injury are dependent on several factors such as support type, timing of support during rehabilitation, and the quality of relationship with support providers. However, this research has mainly considered only musculoskeletal injuries. Due to the nature of

concussion injury and the concussion RTS strategy, the support demands (i.e., support type, timing of support, quality of relationship) that influence athletes' perceptions may be different for concussion recovery. Nonetheless, it seems no one type of support is most effective; rather, it is athletes' perceptions of support that are critical, and perceptions depend on the situation, timing of support, and quality of relationship with providers (Bianco, 2001; Podlog et al., 2015; Yang et al., 2014).

Current Models of Sport Injury Social Support

Our understanding of how social support influences SRC recovery may be enhanced by reviewing different social support models that relate to sport injury. Social support theorizing largely purports that the influence of social support during sport injury rehabilitation is dependent on athletes' response to injury and the subsequent rehabilitation processes as opposed to the explicit injury itself (Arvinen-Barrow & Pack, 2013). Importantly, four major models describe social support as a mechanism to influence athletes' responses to injury: the Main-Effect Model of Social Support (Cohen & Wills, 1985; Rees, 2007), the Stress-Buffering Model of Social Support (Cohen & Wills, 1985; Rees, 2007), the Optimal Matching model (Cutrona & Russell, 1990), and the sport concussion-adapted version of the Integrated Model of Psychological Response to Sport Injury and Rehabilitation (Wiese-Bjornstal et al., 2015). However, only the latter has been applied to SRC.

Main-Effect Model of Social Support

The main-effect model of social support describes that the mere presence of social support directly impacts athletes' psychological responses regardless of the presence of stressors, and thus, if there is a higher level of social support then outcomes will be better (Cohen & Wills, 1985; Freeman, 2020; Rees, 2007). Interestingly, 'level' is not defined in

the main-effect model of social support as an explicit amount, type of provider, or type of support. Instead, the model suggests that several structural elements such as the size of the social support network, frequency of interaction with the support, and social integration can influence the impact of social support (Cohen & Syme, 1985; Rees, 2007; Rhind et al., 2011). Notably, the main-effect model is typically associated with structural components of social support, as it purports that the simple presence of social support networks will have a direct effect on outcomes (Rees, 2007).

When looking to the functional dimension of social support (i.e., perceived and received support), there is conflicting evidence of how the main-effect model applies. Bianco and Eklund (2001) highlight that the presence of social support alone can influence an individual's development of the necessary coping skills because those who are high in perceived support are aware of resources available to them, and thus can work to cope with a stressful event. The main-effect model has also been explored with respect to athlete performance, and it has been demonstrated that perceived support is more important than received support (Freeman & Rees, 2008). Importantly, minimal research has used the main-effect model for examining social support and sport injury.

Mitchell and colleagues (2014) performed two studies that examined the main effects of support as they related to psychological responses to sport injury. One study examined whether there are main effects with respect to the perception of social support and athletes' psychological responses to sport injury. The other examined whether there are main effects with respect to received social support and the athletes' psychological responses to sport injury. Mitchell and colleagues (2014) hypothesized that both the perception and explicit received support would positively influence athletes' psychological responses to injury.

Regarding the perception of social support on athletes' psychological responses to injury, the results showed stress and perceived social support directly influenced psychological responses. For social support, higher levels of perceived social support were associated with lower levels of adverse psychological responses (i.e., isolation). Furthermore, they found that when athletes were high in perceived social support, they were less likely to experience stress than athletes who were low in perceived social support. Thus, the authors noted that perceived social support may act as a preventative mechanism for injury-related stressors.

Concerning received social support on athletes' psychological responses to injury, the results showed received social support influenced psychological responses. Specifically, support significantly influenced psychological responses to injury as the authors found direct effects of emotional, esteem, and tangible support on psychological responses to stress. This is important as it highlights how received social support can positively influence responses to injury. The authors noted that the received social support (i.e., emotional, esteem, and tangible) may have provided positive affect that reduced how certain stressors impacted the athletes. Further, Mitchell and colleagues (2014) highlighted that the effects of received support may be attributed to the integration of social networks, such that the structural components of social support that already exist (i.e., team environment) may have influenced this result.

The effect of received social support on psychological response to injury found in Mitchell et al.'s (2014) study is important to consider for our study. Specifically, we will be looking at how different types of support, support providers, and the relative importance of these providers influences athletes' progression through the RTS strategy. Therefore, it will be important to consider whether athletes who already have strong

support systems at the beginning of the strategy have more positive psychological responses to injury when compared to those athletes who do not, and whether this changes throughout the strategy.

Stress-Buffering Model of Social Support

A second model of social support, the stress-buffering model, is typically studied in tandem with the main-effect model (Arvinen-Barrow & Pack, 2013; Bianco & Eklund, 2001; Cohen & Wills, 1985; Freeman, 2020; Rees, 2007). In this model with respect to sport injury, injury is viewed as a stressor and social support can act as a stress 'buffer' to the deleterious impacts of injury (i.e., negative cognitive appraisal) to influence rehabilitation (Arvinen-Barrow & Pack, 2013; Cohen & Wills, 1985; Freeman, 2020; Rees, 2007). Specifically, this model articulates that social support acts as a 'buffering' mechanism to negative psychological responses to injury, and that if the injury is viewed as a stressor, social support will act to moderate the impact of negative psychological responses. The stress-buffering model is different than the main-effect model, as in the main-effect model, the mere perception of the availability of social support is thought to directly influence an athlete's response to sport injury. However, similar to the main effect model when looking at perceived and received social support, there is a discrepancy as to which experience of social support (i.e., perceived or received) is more beneficial under the stress-buffering model (Bianco & Eklund, 2001).

Mitchell and colleagues' (2014) study examined the effects of both perceived and received social support on psychological responses to injury, and thus also tested constructs of stress-buffering models. The authors hypothesized that interactions between stress and support would exist. Specifically, with respect to perceived support, they hypothesized that athletes with a high perception of available support would experience a

reduction in psychological responses caused by stress. With respect to received support, they hypothesized that athletes with high received support would experience a reduction in psychological responses caused by stress. Overall, as interpreted through a stress-buffering lens, both the perceived and received social support would act as a 'buffer' to stressors that cause adverse psychological responses to injury (Mitchell et al., 2014). The results from Mitchell and colleagues' (2014) study showed that when social support was perceived to be available in high levels, negative psychological responses (i.e., isolation) were lower. However, they found received social support did not act as a stress buffer on psychological responses to injury. These results suggest that when looking specifically at sport injury, that perceived social support may have more influence on psychological responses to injury, when the injury is viewed as a stressor.

Rees et al. (2010) have also noted the importance of perceived social support when explored through the lenses of the main-effect and stress-buffering models. In their study, they tested if an athlete's level of performance (i.e., high or low) influenced the relationship between perceived social support, psychological responses to injury, and stressors. High performing athletes were classified as athletes who participated at the national or international level, and low performing athletes were those who participated at the college, recreational, or local level. Their results showed that for high performing athletes (i.e., national, and international) perceived social support directly influenced athletes' psychological response to injury. In contrast, for low performing athletes (i.e., college), perceived social support had a buffering effect for psychological responses, indicating that those who perceived higher levels of social support had reduced psychological responses because the social support acted as a buffer.

Researchers using the stress-buffering model have also identified the need to understand the best types of social support for particular stressors (Cutrona & Russell, 1990; Rees, 2007). Cutrona and Russell (1990) articulated that although social support may act as a buffer to stress caused by sport injury and potentially reduce any related adverse psychological responses, they emphasize that inappropriate or unmatched types of social support are unlikely to have this desired effect. Essentially, they highlight that for social support to effectively buffer psychological responses, the type of social support (i.e., emotional, esteem, informational and/or tangible) must be specifically 'matched' to the athlete's perception of the stressor.

Optimal Matching Model of Social Support

In combination with exploring athletes' perceptions of support, it is important to understand that certain types of support may be more beneficial depending on an athlete's perception and the situation the athlete is in. The optimal matching model (Cutrona & Russell, 1990) articulates that certain support types may be more beneficial for specific types of stressors and is thus linked to stress-buffering and coping literature (Freeman, 2020; Rees, 2007).

Cutrona and Russell (1990) have articulated that stressors typically possess the following characteristics that can influence how to optimally match social support to stressors: controllability, desirability, duration of consequences, and life domain (Cutrona & Russell, 1990; Freeman, 2020). Controllability is understood as an individual's perception of whether they can achieve or prevent events that are viewed as goals or losses, respectively. Desirability refers to events that are perceived to provide potential gain and/or growth, whereby those events that are potentially harmful are not viewed as desirable. Duration of consequences is defined as events that encompass stressful

components that endure for long or short periods of time after the initial stressor. Life domain is split into four additional categories of: assets, relationships, achievement, and social roles. Assets are desired resources (e.g., physical health). Relationships are understood as stressful components such as interpersonal disputes, or loss of relationship (e.g., friends). Achievement refers to events that involve evaluative, meritorious, and/or competitive scenarios. Social roles are events that involve changes in social positions such as gains or loss. Within these subdivisions, life domain is understood as stressful events that can occur within any of these in any setting (e.g., work, school, home etc.; Cutrona & Russell, 1990).

Cutrona and Russell (1990) emphasize that of these characteristics of stressors, controllability is typically most influential for social support needs. Specifically, when understanding how to cope with a stressor, controllability can be broken down into events that are controllable and uncontrollable. Those that are controllable will likely require a form of social support that is problem-focused, whereby stressors that are uncontrollable will typically require a social support that is emotion-focused. Cutrona and Russell (1990) articulate that these general forms of coping can be achieved with certain types of social support. For instance, controllable events that require problem-focused coping strategies may require types of social support like informational and tangible, where uncontrollable events that require emotion-focused coping my require types of social support like emotional and esteem (Cutrona & Russell, 1990).

Notably, the optimal matching model has important implications for our study with respect to injury as a stressor. It is important to understand that athletes' perceptions of the stressor will influence the effectiveness of the specific support (Griffin et al., 2021). For example, if one athlete views their progression through concussion RTS as

something within their control, they may require problem-focused support (i.e., informational support on rehabilitation). However, if for a similar rehabilitation it is not viewed as controllable, another athlete may require emotion-focused support that matches their feelings of lack of control (i.e., emotional support; Griffin et al., 2021). This variability in the perception of control is one of the several limitations of the optimal matching model.

Relatedly, the optimal matching model also has other important caveats. As Arvinen-Barrow and Pack (2013) described, there are numerous extenuating factors that can complicate the ability to match a social support type with the injury stressor. For example, athletes' access to support, the quality of the pre-existing support relationships as well as the support needs that change over time, can influence the agents' ability to match support. A recent study by Steins and colleagues (2022) supports this notion as they articulated that social support can have adverse effects on athletes' return to sport if the support is inappropriate or does not match athletes' needs. Specifically, their results demonstrated that athletes experienced negative reactions when social supporters constantly asked how the athlete was feeling. Although the athletes believed these agents were trying to be supportive, this action did not appear to meet the athletes' needs at the time the support was provided, and further demonstrates that social support agents need to better understand how to provide support that matches athletes' specific return to sport support needs. As social support pertains to the concussion RTS strategy, which is continually evolving (i.e., setbacks in strategy), athletes may not require a one-size fits all approach to matching support type (Bloom et al., 2022; Patricios et al., 2023). In addition, each athlete's SRC recovery will be different, and thus, an approach that matches support

for one athlete, may not work for another, or even work for that same athlete during a different concussion – as no two concussions are the same.

Bearing this variability in mind, it is also important to note that no research to our knowledge has specifically examined the optimal matching hypothesis and concussion injury. However, research supporting the optimal matching hypothesis with other injuries is mixed. For instance, looking back to Mitchell et al.'s (2014) data can allow for testing of stipulations of the optimal matching model pertaining to the matching of stressors to psychological responses to injury. Specifically, the Psychological Responses to Sport Injury Inventory (Evans et al., 2008) was used to examine athletes' psychological responses; the subscales of restlessness, isolation, and feeling cheated were chosen as the authors thought these matched the specific injury stressors they were examining (i.e., incapacitation and loss of confidence). They found that when looking at perceived support specifically, matching support types to stressors helped in the injury recovery process. However, this same effect was not found for received support. Mitchell and colleagues (2014) proposed that the reason why optimal matching is supported for perceived support as opposed to received support is that actual exchanges of support may be mismatched (i.e., poor timing, inappropriate provider). Thus, these results are important to consider in our study, as athletes may report received support as more or less important, depending on how they perceived this support to have matched their concussion and RTS needs.

Taken together, although the optimal matching model is valuable, it may be limited when applying it to concussion. Due to the extreme variation throughout the RTS strategy (i.e., setbacks) and concussion symptom progression itself (Bloom et al., 2022; Patricios et al., 2023; Silverberg et al., 2023), SRC cannot be restricted into definitive

confines that articulate how one type of support will match overall with concussion rehabilitation. Moreover, this demonstrates that it is critical to understand athletes' lived experiences and perceptions of social support during the concussion RTS strategy to generate a more holistic understanding of what support types are required by athletes throughout RTS and how to best match these supports for individual athletes.

Overall, the three models presented above help enhance our understanding of the mechanisms of social support in sport injury. Each model offers an explanation for how social support operates to influence athletes' psychosocial recovery from sport injury. Moreover, each model demonstrates several strengths and limitations when examining social support and sport injury rehabilitation. Despite the advantages of these models for explaining the mechanism of social support in sport injury, none have been applied to SRC explicitly. Due to the nature of SRC and its distinct differences from musculoskeletal injury (i.e., invisibility of injury; Bloom et al., 2022) as well as the idiosyncrasies of individual SRCs and their associated rehabilitations (Kenzie et al., 2018), further examination of athletes' perceptions of social support during SRC rehabilitation is needed.

Sport Concussion-Adapted Version of the Integrated Model of Psychological Response to Sport Injury and Rehabilitation

Unlike the three previously reviewed models, Wiese-Bjornstal and colleagues' (2015) model emphasizes the utility of social support in the SRC rehabilitation process. Broadly, the model articulates injury (i.e., concussion) as a stressor, and demonstrates the subsequent influence of this stressor on an athlete's psychological and psychosocial outcomes. The model posits that prior to experiencing a concussion, there are several pre-injury psychological risk factors that influence athletes' responses to the stress of

concussive injury: personality, history of stressors, coping resources, and interventions. These factors not only influence athletes after receiving a concussion but can also predispose athletes to concussion injury risk as they impact cognitive appraisals, and physiological and attentional changes that can contribute to the onset of a concussion injury.

Once the concussion occurs it is viewed as a stressor, whereby several personal (e.g., individual differences) and situational (e.g., social support) factors can influence athletes': cognitive symptoms and appraisals (e.g., memory problems), behavioural (e.g., social isolation) and affective (e.g., emotional instability) symptoms, and responses to the concussion as a stressor (Wiese-Bjornstal et al., 2015). Notably, the model articulates social support as both a potential coping resource available within pre-injury risk factors and as a post-injury situational factor that can influence athletes' psychological outcomes during rehabilitation. For our study, we will focus on the description of social support as a post-injury situational factor as opposed to a pre-injury coping resource, as this is most applicable to the concussion RTS strategy.

With respect to the SRC literature, research findings have demonstrated that social support as a situational factor can improve rehabilitation outcomes for concussed athletes (Caron et al., 2021; Horton et al., 2002; Kita et al., 2020; Steins et al., 2022). For example, Horton and colleagues (2002) examined whether social support groups influenced university athletes' psychological responses during their concussion rehabilitation. They found that athletes in the social support groups had more positive psychological responses to their concussion than those in the control (i.e., no social support) group. The authors also investigated whether engagement in support groups would result in less severe post-concussion symptoms. Their data indicated that social

support did not alleviate post-concussion symptoms, but they did find that social support influenced athletes' psychological response to concussion. Thus, Horton and colleagues' (2002) study supports Wiese-Bjornstal and colleagues' (2015) model, as they articulate that post-concussion social support can influence athletes' psychological responses.

In Kita and colleagues' (2020) qualitative examination, the authors interviewed high-school aged females about their experiences with social support during concussion recovery. Markedly, this study focused on how athletes perceived support from various providers and explored social support as a post-concussion situational factor. The authors found that specific support providers (i.e., close friends, parents, friends with concussion history) were beneficial and that each type of supporter offered certain types of support. Specifically, close friends' social ties with athletes mitigated feelings of social isolation, parents provided practical challenges, and those with concussion experience offered empathetic advice. This study demonstrated how each support provider may play a different role during concussion rehabilitation. Further, it offers valuable insight into the functionality of social support during concussion recovery.

Another study by Caron and colleagues (2021) examined how athletes' social support perceptions can influence their concussion recovery. Results from this study demonstrate discrepancies involving athletes' perceptions of the efficacy of social support during their SRC rehabilitation. More specifically, Caron and colleagues' (2021) results highlight a key limitation of the Wiese-Bjornstal et al. (2015) model, as this model posits that social support as a situational factor directly improves athletes' concussion recovery. Akin to the Wiese-Bjornstal et al. (2015) model, one athlete reported that while social support was a desired situational factor during their rehabilitation, they did not perceive the support they received to be beneficial (Caron et al., 2021). Instead, the athlete

believed that the support they received during their rehabilitation was not what they needed, even though their support providers (i.e., coach and teammates) thought the support they were providing was helpful. These results highlight a disconnect between athletes and social support agents in the understanding of how to best support SRC injured athletes, and that further exploring athletes' perceptions of social support during SRC rehabilitation may be critical for conceptualizing how to provide effective social support during concussion recovery.

Relatedly, Steins and colleagues (2022) examined coping styles during prolonged SRC, factors that influence their coping, and the role social support plays during recovery. Participants in this study were all university athletes within Canada (i.e., USPORTS) or the United States (i.e., NCAA). With respect to social support, the authors found that athletes with prolonged concussion recoveries viewed social support as important, and that their main support agents were family, friends, athletic therapists, coaches and teammates. However, athletes perceived that the way in which they were supported (i.e., repetitively asking how they are feeling) was ineffective and was interpreted negatively. Steins and colleagues' (2022) results highlight another limitation of the Wiese-Bjornstal et al. (2015) model, whereby this model fails to incorporate the importance of athletes' perceptions of social support from social support agents during their SRC recovery.

Although valuable for understanding social support and its implications for concussion recovery in general, the abovementioned studies on social support as a situational factor for rehabilitation (Caron et al., 2021; Horton et al., 2002; Kita et al., 2020; Steins et al., 2022) are limited for making inferences about the concussion RTS strategy. Importantly, concussion rehabilitation is broad, as it includes the onset of injury,

the RTS strategy, and subsequent rehabilitation after a return to sport (Patricios et al., 2023). Moreover, the distinct concept of clinical recovery from concussion is still largely unknown, although factors such as athletes' meaningful functional outcomes like return to pre-injury performance and RTS have been identified as contributing determinants of recovery (Patricios et al., 2023). Therefore, it is possible that each stage of concussion rehabilitation will require social support from varied providers and different types of support depending on athletes' unique needs at each phase. Further, as the RTS strategy is based on a staged program, it is also possible that support needs (i.e., type of support, type of provider) will vary by RTS strategy stage (i.e., stage one vs. stage six). Due to the individual differences in how athletes progress through the RTS strategy (i.e., setbacks), it is also important to examine how social support as a situational factor impacts psychological recovery outcomes and how it is perceived by athletes during the RTS strategy itself. Thus, while the current findings in the literature provide a broad view of how social support can influence concussion recovery, they do not explicitly examine the RTS strategy in depth.

Limitations of Social Support Literature

Overall, the abovementioned models offer valuable conceptualizations of social support as a mechanism to aid psychological recovery from sport injury and concussion. Importantly, these models present a broad framework of how social support can influence recovery from sport injury. With this said, the literature used to draw information on models is limited in its applicability to concussion for several reasons.

Reliance on Musculoskeletal Injury

First, the current literature on social support and sport injury is limited by its reliance on musculoskeletal injury, as only a few studies focused on concussion (e.g.,

Kita et al., 2020; Steins et al., 2022). SRC injured athletes may require diverse forms of support during their recovery that are different from athletes recovering from musculoskeletal injury. For instance, Covassin and colleagues (2014) directly compared social support implications for collegiate athletes with orthopedic and concussion injuries and found that athletes with an orthopedic injury reported greater support satisfaction than the concussed group from agents such as family members, athletic therapists, and especially teammates.

This discrepancy may be explained by Caron and colleagues' (2021) study, where they examined the perceptions of social support in three coach-athlete-teammate triads related to university athletes SRC. Markedly, the authors found that there were misunderstandings between the concussed athlete and the support providers on the efficacy of support provided. For example, one athlete reported not feeling supported by teammates and coaches during their SRC recovery, however these support providers felt that their actions (i.e., promoting rehabilitation accountability) were supportive. This echoes findings from Bianco (2001), which showed that the best way to provide support to athletes is to understand the type, time, and provider of support. Thus, there is a need to examine the implications of social support on SRC injured university athletes since findings from studies on musculoskeletal injuries may not readily apply to concussed athlete populations.

Methodological Limitations of Social Support Literature

There are also methodological limitations worth considering when drawing conclusions from the above reviewed literature on social support and applying them to SRC injured university athletes. For instance, there has been a lack of prospective design used in previous research when assessing the influence of social support on psychological

components of SRC recovery (Caron et al., 2021; Kita et al., 2020; Steins et al., 2022). The use of prospective designs (i.e., watching outcomes over a period of time) for assessing social support in the RTS strategy for concussed athletes offers certain advantages. First, prospective research on social support for SRC injured athletes can offer the potential to decipher whether social support varies at certain stages of the RTS strategy or how it may impact an athlete's return to sport at the end of the strategy (Patricios et al., 2023). Certainly, tracking athletes across their RTS can add nuance to our understanding of athletes' perceptions of social support during specific stages. Second, because SRC often impacts memory, retrospective studies may be problematic because they ask athletes to recall their experiences from a previous injury (Caron et al., 2021; Patricios et al., 2023; Podlog et al., 2015). Prospective research designs that track athletes through the RTS strategy could minimize the fallibility of human memory and potential biases.

Another methodological limitation worth considering is how social support has been measured in the past. Previous literature has assessed social support during sport injury through both quantitative and qualitative methodologies. A common quantitative tool to assess social support in injured athletes is the Social Support Questionnaire (SSQ; Sarason et al., 1983). This is a 6-item questionnaire that assesses general social support by asking participants to list individuals they can turn to for support in several different circumstances and to indicate their satisfaction with these social supports (Sarason et al., 1983). Yang and colleagues (2014) used the SSQ prospectively when exploring collegiate athletes' experiences with social support across several injury types. However, the utility of this scale within sport is problematic as it was not designed for use in sport injury, rather its intended use is for general life social support (Sarason et al., 1983). It is also

challenging to use the SSQ with elite injured athlete populations such as university athletes, as the items in the questionnaire are not specific to this population. For instance, the item "who do you feel really appreciates you as a person," may not be indicative of a support requirement for injured university athletes during RTS (Sarason et al., 1983).

Several qualitative measures have also been used to assess university athletes' social support perceptions during injury rehabilitation. Udry et al. (1997) used retrospective qualitative interviews to explore the perceptions of athletes who experienced season-ending injuries and the impact of social support from several different agents (e.g., coach, teammates etc.) had on their injury recovery. The interviews were semi-structured in nature and were effective for determining the roles each agent played in support for athletes and whether that support was positive, negative, or neutral (Udry et al., 1997). Alternatively, Podlog and Eklund (2007) specifically examined coaches' perspectives of the injury return to sport process and their role in assisting athletes using retrospective interviews. The authors found that coaches believed they played an important role in meeting athletes' social support needs. Together, these studies highlight the utility of semi-structured interviews when examining the perceptions of social support during injury rehabilitation. However, neither study assessed the nuances or unique support requirements at different stages of recovery. Moreover, these methods have not been used to directly assess support in the concussion RTS strategy.

Literature Review Summary

Overall, it was identified that SRC injured athletes want and need social support during their SRC rehabilitation. Specifically, evidence suggests that athletes' social support needs will differ by both the individual themselves and the individual concussion throughout the duration of recovery. Further, numerous studies have revealed that the

type of social support (i.e., emotional, esteem, informational and/or tangible), type of support provider (e.g., family, coach etc.), and/or the timing of support (e.g., injury onset) can influence athletes' perceptions of the efficacy of social support during their SRC rehabilitation. Importantly, the studies reviewed were mainly retrospective in nature, which can present various challenges when examining SRC due to the reliance on memory. Moreover, there were no explicit examinations of social support during the RTS strategy identified in the literature. This is problematic as within Canadian university sport athletes often participate in the RTS strategy for their SRC rehabilitation.

Purpose

The purpose of this thesis was to explore university athletes' lived experiences and perceptions of social support during the SRC RTS strategy, and whether this social support impacted (i.e., helped and/or hindered) athletes' return to sport. The main research question guiding this study was: What are university athletes' perceptions of the role of social support during the SRC RTS strategy? Our specific research questions were: (a) who are the agents that provide social support during the SRC RTS strategy, (b) how do the identified social support agents rank in importance during the RTS strategy, (c) what types of social support are being provided by different agents during the RTS strategy, (d) how does social support change (i.e., support type, support provider, differ by stage etc.) throughout the RTS strategy, and (e) which type, social support agent, or combination of support benefits or prevents athletes from a successful return to sport. Garnering answers to these questions can have implications for university sport SRC policies and procedures, social support agent (i.e., coach) education/information resources (i.e., coaching clinics), and overall SRC governing body (i.e., Concussion in Sport Group) policies.

Chapter 3: Methodology

Philosophical Assumptions

A critical realist philosophical assumption was adopted (Bhaskar, 2008; Ryba et al., 2022; Tamminen & Poucher, 2020) for this study. Critical realism (CR) is related to both positivism and constructionism, while both aligning and diverging from these paradigms ontologically and epistemologically (Fletcher, 2017; Ryba et al., 2022). Ontologically, critical realists operate like positivists and believe we understand "what exists" through a single truth/reality that exists outside of individual interpretation. Epistemologically, critical realists align with constructionists because they believe truth/reality can be influenced by non-visible and unknown social, psychological, and cultural constructs (Ryba et al., 2022). Taken together, critical realists emphasize that truth is "real" and tangible but accept that the truth that exists is interpreted by humans.

Critical realists observe that reality is multifaceted, such that it may be composed of multiple domains or levels, which should not be confused with the constructionist concept of multiple truths/realities amongst individuals (Ryba et al., 2022). Within CR, reality is ontologically understood to be stratified across three levels that vary across time: the empirical, actual, and real (Fletcher, 2017). The empirical level is described as the experience of objects/events. Within this level, objects/events exist objectively, but our explanations of these are proxied by experience and interpretation (Fletcher, 2017). Thus, CR postulates that these interpretations can be causal, yet individual explanations of these constructs are often facilitated by perception, which itself can influence causal mechanisms (e.g., progression through RTS strategy was delayed due to perceived lack of informational social support). With respect to this study, we can conceptualize that the

RTS strategy and social support are at the empirical level, as they can be measured (i.e., SSQ for social support; Sarason et al., 1983).

The actual level is described as objects/events without human experience, whereby events (e.g., SRC) will occur no matter the interpretation. These events can be either observable (e.g., some SRC causal mechanisms) or unobservable (e.g., SRC symptoms like feeling in a fog). Importantly, although unobservable constructs cannot be measured, they are no less "real" than their observable counterparts (Ryba et al., 2022). Moreover, CR suggests that unobservable factors can influence the observable object and events. In the context of this study, the actual level could be interpreted as the occurrence of an SRC. This event will exist no matter the individual's interpretation of the SRC and may occur differently than what the athlete experiences at the empirical level. Lastly, at the real level, CR posits that there are inherent causal mechanisms in objects that trigger the occurrence of events at the empirical level (Fletcher, 2017). For instance, the provision of a certain type of social support may influence the speed at which an athlete recovers from their SRC as indicated by their progression through the RTS strategy.

Explanatory-Sequential Mixed Methods

From a critical realist perspective, the purpose of mixed methods research is to "enhance explanation, interpretation, and understanding of social psychological objects and structures" (Ryba et al., 2022, p. 157). Through a critical realist lens, the utility of mixed methods research lies within its ability to explain phenomena in-depth by using multiple approaches (i.e., quantitative and qualitative) to understand why mechanisms work (Ryba et al., 2022). Since SRC is a complex injury, a methodology that is capable of accounting for both the innate realities of SRC (e.g., participation in the RTS strategy) and athletes' subjective experiences (e.g., perceptions of social support) during SRC

rehabilitation, may be necessary to generate an enhanced and in-depth explanation of the phenomenon.

One advantage of mixed methods research is that it is uniquely flexible for deep understanding of complex phenomena (i.e., SRC; Kay & Kucera, 2018). Previous research has emphasized the necessity to understand athletes' perceptions of concussion rehabilitation in combination with interactions with social actors (e.g., coaches, teammates etc.) to gain a better understanding of the influence of psychosocial phenomena during SRC RTS (Caron et al., 2021; van Ierssel et al., 2022). Similarly, Dean (2020) highlighted that those researchers studying psychosocial components of SRC should employ mixed methods procedures to better understand SRC, as mixed methods designs can utilize number-driven datasets (e.g., types of social support agents), whilst adding context (e.g., how did that agent help) that speaks with the participants as opposed to speaking for them to get a broader picture of SRC rehabilitation. Exploring concussed athletes lived experiences via mixed methods research can help articulate the influence that contextual and/or sociocultural factors such as social support have on SRC rehabilitation, and the usage of mixed methods research when examining psychosocial components of SRC could markedly contribute to the current body of literature.

For this study, we used a prospective explanatory-sequential mixed methods (Creswell & Creswell, 2018; Creswell & Plano-Clark, 2018) design to understand the impact of social support on university athletes' psychosocial SRC rehabilitation during RTS. Explanatory-sequential mixed methods research begins with quantitative data collection and analysis, and then utilizes qualitative data collection and analysis strategies to elaborate on and strengthen the quantitative findings (Creswell & Creswell, 2018; Creswell & Plano-Clark, 2018). An explanatory-sequential design aligned with CR (Ryba

et al., 2022) because it allowed for a holistic exploration of why (i.e., causal explanation) athletes experienced innate components of the RTS strategy and social support which influenced athletes' perceptions, experiences, and interpretations of these realities.

A prospective approach was chosen for this study due to the nature of SRC and the RTS strategy. Specifically, SRC can be accompanied by a host of cognitive and/or psychosocial detriments (Caron, Schaefer et al., 2017; Patricios et al., 2023), whereby recall memory can be adversely impacted. Concerning the RTS strategy, the minimum time to RTS is seven days, although it can last longer due to potential setbacks (i.e., reoccurrence and/or worsening of symptoms) derived from the symptom-limited and sequential fashion of the strategy (Patricios et al., 2023). Therefore, a prospective explanatory-sequential methodology mitigated the influence of memory disruption and/or variable progression through the RTS strategy because we were able to pinpoint social support mechanisms at each RTS stage and examine these phenomena in-depth in real time (Creswell & Creswell, 2018).

Multiple-Case Study

A multiple-case study approach was chosen for this study to examine the qualitative semi-structured interview data (Yin, 2018). Case studies explore single or multiple cases, which considers that phenomena are bound to the context to which they occur, and that the two cannot be separated when understanding real world experiences (Creswell & Poth, 2018; Yin, 2018). A multiple-case study approach was chosen because it allows for multiple in-depth perspectives of social support during the RTS strategy to be made (Creswell & Poth, 2018). As it relates to CR, the multiple-case study approach is advantageous as it allows one to understand "what exists" objectively through the understanding of the non-visible (e.g., contextual factors) constructs that each individual

experiences. Further, a multiple-case study approach allowed us to understand the consensus of athletes' "truth" related to social support during the concussion RTS strategy through cross-case comparisons while also considering individual interpretation.

Recruitment

Before data collection, ethical approval was granted from the Research Ethics Board. Purposeful sampling was used to recruit concussed university athletes from the University of Lethbridge during the 2022-2023 sport season. Prior to data collection, the primary investigator contacted relevant sport injury recovery staff within the University of Lethbridge athletic department (i.e., head athletic therapist, university sport coaches, and the Rebound Health Centre concussion clinic injury care coordinator) via email. These individuals were asked to participate in the study as key informants. The key informants assisted with recruitment by identifying university athletes who met our inclusion criteria and connecting athletes with the primary investigator via email.

To participate in this study, participants must have: (a) been competing for a University of Lethbridge varsity team, (b) incurred a concussion during the 2022-2023 season, c) not yet completed stage two of the RTS strategy for their SRC, and d) intended to complete the RTS strategy before returning to play.

Athletes who contacted the primary investigator and expressed interest in participating in the study were provided with a recruitment letter (see Appendix A) and consent form[1] (see Appendix B). The recruitment letter included a brief overview of the purpose of the study, contact information for the primary investigator, and a description

[1] Athletes were provided the recruitment letter and consent form via e-mail prior to meeting with the primary investigator and were given the option to sign electronically or in-person. Upon the first meeting, athletes were again given an executive verbal summary of the consent form prior to data collection.

of what was required from the participants. The consent form delineated the purpose, procedures, benefits, and any foreseeable potential harms of the study. Further, the consent form articulated that participation is voluntary and that participants have the right to withdraw at any time with no negative consequences. Likewise, participants were advised that all their information or data will be destroyed should they wish to withdraw. All athletes who consented to participate in this study were scheduled for an initial in-person meeting with the primary investigator to review consent, the study strategy, and to complete their first quantitative data collection exercise for stage one of the RTS strategy. Of note, a large quantitative sample size typical of explanatory-sequential mixed methods was difficult to achieve due to the frequency of concussion injury at a single institution. Thus, we recruited as many participants as possible that met our inclusion criteria.

Participants

The final sample included nine athletes (M_{age} = 21.00, *SD* = 1.80). Seven athletes (77.8%) identified as female and two (22.2%) identified as male. On average, the athletes used 2.56 years (*SD* = 1.24) of athletic eligibility. However, due to the unique context of university sport participation (i.e., gap years out of high school; Stehlik, 2010) and the COVID-19 pandemic, athletes sport eligibility status did not coincide with the number of years they had been enrolled in their academic program (*M* = 3.44, *SD* = 1.94). The athletes participated in women's rugby (*n* = 5), women's basketball (*n* = 1), men's basketball (*n* = 1), and track and field (*n* = 2). The athletes indicated sustaining their concussions during pre-season (33.3%), in-season (44.4%), and off-season (22.2%). With respect to RTS timelines, eight participants experienced a typical RTS timeline, and averaged 26.25 days (*SD* = 7.38) to successfully complete the RTS strategy, which was indicated by the clearance from an allied healthcare professional to return to sport. One

participant experienced persisting concussion symptoms and is still engaged in their rehabilitation, thus their time to RTS is unknown. For a summary of each athlete's demographic information see Table 2.

Table 2

Participant Demographics

Pseudonym	Self-identified gender	University sport	Year of sport eligibility	Current year of university	Number of previously diagnosed concussions	Timing of concussion onset	Total time to RTS (days)
Hilary	Female	Rugby	5	7	1	Pre-season	16
Emily	Female	Rugby	2	3	1	In-season	21
Jodie	Female	Basketball	2	3	2	Pre-season	25
Hannah	Female	Rugby	2	3	0	Off-season	35
Shelby	Female	Rugby	1	1	1	Off-season	31
Brittany	Female	Rugby	2	2	0	In-season	37
Alice	Female	Track	2	2	0	In-season	24
Jackson	Male	Basketball	3	4	0	In-season	21
Charlie	Male	Track	4	6	0	Pre-season	Did not return

Procedure

Coinciding with explanatory-sequential mixed methods, a two-phased approach was adopted, and quantitative data was collected first, followed by a qualitative data collection phase (Creswell & Creswell, 2018). At the onset of the study, participants met with the primary investigator and were given a quantitative data collection package that contained: (a) brief instructions on how to complete concentric circles maps (see Appendix C), (b) six printed concentric circles maps (i.e., one for each RTS stage), and (c) copies of the Perceived Available Support in Sport Questionnaire (PASS-Q; Freeman

et al., 2011) (see Appendix D). Participants had access to their package during the entirety of the quantitative data collection phase (i.e., entire RTS strategy), which allowed for participants to complete data collection at times conducive to their demanding university athlete schedules. Of note, RTS stages can last for unexpected time periods if an athlete experiences persisting symptoms or difficulties progressing through certain stages (Patricios et al., 2023), and thus participants completed a concentric circles map on a weekly basis if they were at a single stage for longer than a few days. Together, the concentric circles map and PASS-Q were used to identify who provided social support for SRC injured athletes, the rank-based level of importance athletes attributed to each social support agent during their RTS strategy, and the types of social support (e.g., emotional) that agents offered to athletes.

For their first quantitative assessment, athletes outlined their social network by completing an egocentric name-generating exercise called concentric circles mapping (see Appendix C; Van Waes & Van den Bossche, 2019). Social network analysis is a theoretical and methodological framework that allows for the examination of relationships between individuals often in a visual format (Froehlich et al., 2020; Wäsche et al., 2017). Egocentric name generating refers to identifying all relevant individuals in one's social network (Längler et al., 2020). The purpose of the concentric circles mapping was to understand which social agents were present at each RTS stage, and how important agents were to athletes' SRC recovery. The use of concentric circles mapping aligned with critical realism and reflected the "actual" and "empirical" level of truth. The concentric circles allowed participants to list who was objectively present and "important", based on their own experiences and interpretations of support (Fletcher, 2017).

Concurrent with the concentric circles mapping exercise, athletes completed the PASS-Q (Freeman et al., 2011) for each social support agent listed on their concentric circles map at each RTS stage. The aim of the PASS-Q was to measure perceived support by determining what types of social support athletes perceived to be available from each social support agent at each RTS stage. In conjunction with the concentric circles map responses, the PASS-Q information was also used to frame questions for the qualitative semi-structured interview component of this explanatory-sequential mixed methods study. The use of the PASS-Q aligns with critical realism as it demonstrates the "empirical" level, whereby the object of social support is examined through the way athletes experience it.

For the qualitative portion of this study, data was collected to expand upon the quantitative findings. One-to-one open-ended semi-structured interviews were conducted in-person based on Sparkes and Smith (2014) interview recommendations for sport and exercise interviews. Semi-structured interviews use a flexible structure that starts with an interview guide but can deviate to delve further into interesting or unique concepts (O'Leary, 2021). Semi-structured interviews are beneficial when attempting to understand deeper meanings and potentially uncover unexpected data (O'Leary, 2021). The interviews were incorporated in this study to further assess athletes' perceptions of their social support networks and why/how (i.e., real level) it may impact their return to sport from SRC.

In total, there were two interviews per participant, except for one athlete who received medical clearance upon the completion of stage four and was thus only interviewed at that time point. The first interview occurred between stages four and five of the RTS strategy (i.e., after medical clearance, before full contact), and the second after

the full completion of the RTS strategy (i.e., after stage six, return to sport). The rationale for the timing of the interviews is that progression to stages that risk head contact require clearance from a healthcare provider (Patricios et al., 2023), and athletes may experience challenges feeling ready when shifting from no-contact to contact practice (Bloom et al., 2022). In addition, interviewing after the completion of the RTS strategy was advantageous as it helped to provide insight into athletes' feelings of their success of the completed RTS strategy.

Following participation, participants were provided with a conclusion letter (see Appendix E) that thanked them for their participation in the study and provided the primary investigator's contact information if athletes wished to contact them with questions, comments, and/or concerns. Participants were also informed that they would be sent a copy of their interview transcripts and analyzed themes to verify the accuracy of the researcher's interpretations of the data. Additionally, the conclusion letter asked whether they would like to be contacted about participating in future studies or if they would like to be sent a copy of any publications that are a result of the current study.

Measures

Data was collected using both quantitative and qualitative assessment. From a quantitative perspective, athletes completed concentric circles maps and the PASS-Q. From a qualitative perspective, athletes participated in semi-structured interviews.

Concentric Circles Maps. For the concentric circles mapping exercise, athletes were asked to complete a concentric circles map at each RTS stage that served to identify their social support network. To complete the map, athletes answered the stem "who is currently most important to you in supporting your concussion recovery," by writing the position title (e.g., athletic therapist) of their social support agents on a concentric circles

map in one of three levels (i.e., most important, less important, least important; Banbury et al., 2017; Van Waes & Van den Bossche, 2019). Specifically, the concentric circles map allowed participants to freely identify the social support agents present during their RTS strategy stages and to distinguish these agents' relative importance to the athlete and compared to other agents (Banbury et al., 2017; Van Waes & Van den Bossche, 2019).

Perceived Available Support in Sport Questionnaire (PASS-Q). The PASS-Q is a 16-item measure that was designed to assess athletes' perceptions of the availability of social support types (i.e., emotional, esteem, informational, and/or tangible) in sport and was created with high-level athletes (i.e., international level) to be used across sport settings (e.g., sport injury; Freeman et al., 2011). Although the PASS-Q has not been used to assess support with concussed athlete populations, Freeman et al. (2011) found support for the factorial validity (RMSEA =.04; SRMR = .04, and CFI = .98) and internal consistency reliability (Cronbach's alpha internal reliability coefficients ranged from .79 to .89) using data from a sample of competitive university aged athletes (M_{age} = 21.0, *SD* = 2.70 years). To frame the scale within the context of SRC and the RTS strategy, the items in this study were preceded with the stem: "indicate the extent your [insert support provider here] would perform each statement as it pertains to your concussion rehabilitation," with participant responses on a 5-point Likert scale ranging from 0 (not at all) to 4 (always).

Semi-Structured Interview Guides. Consistent with our critical realist philosophical assumptions and explanatory-sequential mixed methods design, our interview guides were based upon athletes' concentric circles map and PASS-Q results. The interview guides consisted of a combination of standardized questions that were used for all athletes (e.g., can you describe the overall support [insert social support agent]

offered you during your concussion recovery?), as well as multiple questions tailored to individual athletes based on their concentric circles map and PASS-Q responses.

First Interview. At the start of the first interview (i.e., before stage five of the RTS strategy), the researcher asked several demographic questions (e.g., age, gender, year of sport eligibility etc.), a few questions about the participant's experience with the concentric circles mapping tool and PASS-Q to clarify any issues, and questions about their previous and current SRC and sport history to help generate rapport. The main questions asked about athletes' concentric circles map and PASS-Q responses for each nominated social support agent. More specifically, athletes were asked about their relationship with each social support agent, their reasoning behind ranking each social support agents' relative importance, and for examples and/or experiences of support from each social support agent. Questions were also asked related to any changes in the presence of social support agents, importance of agents, and/or types of social support received from agents. Lastly, questions related to the efficacy of social support (e.g., whether the social support agent or social support type was helpful/hindering) were asked. The interview guide is included in Appendix F.

Of note, athletes' concentric circles map responses were available to be used as a reference point throughout the interview to allow participants to elaborate on their perceptions of social support during their RTS strategy. At the end of the first interview, participants were asked if there were any components of their concentric circles map or PASS-Q that they would like to discuss that weren't covered in the interview. They were also asked if they would like to make any changes to the maps based on the interview. Finally, participants were instructed to continue mapping for the final two stages of the RTS strategy.

Second Interview. The second interview occurred at the completion of the RTS strategy[2], after the athlete had completed stage six, which is the full return to competitive sport. This interview consisted of clarification questions from the previous interview and questions related explicitly to stages five and six, where questions akin to the previous interview were asked. Since this interview occurred after athletes' "successful" return to sport, questions were asked regarding how certain social support agents, social support types available from these agents, and the timing of support influenced their feelings of readiness to return to sport. At the conclusion of the second interview, participants were provided with a conclusion letter that debriefed participants about concentric circles mapping, the PASS-Q, and the study overall, and created a space to discuss anything further. This information helped enhance our understanding of the utility of the concentric circles mapping exercise and PASS-Q from the participants perspective and informed the research team of any challenges that may have impacted data collection. A detailed second interview guide is included in Appendix G.

Data Analyses

In this section we present our analyses based on each of the measures used (i.e., concentric circles maps, PASS-Q, and semi-structured interviews). Data from the concentric circles maps, PASS-Q, and interviews were analyzed concurrently with data collection.

[2] The athlete who experienced persistent concussion symptoms did not successfully complete the RTS strategy and did not participate in stage five or six. However, they were interviewed a second time at the completion of their sport season which coincided with their stop of participation in the RTS strategy.

Concentric Circles Map Analysis

To examine who provided social support to athletes, we compiled a list of all the agents nominated on the concentric circles maps in a Microsoft Excel file. This list drew from all typical recovery[3] participants' responses at all RTS stages. This list provided the total number of unique social support agents found within the university sport setting, as well as the types of agents within our context (e.g., mother or coach). Next, agents in this list were nominally grouped based on relation to the athlete. For instance, mother, father, brother, sister, and significant other were grouped as "family".

For our next analysis, we examined the number of participants who listed each type of agent. To do so, we returned to participants' concentric circles maps and measured whether each agent on our list (e.g., coach, mother etc.) was present (score = 1) or absent (score = 0). We then counted the number of different agents each athlete identified. We also looked across our data and counted how many participants listed each type of agent. Using this data, we then calculated the percentage of typical recovery participants who listed each type of agent by dividing the number of participants who listed agents by the total of typical recovery participants.

For the next step, we returned to participants' concentric circles maps and measured how frequently each agent was listed across RTS stages. Specifically, we examined whether each agent on our list (e.g., coach, mother etc.) was listed at each stage of the RTS across all athletes. Using this data, we calculated the total number of times

[3] One athlete in this study experienced persisting concussion symptoms and was not included in the main data analysis for the concentric circles maps and PASS-Q data since they repeated multiple RTS stages. When athletes repeat stages, it causes issues calculating average scores by violating the assumption of independence. Based on this, the analysis of the participant with persisting symptom's data is included separately within the section titled *Persisting Concussion Analysis*.

each agent was listed during RTS[4] by each participant, as well as across athletes. We were particularly interested in the relative frequency that each agent was listed, thus, we divided how often specific agents were listed by the total number of agents listed across RTS for each athlete and across athletes.

We were also interested in the percentage of RTS stages that each agent was listed in for each participant and across participants. For each participant, we counted how many stages the agent was identified in and divided the frequency by the total possible number of stages to be identified in (i.e., six). When calculating across participants, we counted the number of stages the agent was identified in across all participants and divided it by the total possible number of stages (i.e., 46 because there were seven athletes who completed six concentric maps each and one participant who completed four concentric maps).

To assess how the identified social support agents ranked in importance, we utilized a Likert-scale ranking system for agents based on how athletes nominated them on their concentric circles maps (3 = most, 2 = less, and 1 = least important). Using these scores, the average 'importance' of each agent was calculated at each RTS stage listed across participants. The averages from each RTS stage were then combined to get a global average for each agent across the entirety of the strategy. These results offer valuable information on how important agents were when they were listed.

Finally, we performed an analysis that combined the frequency that each agent was listed at each RTS stage with the average importance scores. Specifically, we multiplied the percentage of stages agents were listed in (see calculations above) by the

[4] The max number of times an agent can be listed by one participant is six as there are six RTS stages.

average importance score (see calculations above) to create an "importance score" that considered both frequency and perceived importance when listed.

How support changed throughout RTS with respect to the social support agents listed was also of interest. Thus, we created a trendline in excel using the average total number of agents listed at each stage across typical recovery participants. We also calculated the percentage that each support agent was listed across participants at each RTS stage and across the strategy. In these calculations, a value of 100% indicates that the support agent was listed by every typical recovery participant at that stage (or across the strategy), where a value of 0% indicates that no participants listed that agent.

PASS-Q Analysis

Athletes completed a PASS-Q for each agent they listed on their concentric circles maps. Responses were on a Likert-scale from 0 (not at all) to 4 (always). Importantly, if a social support agent was listed in one stage (i.e., stage one) but not later stages (i.e., stage three), they were assigned a 0 for all items in subsequent stages that they were not listed. For each athlete's identified support agents, responses to the four items for each support type were averaged across the stages. We calculated average support type scores across participants at each RTS stage. To understand how each support type changed throughout RTS, we used trendlines to compare how averages changed for each agent across the six RTS stages.

Semi-Structured Interview Analysis

Due to the explanatory-sequential design of the study, the qualitative analysis results were used to supplement the quantitative results, and data analysis was ongoing with data collection. Interviews were audio recorded using an Olympus WS-852 digital voice recorder and transcribed verbatim. Interview one lasted on average 63.22 minutes

(*SD* = 16.08) while interview two averaged 54.39 minutes (*SD* = 20.86). The interview transcripts were transcribed verbatim, organized using QSR Nvivo software, and analyzed in a deductive-inductive manner using codebook thematic analysis (Braun et al., 2019; Braun & Clarke, 2021).

Codebook thematic analysis (TA) is a strategy used to identify patterns across the data and to generate themes that reflect the shared meaning in the data (Braun et al., 2019; Braun & Clarke, 2021). TA is flexible, such that it can be used with different theories and types of data. Codebook TA was first conducted in a within-case fashion, where individual participant transcripts were analyzed to create codebooks and themes about their individual experience with social support during their concussion RTS. Then, a cross-case synthesis was performed where individual case themes were analyzed collectively to generate over-arching themes from the cumulative data across all cases.

Within-case Analysis. The first step of the codebook TA involved deductively analyzing data within each case according to main categories identified within the concentric circles mapping and PASS-Q exercises. The main categories for grouping were social support agents, social support type, and RTS stage. Next, interview data was inductively analyzed within each category to create overall patterns, subthemes, and themes related to participants' perceptions and experiences of the relative importance of support during RTS.

As outlined by Braun et al. (2019), TA followed six steps: (a) data familiarization, (b) code generation, (c) generating initial themes from coded and collated data, (d) developing and reviewing themes, (e) refining, defining, and naming themes, and (f) writing the report. Importantly, these stages did not occur linearly. Data familiarization occurred through the data generation and transcription process and involved an immersive

engagement with the data (Braun et al., 2019). More specifically, the primary author listened to each interview recording with the transcript present while taking notes.

Codes were generated by systematically deriving meaning from the data and organizing collections of data into "codes" based on their shared meaning. Both semantic and latent codes were utilized in this process. Although both types of coding explore meaning, semantic coding uses explicit or overt information (i.e., describing words spoken verbatim), while latent coding uses implicit and underlying information (i.e., reading between the lines; Braun et al., 2019). Using these coding types, code generation occurred by deductively developing a codebook using the theoretical concepts from participants' concentric circles mapping responses (i.e., social support agent, social support type, RTS stage) as a guide. In a first pass through the transcript, data was grouped by support agent (e.g., father, coach etc.). Then, data was further divided using semantic and latent coding to inductively determine patterns of meaning related to support agents' behaviours as they related to support types and various RTS stages. Once complete, the codebook included names of codes, descriptions/definitions of codes with inclusion and exclusion criteria, and examples of the code from the study (Creswell & Poth, 2018; DeCuir-Gunby et al., 2011).

Within-case themes were then constructed from the codebook. Themes are patterns of shared meaning around a concept generated by the researcher (Braun et al., 2019). The themes were generated by clustering similar codes together to create groups that signify a central idea about an aspect of the dataset (Creswell & Poth, 2018). Each theme's boundaries and core concepts were explicitly described within the codebook to ensure no overlap or weakness in themes. Further, each theme was compared to each other and the overall dataset to ensure distinctness.

Cross-case Synthesis. Upon completion of the within-case codebooks for each case, within-case subthemes were extracted from the within-case analysis of each case to perform a cross-case synthesis. First, within-case subthemes were analyzed for patterns of meaning related to athletes' perceptions of support behaviours performed by agents across the RTS strategy. Second, subthemes were analyzed based on specific concussion and contextual (i.e., university sport) factors that influenced athletes' perceptions of social support during their RTS. Then, within-case subthemes were analyzed related to athletes' perceptions of how social support influenced their feelings of readiness to RTS. A visual thematic map was generated to aid the primary investigator in conceptualization of the cross-case synthesis (Creswell & Poth, 2018). This stage was critical to ensure that themes clearly and concisely elucidate the overall meaning of the collective data. The final phase was report production. This involved revisiting each aforementioned process and relating the results to the literature to generate insightful conclusions (Braun et al., 2019).

The use of deductive-inductive codebook TA was suitable for identifying social support factors that may facilitate or hinder athletes' successful return to sport due to the complexity of concussions (Patricios et al., 2023) and the limited knowledge on university athletes' perceptions of social support during the concussion RTS strategy (Caron et al., 2021, 2022; Kita et al., 2020; Lassman et al., 2022; van Ierssel et al., 2022). Codebook thematic analysis aligns with CR as it postulates that there is a single "truth" that can be achieved through rigorous codebook development and refining efforts (i.e., multiple coders), yet it recognizes that the process of using a codebook is iterative and is influenced by the researcher's and coders' interpretation of the "truth" (Braun & Clarke, 2021; Braun et al., 2019). Given that the researcher has experience with SRC and the RTS

schedule, their experience influenced interpretation and thus multiple coders were used to minimize these influences.

Persistent Concussion Analysis

One participant in this study experienced persistent concussion symptoms and a second impact during their RTS that lengthened their concussion rehabilitation. As a result, they completed multiple concentric circles mapping and PASS-Q exercises within RTS stages (i.e., one map per week during four-week stage one) and restarted the strategy after their second impact, which limited our ability to include their data (i.e., concentric circles maps and PASS-Q) in our quantitative analyses. To analyze their concentric circles mapping and PASS-Q data, scores on both the concentric circles maps and PASS-Q were first aggregated within stages that reflect the athlete's recovery as it relates to their persistent symptoms[5].

For the concentric circles maps analysis, we first compiled a list in a Microsoft Excel file of all the agents the participant nominated on their maps. This list included the total number of unique support agents found during their recovery, as well as the types of agents within the participant with persistent symptom's recovery context (e.g., roommates). Using this list, we calculated the percentage of RTS "stages" each agent was identified. We also calculated the total number of times each agent was identified and the relative percentage of times that each agent was identified compared to the athlete's total number of identified agents throughout RTS.

We also analyzed the participant with persistent symptom's importance rankings on the concentric circles maps. However, this participant had multiple scores for different

[5] Since this athlete spent multiple weeks at certain RTS stages and experienced a second impact, the stages following the second impact are denoted with 'B'.

stages. Thus, we created average importance rankings for each agent at each of the stage denominations (i.e., stage 2 … stage 2B etc.). We then calculated the global average across 25 data points[6] to get an average importance across RTS. We were also interested in how the frequency that agents were listed across RTS influenced the importance rankings. We multiplied the percentage of data points that agents were listed by the average importance score to create an "importance score" that considered both frequency and perceived importance when listed.

Using the concentric map data, we also examined how support changed with respect to the number of support providers throughout RTS. More specifically, for each RTS stage, we counted the number of agents present, added these values, and then divided this number by the number of times the athlete completed the map at that stage (i.e., two maps at stage one).

To analyze the PASS-Q data for each agent, scores on the PASS-Q items were averaged for each support type, at each stage, and across all stages. Notably, to reflect the athlete's "staged" progression (i.e., stage 2 … stage 2B etc.) we averaged the data collection points for each support type within the respective stages (i.e., two data points during stage one were averaged).

For our qualitative analyses, this participant's interview data was analyzed the same as our typical recovery participants' data. A within-case analysis was performed to understand the unique perceptions of a participant with persistent concussion symptoms during RTS. This athlete's interview data was also included within the main cross-case

[6] Due to the participant's persistent symptom progression, they completed multiple data collection measures within some stages (i.e., two concentric circles maps and sets of PASS-Qs during stage one). Due to this, there were 25 total data collection time-points.

synthesis as it represents a unique "truth" related to social support during the concussion RTS strategy that offers a valuable juxtaposition to typical concussion RTS.

Trustworthiness

Trustworthiness allows readers to judge the quality and authenticity of the research to establish whether the findings present are truthful (Creswell & Poth, 2018; Lincoln & Guba, 1985). Consistent with a CR philosophical position, the trustworthiness criteria of credibility, dependability, transferability, and confirmability were implemented at various stages of research design, analysis, and interpretation to ensure the quality of our data (Burke, 2017; Lincoln & Guba, 1985).

Credibility assures the presentation of data accurately reflects participants' reality (Burke, 2017). To promote credibility, several sources of triangulation were used, as well as member checking (Burke, 2017). Methodological triangulation was achieved by collecting data at multiple time points throughout the RTS strategy and by using three different data collection tools (i.e., concentric circles maps, PASS-Q, and semi-structured interviews). We also used multiple analyst triangulation to provide evidence of credibility through an intercoder agreement analysis. To obtain intercoder agreement, the primary researcher engaged in the initial within-case codebook thematic analysis coding process, whereby initial coding units (i.e., quotes) were generated from individual participant transcripts (Creswell & Poth, 2018). Codes and the associated quotes were then sorted into themes, whereby respective sub-theme and theme definitions were articulated in a codebook. One independent coder (i.e., the senior author) was then provided all the quotes, along with the codebook for two participants (i.e., roughly 1/5 of the data) and was instructed to sort the coding units into themes and/or sub-themes based on the operational definitions provided in the codebook. A comparison analysis was performed

to determine inter-rater reliability between the coders and a Cohen's Kappa was calculated. Results showed a Cohen's Kappa of .88, indicating strong inter-rater reliability (Hruschka et al., 2004). After this process, the primary researcher performed the cross-case synthesis, and the senior author was involved in discussions related to refining and grouping cross-case themes to again demonstrate intercoder agreement.

Member checks were also used to ensure that transcripts and summary theme descriptions accurately reflected our participants' constructions of their reality. All participants were sent their transcripts from both interviews and a theme summary document after data analysis for review. Participants stated that their transcripts were accurate and confirmed the accuracy of their theme summaries. Participants also had access to their concentric circles maps throughout the entirety of data collection and were encouraged to add, change, or remove any components that misrepresented their experience throughout this iterative process.

Dependability involved actions taken throughout the research process to ensure that the study was replicable (Burke, 2017). Specifically, we provided detailed descriptions and explanations of the research design, procedures, methods, analysis, and findings to ensure traceability. In addition, participants' concentric circles maps and PASS-Q responses were used to inform the interview guides (e.g., "how did your coach provide emotional support?"). Further, the results of our intercoder agreement analysis give us confidence that our findings are replicable when following the same methods.

Confirmability means the research findings are true to the data (i.e., participants' single truth), and that the findings reflect the "true" experiences and interpretations of the participants (i.e., influence of individual interpretation) while minimizing the researcher's bias (Burke, 2017). This was accounted for with the use of a critical friend (i.e.,

undergraduate student in sport psychology) who examined the theme summaries of both the within and cross-case themes for perception and meaning (Burke, 2017). This process was different than the intercoder agreement, such that the goal was not to gain unanimity on theme meaning and interpretation, but rather to examine and expose any patterns and trends related to the researcher's assumptions. Meetings with the critical friend took place at the completion of analysis, whereby the critical friend encouraged reflexivity and offered alternative explanations for the researcher's interpretations of the data. In addition to the critical friend exercise, the use of multiple data collection methods and member checking helped ensure confirmability.

Though considerations were made to recognize and reduce the researcher's bias (Creswell & Poth, 2018), within the critical realism worldview it is stated that the objective "truth" does not exist in isolation of interpretation. Thus, as the primary researcher, my previous experience and biases as a former university athlete who participated in the concussion RTS strategy impacted the study. As the primary researcher, my experiential 'expertise' with the concussion RTS strategy facilitated rapport building during interviews, as I could understand and relate to athletes' experiences. More specifically, my experience as a university athlete allowed me to understand the unique contextual aspects athletes may have encountered (i.e., balancing school and injury recovery), which allowed me to empathize with any difficulty they may have faced while participating in the concussion RTS strategy. My experiences may have also shaped how I interpreted the data. Thus, inviting the reader to understand the backgrounds of those involved in interpreting the findings helps generate transparency and facilitates the interpretation of findings.

As a former university women's hockey player, I had first-hand experience with SRC and its associated RTS strategy during my university sport career and witnessed my teammates' recoveries as well. Through these experiences, I noticed the psychosocial ramifications (e.g., social isolation) of SRC within the university sport context. As I experienced two SRCs myself at varying time points in my career (i.e., 3rd and 5th year of eligibility), I noted discrepant perceptions of social support during both concussions. Specifically, in my third year I perceived little to no support throughout my recovery. Conversely, support was accessible and noticeable in my last year of eligibility, likely due to me playing a significant role on the team.

Although there was an abundance of support in my fifth year, my recovery was not without challenges. Due to the contextual aspects of university sport (i.e., roster spot competition and pre-season schedule), I felt pressure to prematurely return, which influenced my perception of the quality of support I received. I also felt that I needed to play because I had something to prove as a graduating player, a sentiment that was encouraged by certain support providers in power (e.g., head coach). As a consequence, I returned prematurely and experienced worsening symptoms, and it was only after this remission that I chose to report my concussion to our athletic therapist to get the care that I needed to begin the RTS strategy. My ill-advised choice to return early resulted in a prolonged recovery and worse outcomes than I anticipated, which made me feel resentment towards specific support providers who reinforced my decision, but also toward myself because I was aware of the potential consequences of this choice.

As a university athlete I also witnessed how concussed teammates experienced and accessed social support during their RTS strategies. Several teammates experienced persistent concussion symptoms and struggled to access extended healthcare (e.g.,

concussion specialist) outside of our internal athletic therapist. By not referring athletes to other practitioners, my teammates had limited access to additional social support. As a result, many had to further exclude themselves to manage their symptoms. Several of my teammates also experienced relational difficulties (e.g., intra-team conflict) due to the lack of social support they perceived during their RTS, which complicated their attempts to re-integrate with the team upon completion of their strategy. Together, these experiences made me realise the importance of social support for university athletes who experience SRC and participate in the RTS strategy.

Transferability implies that findings from this study can extend beyond the finite point in time, population, and/or context of the current study (Burke, 2017). Given the cross-case nature of our analysis, we believe that findings can transfer across contexts. However, as critical realism posits, contextual components can influence individuals' interpretations of the "truth", but it is not necessary to seek large-scale generalizability of the findings. Rather, it is methodologically coherent to state the unique context of the study findings in detail to allow the reader to assess how and where findings may transfer (Burke, 2017). For instance, as athletes in our study participated in sports like rugby and track and field, with varying levels of collisional contact (i.e., collision vs. non-collision sports), our findings might be relevant for multiple sports. Further, there are many shared contextual aspects of the concussion RTS strategy (e.g., removal from social environments) that are also experienced at other levels of competition (e.g., recreational) and age ranges (e.g., youth sport). Lastly, although the unique contextual aspects of concussion (e.g., invisibility of injury) are integral to the nature of our results, our findings may still be applicable to other injury populations (e.g., musculoskeletal) at

various time points of rehabilitation where physical indicators of injury (i.e., casts, braces, limps etc.) are not apparent.

Chapter 4: Results

In this chapter we will present the results from nine Canadian university athletes' experiences with social support during their sport-related concussion (SRC) Return-to-Sport (RTS) strategy. Our results include data from the concentric circles maps, Perceived Available Support in Sport Questionnaires (PASS-Q; Freeman et al., 2011), and semi-structured interviews.

Concentric Circles Map Results

Athletes were asked to use the concentric circles maps to identify individuals in their life who were important in supporting their concussion recovery during the RTS strategy. For the concentric map data, only data from the eight participants with typical recovery times are reported. Across these eight participants, there were 16 different social support agents identified (see Table 3). These agents were nominally grouped into the following categories: sport medicine staff (i.e., athletic therapist, student trainer, concussion specialist, high performance staff), coaching staff (i.e., head coach and assistant coach), family (i.e., mother, father, brother, sister, significant other), and peers/teammates with various roles (i.e., friends outside of the team, teammates, teammates/friends, teammates/roommates, teammates with similar positions).

Since athletes in our study identified unique agents with their own descriptors (i.e., teammate/friend), the definitions of these actors were clarified during qualitative interviews. More specifically, teammates/friends were individuals who the athlete had a stronger and/or closer relationship with than their average teammates. Teammates/roommates were agents who the athlete lived with but were also members of their varsity team. Teammates with similar positions were those agents who the athlete

engaged with frequently as a result of their shared sport position (i.e., forward vs. defence).

Of the 16 agents, only the athletic therapist was identified by all eight participants (see Table 3). Other agents, such as the head coach and student trainer were listed by nearly every typical recovery participant (i.e., 7/8). Agents such as the concussion specialist, teammates with similar positions, and brother were listed by only one participant.

When considering frequency as an importance indicator, a total of 210 agents were listed. Based on the relative percentages that agents were listed, the athletic therapist (18.1%), head coach (13.3%), student trainer (12.9%), teammates/friends (9.1%), teammates (9.1%), and significant other (8.1%) were the six social support agents listed most often (see Table 4).

We also examined the percentage of RTS stages that agents were listed in (see Table 5). The athletic therapist (82.6%) and head coach (60.9%) were listed in the most stages. Of note, several agents were listed at every single RTS stage (i.e., 100%) for some participants. The athletic therapist was listed at every single stage by Emily, Hannah, Jackson, and Alice. The head coach was listed at every single stage by Jodie and Brittany. Student trainers, significant others, teammates, and teammates/roommates were listed at every single stage by Hannah, Jackson, Brittany, and Hannah, respectively.

The importance rankings shown in Table 6 were also analyzed for all eight typical recovery participants. These rankings considered the average importance of agents when they were listed. Results showed the concussion specialist (M = 3.00, SD = N/A) and teammates with similar positions (M = 3.00, SD = N/A) were ranked on average as most

important when considering only when they were listed. However, there is no standard deviation for these agents as they were only listed by one participant.

When accounting for frequency and average importance when indicated[7], the top five agents were the athletic therapist (1.88), student trainer (1.17), head coach (1.14), significant other (1.09), and teammates/friends (0.98). The bottom six agents were friends outside of the team (0.22), the concussion specialist (0.07), teammates with similar positions (0.07), assistant coaches (0.07), high performance staff (0.04), and brothers (0.02). See Table 6 for all results.

We also explored how support changed throughout RTS with respect to the presence of social support agents (see Figure 1). On average, the number of social support agents listed decreased as typical recovery athletes moved through the RTS strategy[8]. The percentage of participants that listed each social support agent across the RTS strategy can be found in Figure 2. From stage one to four, the athletic therapist was listed by 100% of participants. During these same stages, the student trainer, head coach, and teammates were listed by 50% or more participants, while several agents (e.g., brother, concussion specialist, teammates with similar positions, high performance staff) were listed by only one participant (i.e., 12.5%). After athletes' clearance for contact (i.e., stage five), the athletic therapist and student trainer were listed by four of seven participants (i.e., 57.1%), where several agents (i.e., head coach, significant other, and mothers) were listed by three of seven participants (i.e., 42.9%). During athletes' return to normal game play (i.e., stage

[7] Of the eight typical recovery participants, one participant (i.e., Alice) was cleared to RTS at the completion of stage four, and therefore any RTS stage-based calculation is out of 46 since seven participants completing all six RTS stages and one participant completed four.
[8] Alice only completed the first four RTS stages as they participated in a non-contact sport (i.e., track and field) that warranted clearance to return at this time by their healthcare provider, and thus these results must be interpreted with this in mind.

six), the athletic therapist, student trainer, and head coach were listed by three participants, teammates, significant others, and teammates/friends were listed by two participants, and mother, teammates/roommates, sister, and father were listed by one participant.

As a reminder, the athletic therapist, student trainer, teammates/friends, significant other, and head coach were considered the 'most' important agents. The percentage of participants that listed these agents is shown in detail in Figure 3. Notably, the frequency that these agents were listed decreased through RTS, with a sharp decrease in the number of participants who listed the athletic therapist after stage four (i.e., clearance to return to contact).

Table 3

Frequency of Social Support Agents Listed by Typical Recovery Participants

Social support agent	Hilary	Emily	Jodie	Hannah	Shelby	Jackson	Brittany	Alice	Number and Percentage of Athletes who Listed Agent (%)
Athletic therapist	1	1	1	1	1	1	1	1	8 (100)
Student trainer	1	1	1	1	1	0	1	1	7 (87.5)
Concussion specialist	0	0	1	0	0	0	0	0	1 (12.5)
High performance staff	0	0	0	1	0	0	1	0	2 (25)
Head coach	1	1	1	1	1	1	1	0	7 (87.5)
Assistant coach	1	0	0	1	0	0	0	0	2 (25)
Mother	1	1	0	1	1	1	1	0	6 (75)
Father	1	0	0	1	1	0	1	1	5 (62.5)
Sister	0	0	0	1	1	0	1	0	3 (37.5)
Brother	0	0	0	1	0	0	0	0	1 (12.5)
Significant other	1	0	1	0	1	1	0	0	4 (50)
Friends outside of team	1	0	0	1	0	0	0	0	2 (25)
Teammates	1	0	1	1	1	0	1	0	5 (62.5)
Teammates/friends	1	0	1	0	0	1	1	0	4 (50)
Teammates/roommates	1	1	1	1	0	0	0	0	4 (50)
Teammates with similar positions	0	0	0	1	0	0	0	0	1 (12.5)
Total Different Agents Listed by Participant [a]	11	5	8	13	8	5	9	3	62

Note. Agent listed = 1; Agent not listed = 0; Relative percentage of each agent listed across participants found in parentheses.

[a] Values at the bottom of each participant column represent the total number of different agents each participant listed. Value at the end of this row represents the total number of different agents across all participants.

Table 4

Raw and Relative Frequency of Social Support Agents Across RTS

Social support agent	Hilary (%)	Emily (%)	Jodie (%)	Hannah (%)	Shelby (%)	Jackson (%)	Brittany (%)	Alice [a] (%)	Total Times Agent Listed Across Participants During RTS (%)
Athletic therapist	4 (11.1)	6 (33.3)	3 (9.4)	6 (14.0)	4 (25.0)	6 (28.6)	5 (13.2)	4 (66.7)	38 (18.1)
Head coach	3 (8.3)	5 (27.8)	6 (18.8)	4 (9.3)	1 (6.3)	3 (14.3)	6 (15.8)	0	28 (13.3)
Student trainer	2 (5.6)	5 (27.8)	5 (15.6)	6 (14.0)	5 (31.3)	0	3 (7.9)	1 (16.7)	27 (12.9)
Teammates	3 (8.3)	0	5 (15.6)	4 (9.3)	1 (6.3)	0	6 (15.8)	0	19 (9.1)
Teammates/friends	4 (11.1)	0	5 (15.6)	0	0	5 (23.8)	5 (13.2)	0	19 (9.1)
Significant other	5 (13.9)	0	5 (15.6)	0	1 (6.3)	6 (28.6)	0	0	17 (8.1)
Mother	5 (13.9)	1 (5.6)	0	2 (4.7)	1 (6.3)	1 (4.8)	5 (13.2)	0	15 (7.1)
Teammates/roommates	5 (13.9)	1 (5.6)	2 (6.3)	6 (14.0)	0	0	0	0	14 (6.7)
Sister	0	0	0	5 (11.6)	2 (12.5)	0	5 (13.2)	0	12 (5.7)
Father	1 (2.8)	0	0	2 (4.7)	1 (6.3)	0	2 (5.3)	1 (16.7)	7 (3.3)
Friends outside of team	2 (5.6)	0	0	4 (9.3)	0	0	0	0	6 (2.9)
Assistant coach	2 (5.6)	0	0	1 (2.3)	0	0	0	0	3 (1.4)
High performance staff	0	0	0	1 (2.3)	0	0	1 (2.6)	0	2 (1.0)
Brother	0	0	0	1 (2.3)	0	0	0	0	1 (0.5)
Teammates with similar positions	0	0	0	1 (2.3)	0	0	0	0	1 (0.5)
Concussion specialist	0	0	1 (3.1)	0	0	0	0	0	1 (0.5)
Total Number of Agents Listed by Participant Across RTS	36	18	32	43	16	21	38	6	210

Note. The max number of times an agent can be listed by one participant is six (i.e., six RTS stages). Relative frequencies (i.e., percent) of individual agents for each participant and across participants found in parentheses.

[a] Due to the nature of Alice's sport (i.e., track and field) she was cleared to RTS at the completion of stage four, therefore the max number of times an agent can be listed for her is four.

Table 5

Percentage of RTS Stages that Social Support Agents are Identified

Social support agent	Hilary (%)	Emily (%)	Jodie (%)	Hannah (%)	Shelby (%)	Jackson (%)	Brittany (%)	Alice[a] (%)	Total (%)
Athletic therapist	4 (66.7)	6 (100)	3 (50.0)	6 (100)	4 (66.7)	6 (100)	5 (83.3)	4 (100)	38 (82.6)
Head coach	3 (50.0)	5 (83.3)	6 (100)	4 (66.7)	1 (16.7)	3 (50.0)	6 (100)	0	28 (60.9)
Student trainer	2 (33.3)	5 (83.3)	5 (83.3)	6 (100)	5 (83.3)	0	3 (50.0)	1 (16.7)	27 (58.7)
Teammates	3 (50.0)	0	5 (83.3)	4 (66.7)	1 (16.7)	0	6 (100)	0	19 (41.3)
Teammates/friends	4 (66.7)	0	5 (83.3)	0	0	5 (83.3)	5 (83.3)	0	19 (41.3)
Significant other	5 (83.3)	0	5 (83.3)	0	1 (16.7)	6 (100)	0	0	17 (40.0)
Mother	5 (83.3)	1 (16.7)	0	2 (33.3)	1 (16.7)	1 (16.7)	5 (83.3)	0	15 (32.6)
Teammates/roommates	5 (83.3)	1 (16.7)	2 (33.3)	6 (100)	0	0	0	0	14 (30.4)
Sister	0	0	0	5 (83.3)	2 (33.3)	0	5 (83.3)	0	12 (26.1)
Father	1 (16.7)	0	0	2 (33.3)	1 (16.7)	0	2 (33.3)	1 (16.7)	7 (15.2)
Friends outside of team	2 (33.3)	0	0	4 (66.7)	0	0	0	0	6 (13.0)
Assistant coach	2 (33.3)	0	0	1 (16.7)	0	0	0	0	3 (6.5)
High performance staff	0	0	0	1 (16.7)	0	0	1 (16.7)	0	2 (4.4)
Brother	0	0	0	1 (16.7)	0	0	0	0	1 (2.2)
Teammates with similar positions	0	0	0	1 (16.7)	0	0	0	0	1 (2.2)
Concussion specialist	0	0	1 (16.7)	0	0	0	0	0	1 (2.2)
Total Agents Listed Across RTS [b]	36 (17.1)	18 (8.6)	32 (15.2)	43 (20.5)	16 (7.6)	21 (10.0)	38 (18.1)	6 (2.9)	210

Note. Within each participant's column, percentages (%) of stages that agents are identified are found within parentheses. The denominator for calculating individual participant's percentages was six since the RTS strategy has six stages. The denominator for calculating the total percentages is 46 because six participants completed eight stages and one completed four.

[a] Due to the nature of Alice's sport (i.e., track and field) she was cleared to RTS at the completion of stage four, and thus the denominator for calculating percentages within her column was four.

[b] Percentages in this row represent the relative percentage of each participant's listed agents (i.e., participant's total number of identified agents/total number of identified agents (i.e., 210) across participants)

Table 6

Average Importance Rankings for Social Support Agents Across RTS

Agent	S1 (*SD*)	S2 (*SD*)	S3 (*SD*)	S4 (*SD*)	S5 (*SD*)	S6 (*SD*)	All Stages when Listed (*SD*)	Total Stages Listed[a]	% Total Stages[b]	All Stages X % Total Stages[c]
AT	2.19 (0.75)	2.25 (0.71)	2.43 (0.79)	2.00 (0.76)	2.75 (0.50)	2.33 (0.58)	2.28 (0.70)	38.00	0.83	1.88
ST	2.17 (0.98)	2.20 (0.84)	1.60 (0.89)	1.75 (0.96)	2.25 (0.50)	2.00 (0.00)	2.00 (0.78)	27.00	0.59	1.17
HC	2.08 (0.92)	1.40 (0.55)	2.00 (0.89)	1.80 (0.84)	2.33 (0.58)	1.67 (0.58)	1.88 (0.77)	28.00	0.61	1.14
SO	3.00 (0.00)	2.75 (0.50)	3.00 (0.00)	3.00 (0.00)	3.00 (0.00)	3.00 (0.00)	2.94 (0.24)	17.00	0.37	1.09
TF	2.33 (0.58)	2.17 (1.11)	2.42 (1.17)	2.50 (1.00)	1.83 (1.65)	3.00 (0.00)	2.37 (0.94)	19.00	0.41	0.98
T	1.13 (0.25)	2.00 (1.00)	2.00 (0.00)	2.00 (0.71)	3.00 (0.00)	2.00 (1.41)	1.92 (0.85)	19.00	0.41	0.79
TR	2.25 (0.96)	3.00 (0.00)	2.33 (0.58)	3.00 (0.00)	2.00 (1.41)	2.00 (N/A)	2.43 (0.76)	14.00	0.30	0.74
M	2.00 (0.82)	2.50 (0.71)	2.00 (1.41)	1.67 (0.58)	2.67 (0.58)	2.00 (N/A)	2.13 (0.74)	15.00	0.33	0.70
S	2.75 (0.35)	2.00 (0.00)	1.33 (0.58)	1.50 (0.71)	1.00 (N/A)	2.00 (N/A)	1.79 (0.66)	12.00	0.26	0.47
F	1.50 (0.58)	2.00 (N/A)	0.00 (0.00)	0.00 (0.00)	3.00 (N/A)	1.00 (N/A)	1.71 (0.76)	7.00	0.15	0.26
FOT	2.00 (1.41)	0.00 (0.00)	2.00 (0.00)	1.00 (N/A)	1.00 (N/A)	0.00 (0.00)	1.67 (0.82)	6.00	0.13	0.22
CS	3.00 (N/A)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	3.00 (N/A)	1.00	0.02	0.07
TSP	0.00 (0.00)	0.00 (0.00)	3.00 (N/A)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	3.00 (N/A)	1.00	0.02	0.07
AC	0.00 (0.00)	1.00 (N/A)	1.00 (N/A)	1.00 (N/A)	0.00 (0.00)	0.00 (0.00)	1.00 (0.00)	3.00	0.07	0.07
HPS	1.00 (N/A)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.00 (N/A)	0.00 (0.00)	1.00 (0.00)	2.00	0.04	0.04
B	1.00 (N/A)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.00 (N/A)	1.00	0.02	0.02

Note. Each column (i.e., S1 … S6) represents typical recovery participants' average importance ranking for each listed agent. Standard deviations are presented in parentheses. S1= Stage 1; S2 = Stage 2; S3 = Stage 3; S4 = Stage 4; S5 = Stage 5; S6 = Stage 6; *SD* = Standard Deviation; All Stages = Average ranking across all stages; AT = athletic therapist; ST = student trainer; HC = head coach; SO = significant other; TF = teammates/friends; T = teammates; TR = teammates/roommates; M = mother;

S = sister; F = father; FOT = friends outside of team; CS = concussion specialist; TSP = teammates with similar positions; AC = assistant coach; HPS = high performance staff; B = brother; N/A = agent was only listed once, thus standard deviation could not be calculated.

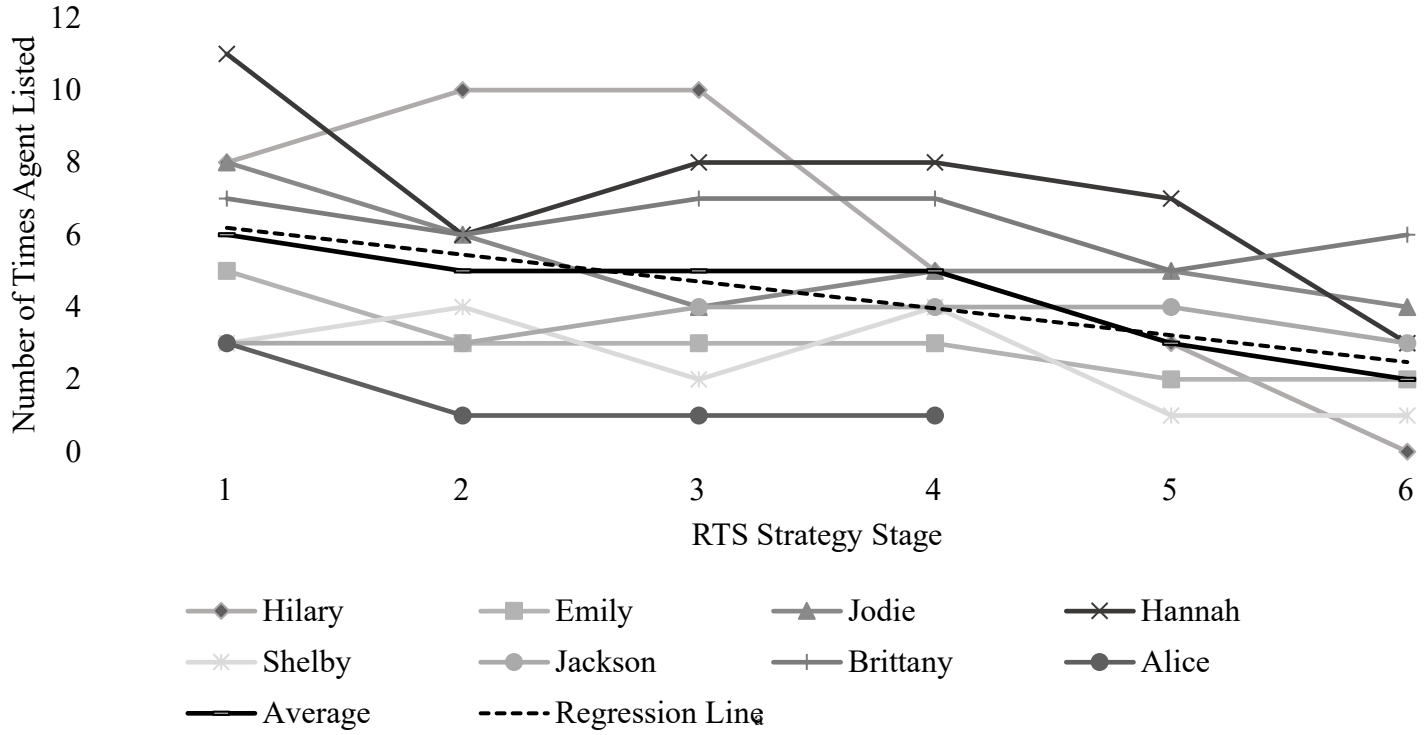
[a] Total stages listed is the sum of all the stages the agent was listed across participants, with a max possible frequency of 46 given that 7 participants completed six RTS stages, and one participant completed four.

[b] The percent of total stages listed is each agents' total frequency divided by the possible frequency (i.e., 46).

[c] This column represents all stages importance ranking for each agent multiplied by the percent of total stages for each agent, which represents 'importance' status by considering both the average rankings and the frequency agents were listed.

Figure 1

Change in the Number of Social Support Agents Listed as a Function of RTS

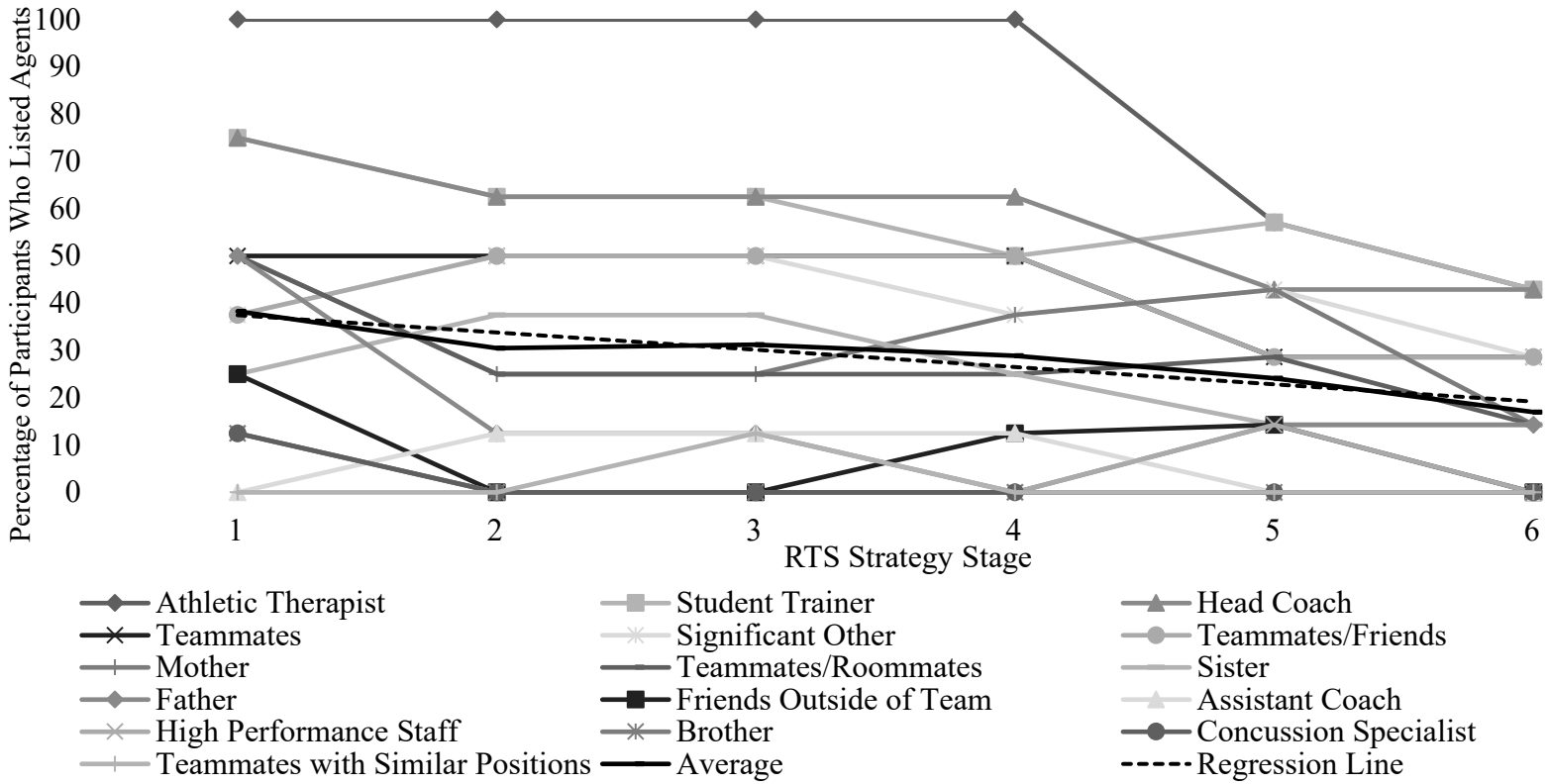


Note. This figure shows the number of agents each typical recovery participant listed at each RTS stage. Each participant is indicated by various lines as shown in the above legend. The solid black line represents the average number of agents listed across participants at each stage. The dotted black line is a regression line which represents how the number of agents listed across participants changes throughout RTS.

[a] Alice only participated in RTS until stage four.

Figure 2

Changes in the Percentage of Participants who Identify Social Support Agents as a Function of RTS

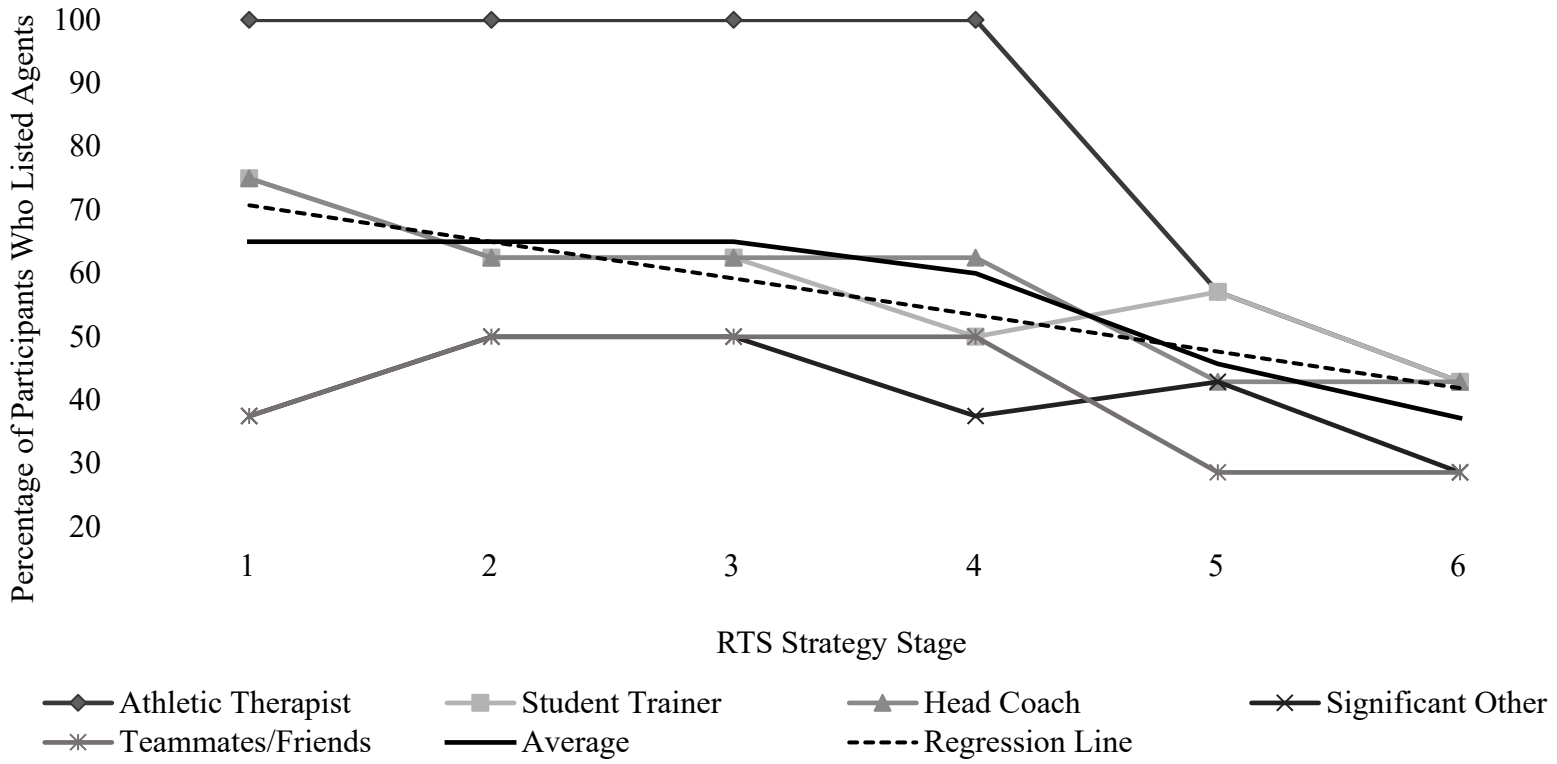


Note. This figure shows the percentage of typical recovery participants who listed each agent across RTS stages. Percentage is based on the number of participants who completed each stage (i.e., 8 participants for stages 1-4, 7 participants for stages 5 and 6). Each agent is indicated by various lines shown in the above legend. The solid black line represents the average percentage

of participants that listed agents across all agents. The dotted black line is a regression line which represents how the percentage of overall agents listed changes throughout RTS.

Figure 3

Changes in the Percentage of Participants who Identify the Top Five Most Important Agents as a Function of RTS



Note. This figure shows the percentage of typical recovery participants who listed agents across RTS stages for the athletes' top five perceived most important agents as indicated in Table 4. Percentage is based on the number of participants who completed each stage (i.e., 8 participants for stages 1-4, 7 participants for stages 5 and 6). Each agent is indicated by various lines shown

in the above legend. The solid black line represents the average percentage that participants listed agents across all agents. The dotted black line is a regression line which represents how the percentage of overall agents listed changes throughout RTS.

Persistent Concussion Concentric Map Results

Data from the athlete with persistent concussion symptom's (i.e., Charlie) concentric circles maps are reported here[9]. This athlete completed data collection measures 25 times throughout their recovery which coincided with both changes in stage progression (i.e., stage two five-minute bike to ten-minute bike) or stagnant strategy phases (i.e., stage three for multiple weeks). Across his recovery there were seven different social support agents identified: mother, athletic therapist, roommates, teammate A, teammate B, teammate C, and the sports medicine doctor (see Table 7).

Of the seven identified agents, his mother was identified at every stage. Additionally, the athlete identified agents 100 times throughout the duration of their 25 data collection timepoints. When looking further at when agents were identified throughout RTS, we calculated the relative percentage each support agent made-up of the participant's total identified agents (see Table 7)[10]. Based on the percentage of identified agents, his mother (25.0%) and athletic therapist (22.0%) composed nearly 50% of all listed agents across his recovery.

We also analyzed the importance rankings (i.e., most, less, and least important) for each agent when they were listed at each data collection timepoint and across the entirety of RTS. Charlie's mother (M = 2.96, SD = 0.20) and athletic therapist (M = 2.95, SD = 0.21) were ranked highest. Similar to the typical RTS athletes, the results from this

[9] Although this athlete was still recovering from their concussion at the end of the 2022/2023 university sport season, data collection was cut-off for the participant with persistent symptoms at the conclusion of the 2022/2023 university sport season.

[10] Due to the second impact Charlie experienced, he restarted the strategy after stage four and thus the second set of RTS stages are identified as Stage 1B, Stage 2B, and Stage 3B.

analysis did not consider the frequency that agents were listed. When factoring in frequency, the order of importance only changed for teammate B (see Table 8).

Lastly, we examined the number of agents nominated across this athlete's RTS. As seen in Figure 4, the number of different agents decreased as the athlete moved through their rehabilitation.

Table 7

How Frequently Agents Were Identified Across Persistent Concussion Symptoms RTS

Agent	S1[a] (%)	S2 (%)	S3 (%)	S4 (%)	S1B (%)	S2B (%)	S3B (%)	Total Times Listed Across RTS (%)	Relative Percentage of Agents Listed [b] (%)
M	2/2 (100)	5/5 (100)	6/6 (100)	1/1 (100)	2/2 (100)	1/1 (100)	8/8 (100)	25 (100)	25 (25)
AT	2/2 (100)	5/5 (100)	3/6 (50)	1/1 (100)	2/2 (100)	1/1 (100)	8/8 (100)	22 (88)	22 (22)
R	2/2 (100)	4/5 (80)	3/6 (50)	0/1 (0)	2/2 (100)	1/1 (100)	5/8 (62.5)	17 (68)	17 (17)
TA	2/2 (100)	5/5 (100)	3/6 (50)	1/1 (100)	2/2 (100)	1/1 (100)	3/8 (37.5)	17 (68)	17 (17)
TB	2/2 (100)	5/5 (100)	3/6 (50)	0/1 (0)	0/2 (0)	0/1 (0)	1/8 (12.5)	11 (44)	11 (11)
TC	0/2 (0)	5/5 (100)	1/6 (16.7)	0/1 (0)	0/2 (0)	0/1 (0)	0/8 (0)	6 (24)	6 (6)
SMD	2/2 (100)	0/5 (0)	0/6 (0)	0/1 (0)	0/2 (0)	0/1 (0)	0/8 (0)	2 (8)	2 (2)
Total Agents Listed Across RTS	12	29	19	3	8	4	25	100	100 (100%)

Note. M = mother; AT = athletic therapist; R = roommates; TA = teammate A; TB = teammate B; TC = teammate C; SMD = sports medicine doctor; S1 = Stage 1; S2 = Stage 2; S3 = Stage 3; S4 = Stage 4; S1B = Second Stage 1; S2B = Second Stage 2; S3B = Second Stage 3.

[a] Due to the athlete's symptom progression, they completed measures (i.e., concentric circles maps and PASS-Qs) several times during one 'RTS stage', thus agents had the potential to be identified several times throughout a stage. Percentages

within each ‘stage’ column represent the percentage of the stage that the agent was identified during the athlete’s time in that stage.

[b] Percentages in this column represent the number of times each agent was listed divided by the total number of agents identified throughout persistent concussion symptom RTS.

Table 8

Average Importance Rankings for Social Support Agents Across Persistent Concussion Symptoms RTS

Agent	S1[a] (*SD*)	S2 (*SD*)	S3 (*SD*)	S4 (*SD*)	S1B (*SD*)	S2B (*SD*)	S3B (*SD*)	All Stages [b] (*SD*)	Total Stages Listed	% Total Stages	All Stages (*M*) X % Total Stages [c]
M	3.00 (0.00)	3.00 (0.00)	3.00 (0.00)	3.00 (N/A)	3.00 (0.00)	3.00 (N/A)	2.88 (0.35)	2.96 (0.20)	25	1	2.96
AT	2.50 (0.71)	3.00 (0.00)	3.00 (0.00)	3.00 (N/A)	3.00 (0.00)	3.00 (N/A)	3.00 (0.00)	2.95 (0.21)	22	0.88	2.60
R	3.00 (0.00)	3.00 (0.00)	2.67 (0.58)	-	3.00 (0.00)	2.00 (N/A)	2.60 (0.55)	2.76 (0.44)	17	0.68	1.88
TA	2.50 (0.71)	2.80 (0.45)	3.00 (0.00)	3.00 (N/A)	2.50 (0.71)	2.00 (N/A)	2.33 (0.58)	2.65 (0.49)	17	0.68	1.80
TB	2.00 (0.00)	2.20 (0.84)	2.33 (0.58)	-	-	-	2.00 (N/A)	2.18 (0.60)	11	0.44	0.96
TC	-	2.60 (0.55)	1 (N/A)	-	-	-	-	2.33 (0.82)	6	0.24	0.56
SMD	1.50 (0.71)	-	-	-	-	-	-	1.50 (0.71)	2	0.08	0.12

Note. Each column (i.e., S1 … S3B) represents the participant with persistent symptom's average (*M*) importance ranking for each listed agent. Standard deviations are presented in parentheses. S1 = Stage 1; S2 = Stage 2; S3 = Stage 3; S4 = Stage 4; S1B = Second Stage 1; S2B = Second Stage 2; S3B = Second Stage 3; M = mother; AT = athletic therapist; R = roommates; TA = teammate A; TB = teammate B; TC = teammate C; SMD = sports medicine doctor; *SD* = Standard Deviation; All Stages = Average ranking across all stages; N/A = no standard deviation was available to be calculated due to the agent only being

listed once in the collection of stages or there only being one data collection timepoint within the collection of stages; - = No data available because agent was not listed during ‘stage’

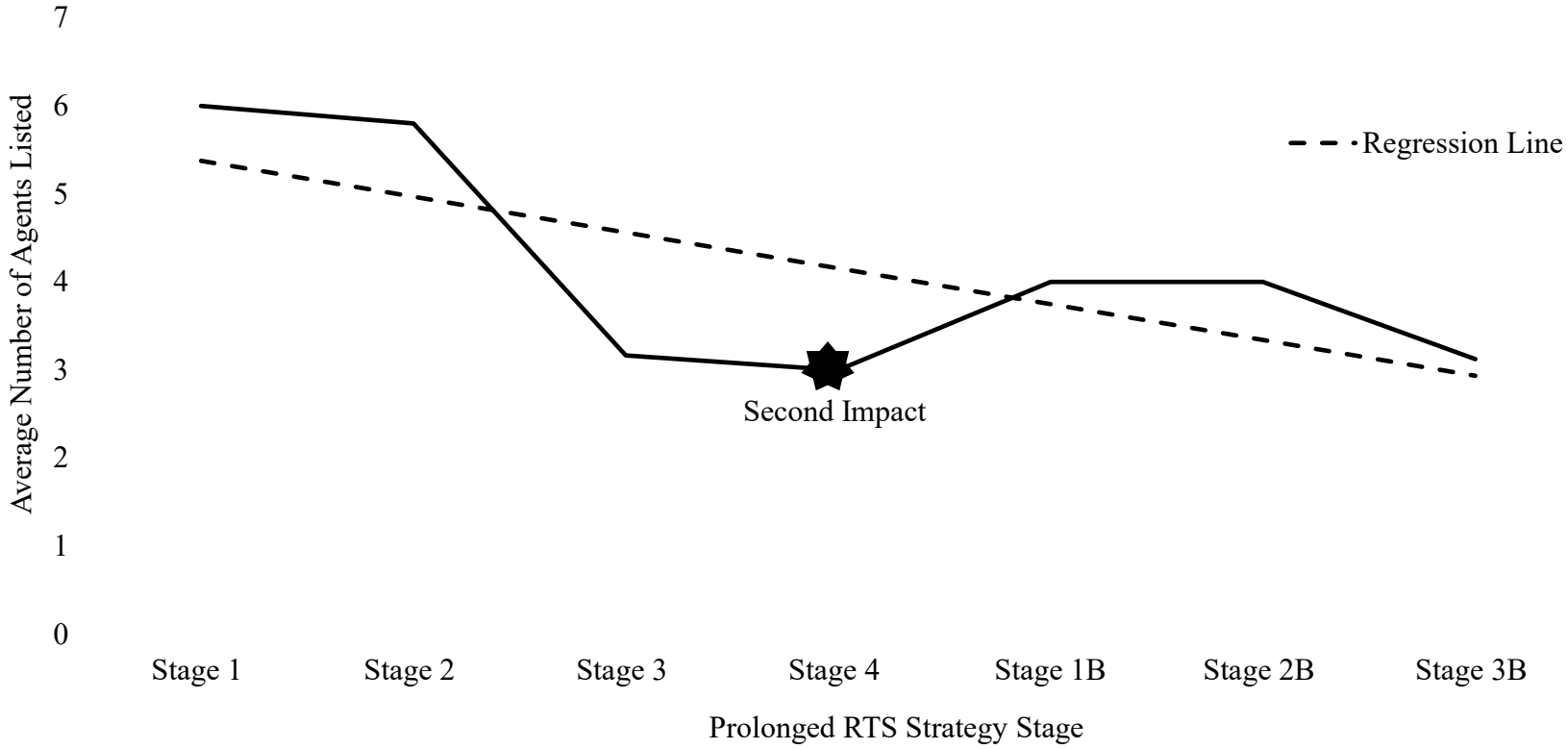
[a] Due to the athlete’s symptom progression, they completed measures (i.e., concentric circles maps and PASS-Qs) several times during one ‘RTS stage’, thus agents had the potential to be identified several times throughout a stage. Averages within each ‘stage’ column represent the average concentric circles map score of the ‘stage’ that the agent was identified during the athlete’s time in that stage.

[b] The averages within the all stages column represent the average concentric circles map score across all data collection timepoints (i.e., 25) throughout RTS.

[c] This column contains the ‘importance score’ that considers both the percentage of stages agents were listed and the average importance score.

Figure 4

Changes in the Average Number of Agents Listed as a Function of Persistent Concussion Symptoms RTS



Note. This figure shows the average number of agents the participant with persistent symptoms listed at each RTS 'stage'. The solid black line represents the average number of agents listed at each 'stage'. The dotted black line is a regression line which represents how the average number of agents listed across participants changed throughout RTS. The star titled 'second impact' denotes the time during RTS where the athlete sustained a second hit and had to restart their RTS strategy.

PASS-Q Results

Emotional Support

The average PASS-Q scores for emotional support across participants at each RTS stage are shown in Table 9. Across all RTS stages, significant others (M = 2.82, SD = 1.85) provided the most emotional support followed by teammates/friends (M = 2.54, SD = 1.64), the athletic therapist (M = 2.51, SD = 1.37), sisters (M = 2.44, SD = 1.80), and teammates/roommates (M = 2.11, SD = 1.88). When looking at the top five agents, we see that as athletes move through the RTS strategy, the amount of emotional support decreases linearly (see Figure 5). More specifically, we see the highest average emotional support for the teammates/roommates (M = 3.88, SD = 0.25) and significant others (M = 4.00, SD = 0.00) at stages one and two, respectively. For both agents, these peaks are followed by a sharp drop, a smaller increase and then a decrease to the end of the strategy. At stage four, agents that were otherwise consistent in emotional support across stages one to three, such as the athletic therapist, teammates/friends, and student trainer, decrease following athletes' clearance for full contact. At the completion of the strategy significant others (M = 2.00, SD = 2.31) and teammates/friends (M = 1.98, SD = 2.29) provided the most emotional support.

Esteem Support

Table 10 contains the average esteem support PASS-Q scores across participants at each RTS stage. Significant others (M = 2.63, SD = 1.85), teammates/friends (M = 2.29, SD = 1.58), the athletic therapist (M = 2.23, SD = 1.42), teammates (M = 1.91, SD = 1.59), and sisters (M = 1.83, SD = 1.43) were the top five providers of esteem support across RTS. The amount of esteem support from these five agents varies throughout the duration of athletes' RTS (see Figure 6). For instance, at stage two, the most average

esteem support is provided by significant others (M = 3.75, SD = 0.35) and sisters (M = 3.25, SD = 0.66). Contrarily at stage five, the least esteem support was provided by sisters (M = 0.75, SD = 1.30) and teammates (M = 0.90, SD = 1.52). On average within these five agents, there are two distinct peaks in esteem support, as there is an increase at stage two and a slight drop at stage three, followed by an increase again at stage four, and then a more drastic decrease at stage five. Despite this double peaked trend, there appears to be a trending decrease in support.

Informational Support

With respect to the average PASS-Q informational support scores across participants and RTS, the athletic therapist (M = 1.86, SD = 1.35), head coach (M = 1.72, SD = 1.63), teammates/friends (M = 1.63, SD = 1.45), sisters (M = 1.57, SD = 1.31), and significant others (M = 1.52, SD = 1.61) provided the most informational support (see Table 11). In Figure 7, we see how informational support changes across RTS within these five agents. Specifically, the athletic therapist (M = 2.63, SD = 1.23) provided the most informational support at stage one. The athletic therapist's support then slightly decreased until a small peak at stage four (M = 2.22, SD = 1.09), followed by a steeper decline at the end of RTS (M = 0.64, SD = 0.94). In contrast, significant others provided informational support early in stage one (M = 2.25, SD = 1.67) that steadily decreased until stage four (M = 0.50, SD = 0.58), and then increased at stage five (M = 1.69, SD = 1.97) and six (M = 1.88, SD = 2.17). Overall, across these top five agents, informational support decreased linearly, as shown by the best-fit line.

Tangible Support

The PASS-Q scores that represent the average tangible support across all social support agents during athletes' RTS strategies are found in Table 12. The agents that provided the most tangible support on average were head coaches (M = 0.93, SD = 1.19), student trainers (M = 0.90, SD = 1.30), teammates/roommates (M = 0.76, SD = 1.00), the athletic therapist (M = 0.66, SD = 0.90), and teammates/friends (M = 0.61, SD = 0.76). Changes in support across these five agents are shown in Figure 8. Of these five agents, teammates/friends provided the least tangible support at stage one (M = 1.16, SD = 1.07), but the second most at stage six (M = 0.77, SD = 0.99). The teammates/roommates provided the most tangible support overall at stage one (M = 2.50, SD = 0.35). All five agents' average tangible support scores decreased from stage one to stage two, where the student trainer and teammates/friends continued to decrease until stage three. Following this general decrease, at stage four, the athletic therapist (M = 0.84, SD = 0.72) and teammates/friends (M = 0.50, SD = 0.58) tangible support increased. At the completion of the strategy, the head coach (M = 0.50, SD = 1.32), student trainer (M = 1.00, SD = 1.62), and teammates/friends' (M = 0.77, SD = 0.99) support increased from stage five. On average, all five agents tangible support linearly decreased as athletes moved through the strategy.

Table 9

Means and Standard Deviations by Agent for Participants' PASS-Q: Emotional

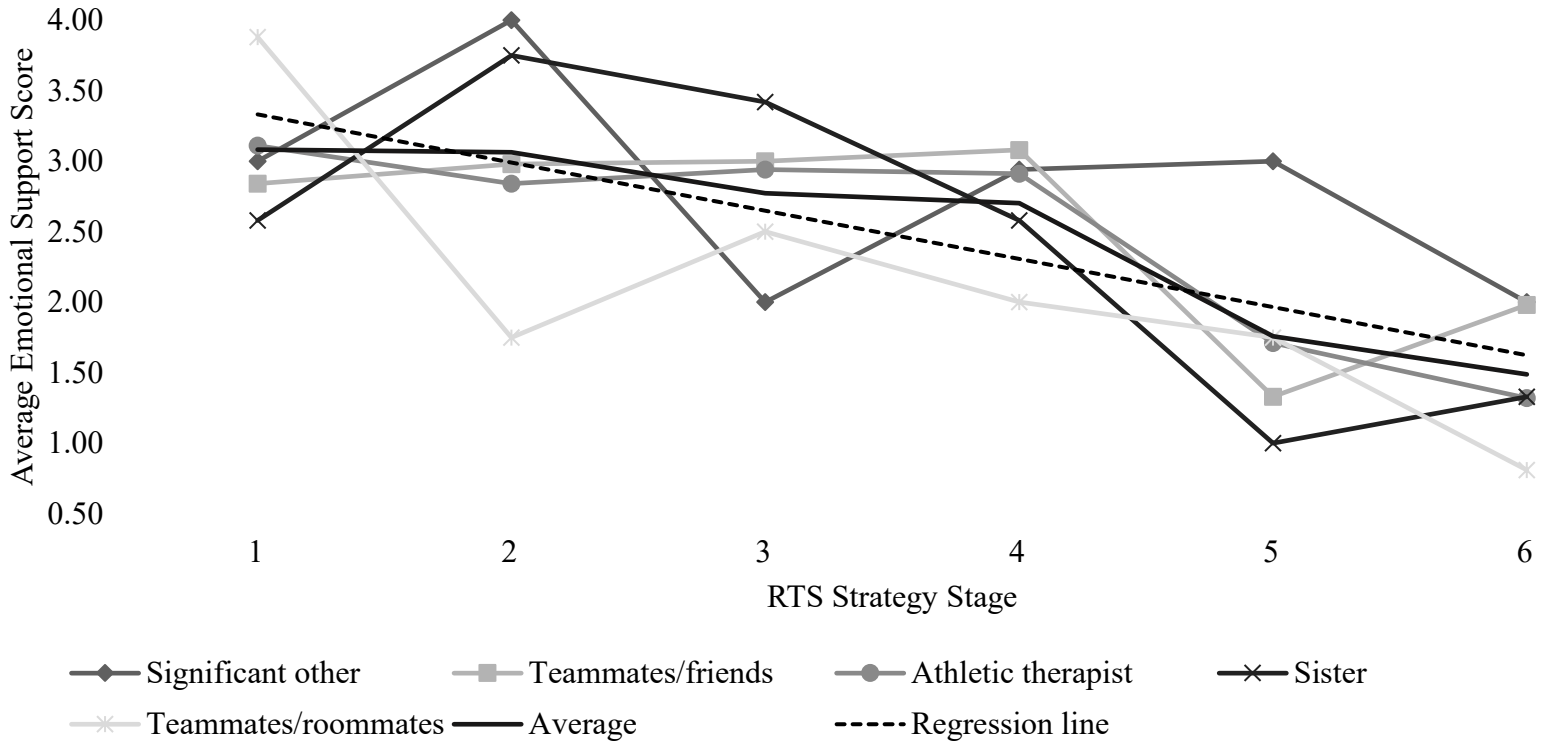
Social support agent	S1 (*SD*)	S2 (*SD*)	S3 (*SD*)	S4 (*SD*)	S5 (*SD*)	S6 (*SD*)	All Stages (*SD*)
Significant other	3.00 (2.00)	4.00 (0.00)	2.00 (2.31)	2.94 (1.96)	3.00 (2.00)	2.00 (2.31)	2.82 (1.85)
Teammates/friends	2.84 (1.92)	2.98 (1.25)	3.00 (1.24)	3.08 (1.26)	1.33 (1.89)	1.98 (2.29)	2.54 (1.64)
Athletic therapist	3.11 (0.77)	2.84 (1.02)	2.94 (1.27)	2.91 (0.86)	1.71 (1.70)	1.32 (1.75)	2.51 (1.37)
Sister	2.58 (2.24)	3.75 (0.43)	3.42 (0.29)	2.58 (2.24)	1.00 (1.73)	1.33 (2.31)	2.44 (1.80)
Teammates/roommates	3.88 (0.25)	1.75 (2.06)	2.50 (1.91)	2.00 (2.31)	1.75 (2.06)	0.81 (1.63)	2.11 (1.88)
Student trainer	2.46 (1.54)	2.43 (1.68)	2.39 (1.71)	1.79 (1.69)	1.92 (1.59)	1.54 (1.76)	2.11 (1.59)
Teammates	2.58 (1.50)	2.35 (1.52)	2.00 (1.87)	2.55 (1.52)	1.30 (1.86)	1.30 (1.79)	2.01 (1.63)
Head coach	2.32 (1.41)	2.07 (1.46)	2.75 (1.27)	2.29 (1.60)	1.32 (1.66)	1.18 (1.52)	1.99 (1.51)
Friends outside of the team	4.00 (0.00)	0.00 (0.00)	3.88 (0.18)	2.00 (2.83)	2.00 (2.83)	0.00 (0.00)	1.98 (2.07)
Mother	2.67 (2.07)	1.33 (2.07)	1.33 (2.07)	1.79 (2.02)	1.88 (2.07)	0.67 (1.63)	1.61 (1.95)
Father	2.60 (1.67)	0.80 (1.79)	0.00 (0.00)	0.00 (0.00)	0.81 (1.63)	0.50 (1.00)	0.79 (1.46)
Teammates with similar positions	0.00 (N/A)	0.00 (N/A)	4.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.67 (1.63)
Brother	4.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.67 (1.63)
Assistant coach	0.00 (0.00)	0.88 (1.24)	0.81 (1.15)	1.50 (2.12)	0.00 (0.00)	0.00 (0.00)	0.53 (1.01)
High performance staff	1.63 (2.30)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.50 (2.12)	0.00 (0.00)	0.52 (1.22)
Concussion specialist	1.50 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.25 (0.61)

Note. Each stage (i.e., S1 … S6) column represents the average (*M*) emotional support PASS-Q scores for each agent across all typical recovery participants. Scores can range from 0 – 4.00. S1 = Stage 1; S2 = Stage 2; S3 = Stage 3; S4 = Stage 4; S5 = Stage 5; S6 = Stage 6; *M* = Mean; *SD* = Standard deviation. N/A = agent was only listed once; thus standard deviation could

not be calculated. All Stages = global average of typical recovery participants' emotional PASS-Q scores across all six RTS stages.

Figure 5

Change in the Top Five Most Important Agents' Emotional Support as a Function of RTS



Note. This figure shows the average emotional PASS-Q scores for the top five most important agents. Each agent is indicated by various lines shown in the above legend. The solid black line represents the average emotional PASS-Q scores across the top five agents. The dotted black line is a regression line which represents how the emotional PASS-Q scores across agents changed throughout RTS.

Table 10

Means and Standard Deviations by Agent for Participants' PASS-Q: Esteem

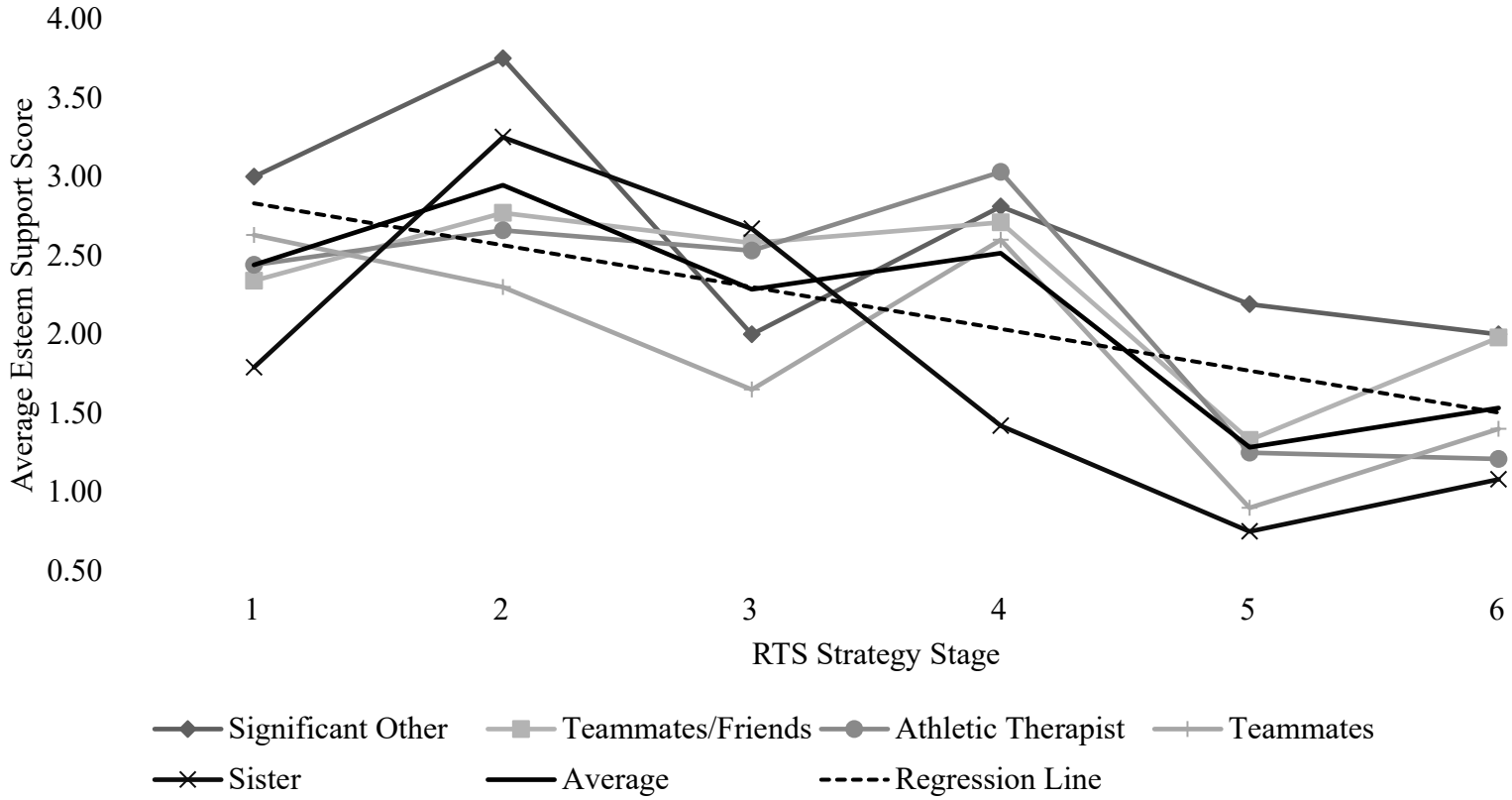
Social support agent	S1 (*SD*)	S2 (*SD*)	S3 (*SD*)	S4 (*SD*)	S5 (*SD*)	S6 (*SD*)	All Stages (*SD*)
Significant other	3.00 (2.00)	3.75 (0.35)	2.00 (2.31)	2.81 (1.91)	2.19 (2.12)	2.00 (2.31)	2.63 (1.85)
Teammates/friends	2.34 (1.74)	2.77 (1.14)	2.58 (1.36)	2.71 (1.49)	1.33 (1.89)	1.98 (2.29)	2.29 (1.58)
Athletic therapist	2.44 (1.27)	2.66 (0.97)	2.53 (1.27)	3.03 (1.03)	1.25 (1.66)	1.21 (1.63)	2.23 (1.42)
Teammates	2.63 (1.53)	2.30 (1.44)	1.65 (1.51)	2.60 (1.53)	0.90 (1.52)	1.40 (1.95)	1.91 (1.59)
Sister	1.79 (1.65)	3.25 (0.66)	2.67 (0.76)	1.42 (1.23)	0.75 (1.30)	1.08 (1.88)	1.83 (1.43)
Teammates/roommates	3.38 (0.43)	1.38 (1.70)	2.19 (1.59)	1.88 (2.17)	1.50 (1.78)	0.47 (0.94)	1.80 (1.64)
Student trainer	2.25 (1.68)	2.11 (1.86)	1.75 (1.64)	1.36 (1.43)	1.96 (1.66)	1.21 (1.38)	1.78 (1.56)
Head coach	2.16 (1.53)	1.79 (1.37)	2.21 (1.21)	2.00 (1.53)	1.18 (1.60)	1.00 (1.38)	1.72 (1.43)
Mother	2.38 (1.88)	0.88 (1.46)	1.21 (1.89)	1.67 (1.87)	1.04 (1.50)	0.58 (1.43)	1.29 (1.67)
Friends outside of the team	3.13 (1.24)	0.00 (0.00)	2.00 (0.71)	1.38 (1.94)	0.75 (1.06)	0.00 (0.00)	1.21 (1.41)
Father	2.50 (1.79)	0.60 (1.34)	0.00 (0.00)	0.00 (0.00)	0.69 (1.38)	0.44 (0.88)	0.71 (1.35)
Assistant coach	0.00 (0.00)	0.56 (0.80)	1.50 (2.12)	1.75 (2.47)	0.00 (0.00)	0.00 (0.00)	0.64 (1.27)
Teammates with similar positions	0.00 (N/A)	0.00 (N/A)	3.75 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.63 (1.53)
Brother	3.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.50 (1.22)
High performance staff	1.50 (2.12)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.50 (0.71)	0.00 (0.00)	0.33 (0.89)
Concussion specialist	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (0.00)

Note. Each stage (i.e., S1 … S6) column represents the average (*M*) esteem support PASS-Q scores for each agent across all typical recovery participants. Scores can range from 0 – 4.00. S1 = Stage 1; S2 = Stage 2; S3 = Stage 3; S4 = Stage 4; S5 = Stage 5; S6 = Stage 6; *M* = Mean; *SD* = Standard deviation. N/A = agent was only listed once; thus standard deviation could

not be calculated. All Stages = global average of typical recovery participants' esteem PASS-Q scores across all six RTS stages.

Figure 6

Change in the Top Five Most Important Agents' Esteem Support as a Function of RTS



Note. This figure shows the average esteem PASS-Q scores for the top five most important agents. Each agent is indicated by various lines shown in the above legend. The solid black line represents the average esteem PASS-Q scores across the top five agents. The dotted black line is a regression line which represents how the esteem PASS-Q scores across agents changed throughout RTS.

Table 11

Means and Standard Deviations by Agent for Participants' PASS-Q: Informational

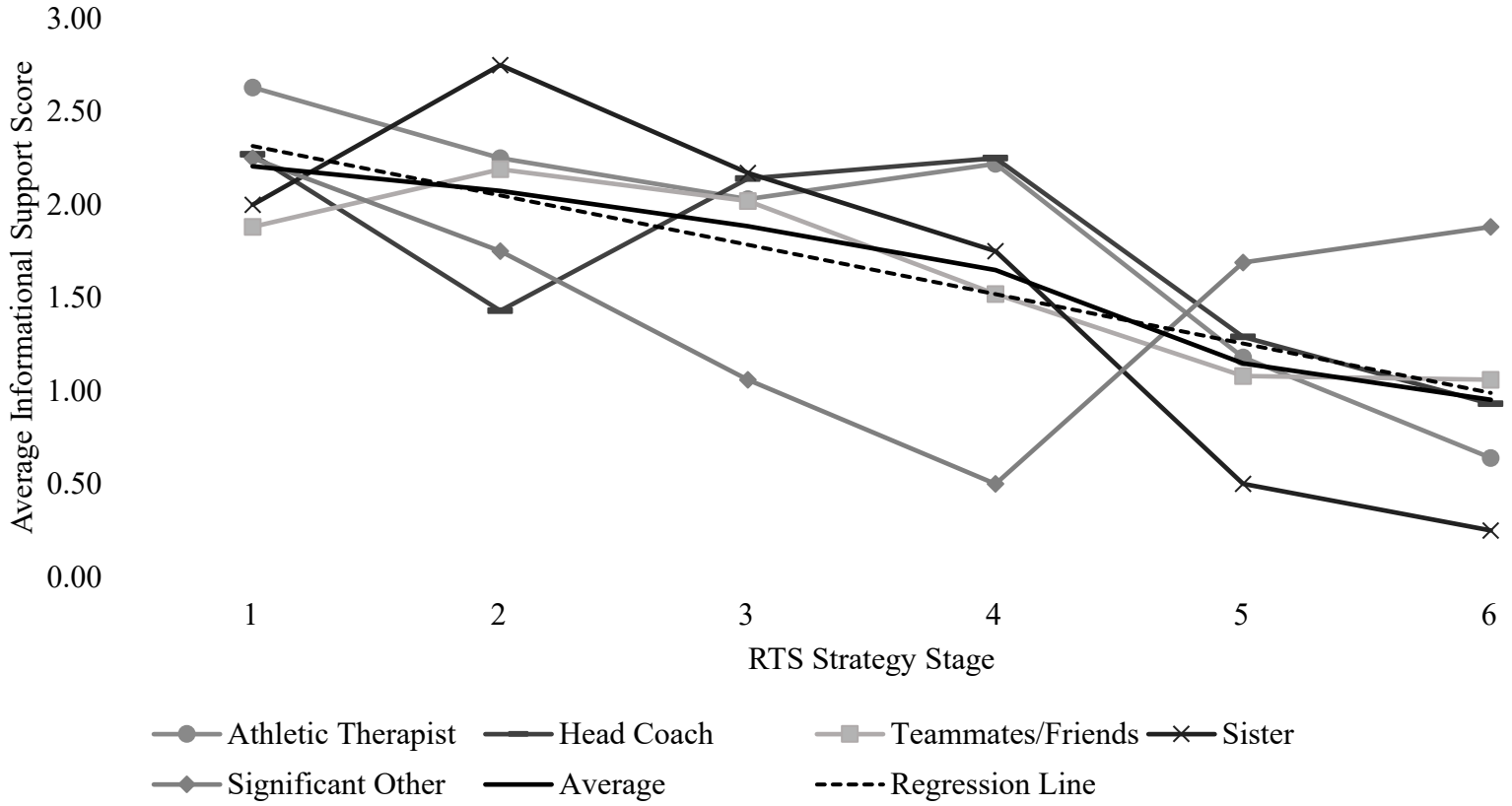
Social support agent	S1 (*SD*)	S2 (*SD*)	S3 (*SD*)	S4 (*SD*)	S5 (*SD*)	S6 (*SD*)	All Stages (*SD*)
Athletic therapist	2.63 (1.23)	2.25 (1.27)	2.03 (1.53)	2.22 (1.09)	1.18 (1.21)	0.64 (0.94)	1.86 (1.35)
Head coach	2.27 (1.78)	1.43 (1.60)	2.14 (1.59)	2.25 (1.69)	1.29 (1.70)	0.93 (1.48)	1.72 (1.63)
Teammates/friends	1.88 (2.05)	2.19 (1.56)	2.02 (0.84)	1.52 (1.17)	1.08 (1.42)	1.06 (1.96)	1.63 (1.45)
Sister	2.00 (1.80)	2.75 (0.66)	2.17 (0.52)	1.75 (1.52)	0.50 (0.87)	0.25 (0.43)	1.57 (1.31)
Significant other	2.25 (1.67)	1.75 (1.65)	1.06 (1.66)	0.50 (0.58)	1.69 (1.97)	1.88 (2.17)	1.52 (1.61)
Teammates	1.00 (1.26)	0.85 (1.11)	1.20 (1.64)	1.75 (1.60)	0.50 (0.87)	0.65 (0.99)	0.99 (1.24)
Student trainer	1.54 (1.52)	1.25 (1.25)	0.64 (0.81)	0.71 (0.87)	0.75 (0.69)	0.29 (0.51)	0.88 (1.04)
Teammates/roommates	1.63 (0.83)	0.63 (1.09)	1.00 (0.84)	0.44 (0.88)	0.44 (0.88)	0.34 (0.69)	0.74 (0.90)
Mother	1.35 (1.09)	0.63 (1.12)	0.46 (0.75)	0.50 (0.79)	0.79 (1.60)	0.00 (0.00)	0.62 (1.03)
Father	2.55 (1.62)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.69 (1.38)	0.38 (0.75)	0.61 (1.26)
Teammates with similar positions	0.00 (N/A)	0.00 (N/A)	3.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.50 (1.22)
Friends outside of the team	0.75 (0.35)	0.00 (0.00)	0.50 (0.71)	0.63 (0.88)	0.88 (1.24)	0.00 (0.00)	0.46 (0.63)
Concussion specialist	2.25 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.38 (0.92)
Brother	1.50 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.25 (0.61)
Assistant coach	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.38 (1.94)	0.00 (0.00)	0.00 (0.00)	0.23 (0.79)
High performance staff	1.25 (1.77)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.21 (0.72)

Note. Each stage (i.e., S1 … S6) column represents the average (*M*) informational support PASS-Q scores for each agent across all typical recovery participants. Scores can range from 0 – 4.00. S1 = Stage 1; S2 = Stage 2; S3 = Stage 3; S4 = Stage 4; S5 = Stage 5; S6 = Stage 6; *M* = Mean; *SD* = Standard deviation; N/A = agent was only listed once; thus standard deviation

could not be calculated. All Stages = global average of typical recovery participants' informational PASS-Q scores across all six RTS stages.

Figure 7

Change in the Top Five Most Important Agents' Informational Support as a Function of RTS



Note. This figure shows the average informational PASS-Q scores for the top five most important agents. Each agent is indicated by various lines shown in the above legend. The solid black line represents the emotional PASS-Q scores across the top five agents. The dotted black line is a regression line which represents how the average informational PASS-Q scores across agents changed throughout RTS.

Table 12

Means and Standard Deviations by Agent for Participants' PASS-Q: Tangible

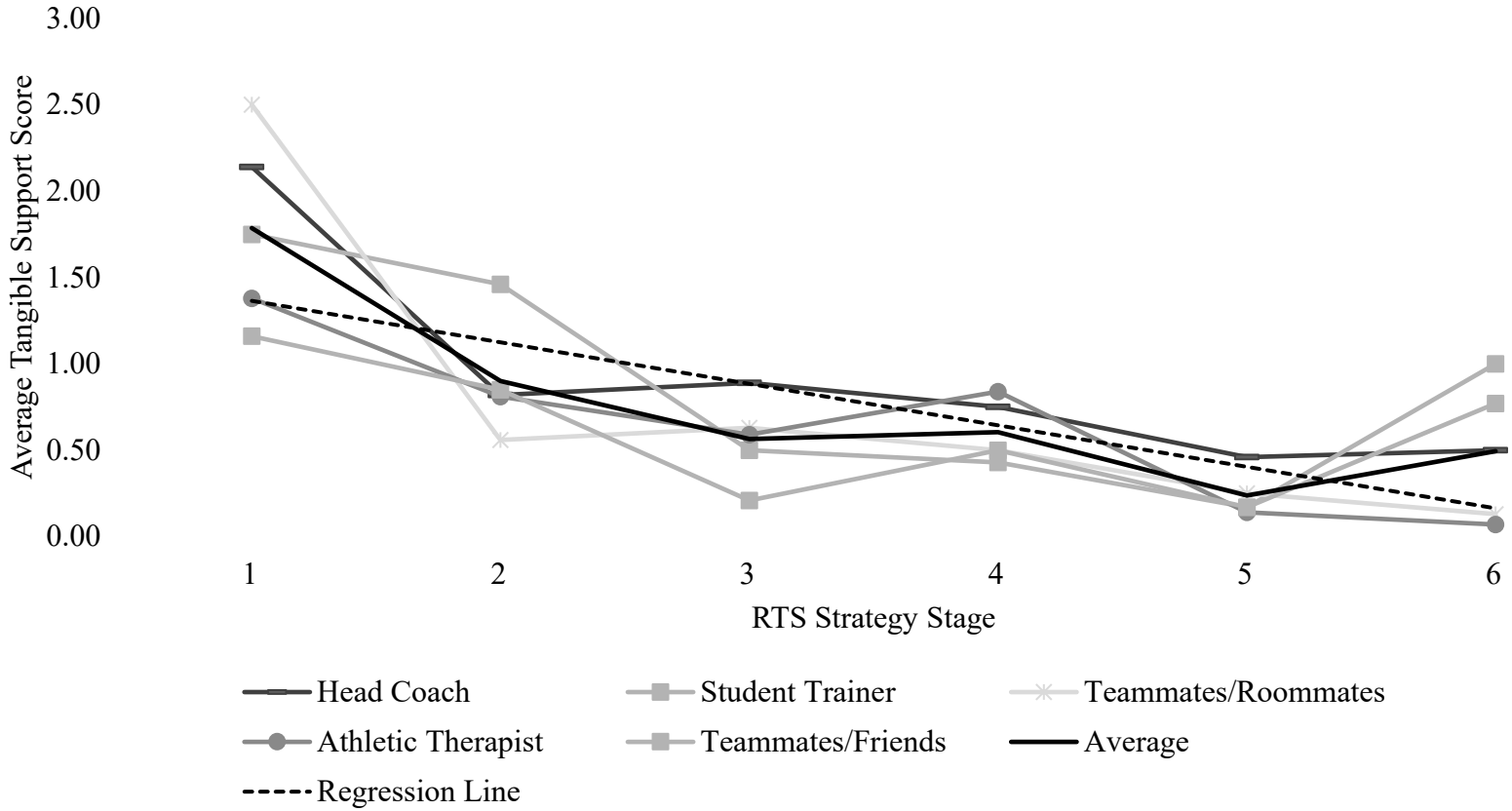
Social support agent	S1 (*SD*)	S2 (*SD*)	S3 (*SD*)	S4 (*SD*)	S5 (*SD*)	S6 (*SD*)	All Stages (*SD*)
Head coach	2.14 (1.21)	0.82 (1.09)	0.89 (1.10)	0.75 (1.13)	0.46 (0.80)	0.50 (1.32)	0.93 (1.19)
Student trainer	1.75 (1.79)	1.46 (1.60)	0.50 (0.66)	0.43 (0.55)	0.17 (0.26)	1.00 (1.62)	0.90 (1.30)
Teammates/roommates	2.50 (0.35)	0.56 (0.72)	0.63 (0.75)	0.50 (1.00)	0.25 (0.50)	0.13 (0.25)	0.76 (1.00)
Athletic therapist	1.38 (1.54)	0.81 (0.73)	0.59 (0.60)	0.84 (0.72)	0.14 (0.38)	0.07 (0.19)	0.66 (0.90)
Teammates/friends	1.16 (1.07)	0.85 (0.83)	0.21 (0.42)	0.50 (0.58)	0.17 (0.33)	0.77 (0.99)	0.61 (0.76)
Significant other	1.00 (1.08)	0.56 (1.13)	0.50 (1.00)	0.25 (0.50)	0.44 (0.88)	0.75 (0.96)	0.58 (0.87)
Teammates	0.85 (0.84)	0.45 (0.87)	0.35 (0.78)	0.35 (0.78)	0.60 (1.34)	0.30 (0.67)	0.48 (0.85)
Sister	0.75 (1.30)	0.92 (1.01)	0.50 (0.50)	0.25 (0.43)	0.42 (0.72)	0.00 (0.00)	0.47 (0.73)
Teammates with similar positions	0.00 (N/A)	0.00 (N/A)	2.25 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.38 (0.92)
Father	1.25 (1.82)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.31 (0.63)	0.00 (0.00)	0.27 (0.87)
Friends outside of the team	0.38 (0.53)	3.50 (0.71)	0.13 (0.18)	0.50 (0.71)	0.38 (0.53)	0.00 (0.00)	0.23 (0.38)
Mother	0.88 (1.05)	0.08 (0.20)	0.13 (0.31)	0.00 (0.00)	0.08 (0.20)	0.00 (0.00)	0.19 (0.53)
Brother	1.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.17 (0.41)
Assistant coach	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.50 (0.71)	0.00 (0.00)	0.00 (0.00)	0.08 (0.29)
High performance staff	0.50 (0.71)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.08 (0.29)
Concussion specialist	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (N/A)	0.00 (0.00)

Note. Each stage (i.e., S1 … S6) column represents the average (*M*) tangible support PASS-Q scores for each agent across all typical recovery participants. Scores can range from 0 – 4.00. S1 = Stage 1; S2 = Stage 2; S3 = Stage 3; S4 = Stage 4; S5 = Stage 5; S6 = Stage 6; *M* = Mean; *SD* = Standard deviation. N/A = agent was only listed once; thus standard deviation could

not be calculated. All Stages = global average of typical recovery participants' tangible PASS-Q scores across all six RTS stages.

Figure 8

Change in the Top Five Most Important Agents' Tangible Support as a Function of RTS



Note. This figure shows the average tangible PASS-Q scores for the top five most important agents. Each agent is indicated by various lines shown in the above legend. The solid black line represents the average emotional PASS-Q scores across the top five agents. The dotted black line is a regression line which represents how the tangible PASS-Q scores across agents changed throughout RTS.

Persistent Concussion Symptom PASS-Q Results

Data from the athlete with persistent concussion symptoms (i.e., Charlie) PASS-Q responses are reported here based on his 25 responses. The emotional, esteem, informational, and tangible PASS-Q scores for each identified support agent across RTS stages are shown in Table 13. The athlete's mother provided the most emotional (M = 3.18, SD = 0.64), esteem (M = 1.76, SD = 0.93), and tangible (M = 0.02, SD = 0.10) support across RTS. The athletic therapist provided the most informational (M = 0.73, SD = 0.37) support throughout RTS. Figure 9 shows the change in support types across agents over RTS. All support types decrease over the course of RTS, with a notable increase at stage four[11].

[11] During this athlete's RTS they experienced a second impact during stage four of their initial RTS, which forced them to restart the strategy.

Table 13

Means and Standard Deviations by Agent for Participant with Persistent Concussion Symptoms PASS-Q: Emotional, Esteem, Informational, and Tangible

Agent	S1[a] (*SD*)	S2 (*SD*)	S3 (*SD*)	S4 (*SD*)	S1B (*SD*)	S2B (*SD*)	S3B (*SD*)	All Stages [b] (*SD*)
Mother								
Emotional	3.88 (0.18)	3.00 (0.61)	3.46 (0.49)	3.75 (N/A)	3.38 (0.53)	4.00 (N/A)	2.69 (0.58)	3.18 (0.64)
Esteem	3.13 (0.18)	1.70 (0.69)	2.13 (0.82)	1.75 (N/A)	2.25 (0.71)	2.25 (N/A)	1.00 (0.85)	1.76 (0.93)
Informational	1.50 (0.71)	0.45 (0.11)	0.33 (0.20)	0.00 (N/A)	0.25 (0.35)	1.00 (N/A)	0.25 (0.44)	0.43 (0.48)
Tangible	0.25 (0.35)	0.00 (0.00)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.02 (0.10)
Athletic therapist								
Emotional	2.63 (0.18)	1.75 (0.25)	1.04 (1.19)	2.50 (N/A)	2.00 (0.35)	1.50 (N/A)	1.66 (0.40)	1.66 (0.76)
Esteem	1.88(0.18)	1.10 (0.49)	0.63 (0.70)	1.00 (N/A)	1.00 (0.35)	0.50 (N/A)	0.50 (0.33)	0.82 (0.58)
Informational	0.88 (0.18)	1.05 (0.33)	0.42 (0.49)	0.25 (N/A)	0.88 (0.18)	0.75 (N/A)	0.75 (0.19)	0.73 (0.37)
Tangible	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (0.00)
Roommates								
Emotional	2.88 (0.18)	2.10 (1.21)	1.04 (1.19)	0.00 (N/A)	2.75 (0.35)	1.75 (N/A)	1.28 (0.84)	1.60 (1.13)
Esteem	1.50 (0.00)	0.60 (0.58)	0.38 (0.41)	0.00 (N/A)	0.75 (0.71)	0.00 (N/A)	0.34 (0.23)	0.50 (0.50)
Informational	0.25 (0.35)	0.00 (0.00)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.02 (0.10)
Tangible	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (0.00)
Teammate A								
Emotional	2.00 (0.35)	1.70 (0.33)	1.04 (1.16)	2.50 (N/A)	1.88 (0.53)	1.75 (N/A)	0.63 (0.89)	1.27 (0.94)
Esteem	1.63 (0.53)	0.85 (0.22)	0.54 (0.62)	1.25 (N/A)	0.75 (0.35)	0.25 (N/A)	0.22 (0.31)	0.62 (0.55)
Informational	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (0.00)
Tangible	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (0.00)
Teammate B								
Emotional	1.75 (0.00)	1.15 (0.22)	0.79 (0.93)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.16 (0.44)	0.61 (0.74)
Esteem	1.25 (0.35)	0.25 (0.35)	0.25 (0.27)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.06 (0.18)	0.23 (0.39)
Informational	0.38 (0.53)	0.50 (0.00)	0.21 (0.25)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.18 (0.26)
Tangible	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (0.00)
Teammate C								
Emotional	0.00 (0.00)	1.35 (0.52)	0.21 (0.51)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.32 (0.62)

Esteem	0.00 (0.00)	0.50 (0.40)	0.13 (0.31)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.13 (0.29)
Informational	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (0.00)
Tangible	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (0.00)
Sports medicine doctor								
Emotional	0.75 (1.06)	0.00 (0.00)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.06 (0.30)
Esteem	0.88 (1.24)	0.00 (0.00)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.07 (0.35)
Informational	1.75 (0.35)	0.00 (0.00)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.14 (0.49)
Tangible	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (N/A)	0.00 (0.00)	0.00 (0.00)

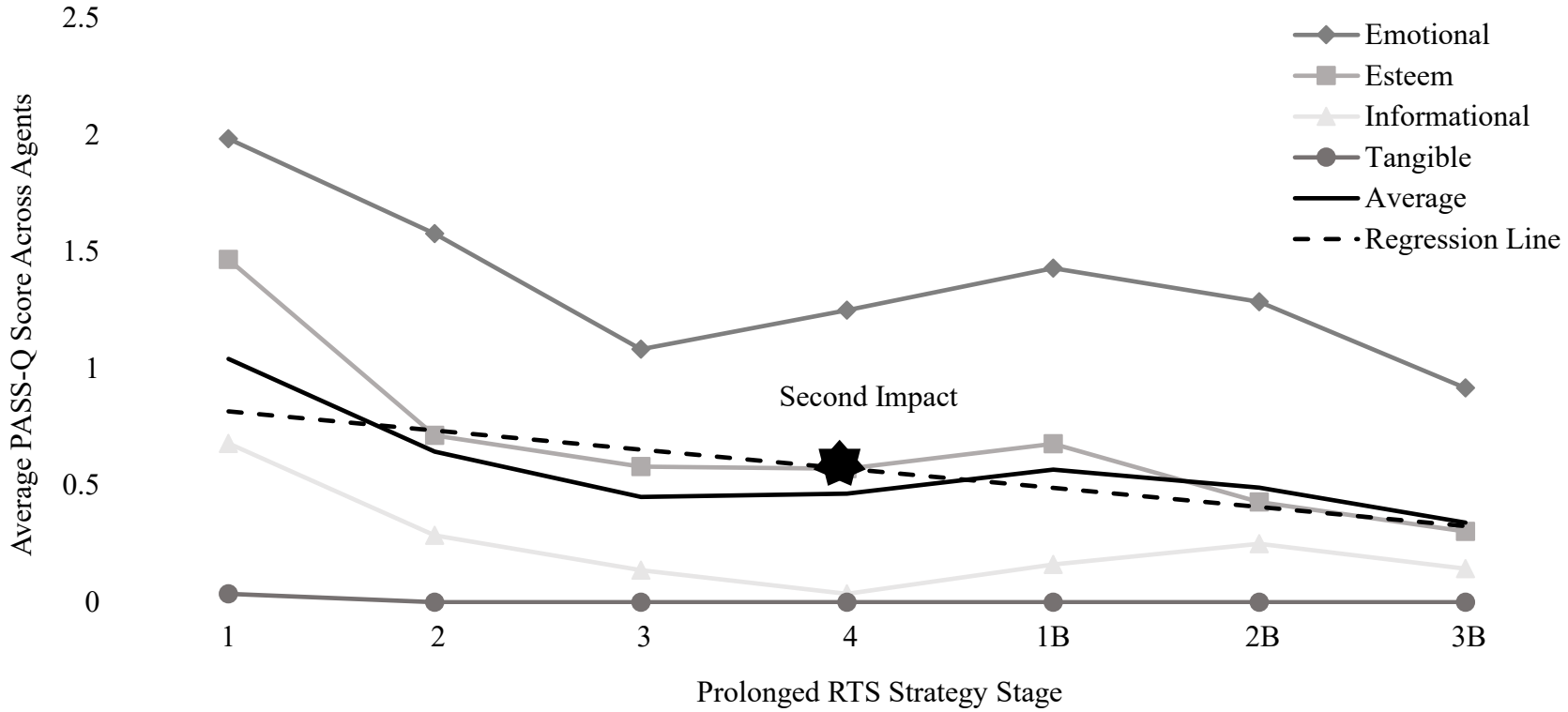
Note. Each column (i.e., S1 … S3B) represents the participant with persistent concussion symptoms average (*M*) PASS-Q scores for each type of support and for each listed agent. Agents are listed in italics. *M* = Mean; *SD* = Standard deviation; N/A = no standard deviation was available to be calculated due to the agent only being listed once in the collection of stages or there only being one data collection timepoint within the collection of stages. S1 = Stage 1; S2 = Stage 2; S3 = Stage 3; S4 = Stage 4; S1B = Second Stage 1; S2B = Second Stage 2; S3B = Second Stage 3.

[a] The athlete completed measures several times during one 'RTS stage', thus agents had the potential to be identified several times throughout a stage. PASS-Q averages within each stage column represent the average scores for the 'stage' for the agent was identified (i.e., two data collection timepoints in stage one) during the athlete's time in that stage.

[b] All Stages = global average of participant with persistent concussion symptoms PASS-Q scores across all data collection timepoints (i.e., 25) throughout RTS.

Figure 9

Change in Support Type Across Agents as a Function of Persistent Concussion Symptoms RTS



Note. This figure shows the average PASS-Q scores for each support type (i.e., emotional, esteem, informational, and tangible) across the participant with persistent concussion symptom's listed agents during RTS. Each support type is indicated by various lines shown in the above legend. The solid black line represents the average PASS-Q scores across support type. The dotted black line is a regression line which represents how the support type PASS-Q scores changed throughout RTS. The star

titled ‘second impact’ denotes the time during RTS where the athlete sustained a second hit and had to restart their RTS strategy.

Semi-Structured Interview Results

In this section, we will present the results of nine athletes' interviews that were completed both during (i.e., between stage four and five) and at the end of their sport-related concussion RTS strategy (i.e., stage six). Importantly, eight athletes completed a typical RTS strategy, while one athlete (i.e., Charlie) experienced persisting concussion symptoms.

Case Descriptions

Each athlete's experience with social support during their concussion RTS strategy was described by using their respective within-case themes and subthemes. The aim of these case descriptions is to elucidate each athlete's unique contextual and psychosocial factors that influenced their experience with social support during the concussion RTS strategy. Descriptions chronologically describe athletes' experience with social support during their RTS. To protect each athletes' anonymity, pseudonyms (i.e., Hilary, Emily, Jodie, Hannah, Shelby, Brittany, Alice, Jackson, and Charlie) were assigned.

Hilary. As the captain of the university rugby team, Hilary was set to begin her last season of eligibility. However, Hilary sustained a concussion during a collision with a teammate in practice prior to the start of their season. Hilary had previous concussion experience in rugby and knew the severity of the injury. In fact, her mother had even once threatened to remove her from sport if she ever had another concussion. Bearing this in mind, Hilary was initially scared to tell her family about her concussion as she did not want to miss the start of her season, but decided to tell them once she was diagnosed with her concussion by the institution's sports medicine team (i.e., sports medicine doctor, student trainer, athletic therapist). Hilary perceived her social support to be effective

overall during her RTS strategy, and she perceived the most support when she first sustained her concussion. Hilary felt that the support she received early in the strategy helped mitigate her negative feelings related to being diagnosed with a concussion.

As the team captain and a standout player, Hilary felt secure in her role on the team, which influenced how agents provided support. For instance, her head coach allowed her to focus on her recovery and often encouraged her recovery by instructing her to go home and rest. However, her coach also encouraged her to participate in practice from a mentorship standpoint which aggravated symptoms. As a result, Hilary felt pressure to rush her recovery to ensure that she could lead her team in the season-opener. Several of Hilary's close friends on the team also contributed to the pressure she felt by making it apparent that they would have been supportive of her playing before fully recovering, since her absence significantly impacted the team.

As Hilary's RTS strategy progressed she felt constrained by the RTS strategy guidelines (i.e., 24 hours between stages), the impending season-opener, and her team's practice schedule. How quickly she could complete the stages was limited by how often her team practiced, which created a time pressure and made her worried about potential setbacks (i.e., going backwards in stages due to symptoms) in her RTS strategy. Support agents such as her athletic therapist, mother, boyfriend, close friends on the team, and head and assistant coaches, recognized her worry and reassured her that although she was missed, her recovery is most important. Her athletic therapist, mother, and boyfriend further emphasized the importance of concussion recovery by encouraging Hilary to be honest about her symptoms.

Hilary's support network used a multitude of support behaviours throughout the duration of her strategy. Nearly all her social support agents inquired about her recovery

(i.e., “how are you feeling?”) directly (e.g., in-person at practice) or indirectly (e.g., asking a close friend how she is doing) at multiple RTS stages. Hilary felt there were effective ways of checking in with her, as agents like her father and assistant coach chose not to dwell on discussing recovery and instead conversed about rugby specifically. These conversations alleviated some of Hilary’s feelings of frustration with the RTS strategy.

Hilary found it helpful to receive concussion information from her athletic therapist, boyfriend, and mother. Her athletic therapist educated her on how to progress through the strategy and provided tips to help reduce symptoms and speed up recovery. Her boyfriend provided advice based on his own concussion experience that helped her stay informed about potential long-term consequences of rushing recovery (i.e., second-impact syndrome). Her mother echoed this sentiment by providing reminders of people who she knows that suffer from mild traumatic brain injuries long-term. This experiential information allowed Hilary to realize the importance of concussion recovery.

Hilary’s boyfriend, teammate/roommates, close friends on the team, mother, assistant coach, teammates, and friends outside of the team, all demonstrated their care and empathy for Hilary throughout her RTS. For instance, her boyfriend, mother, and father spent time with her and did activities with her that facilitated recovery (e.g., played cards instead of TV) and decreased feelings of loneliness. Relatedly, one close friend on the team who was also injured opted to participate in fitness activities with Hilary, which made her feel included in the team and eased her anxiety about decreasing fitness capabilities due to RTS exercise restrictions. Agents like her teammates and boyfriend also explicitly assisted Hilary with tasks such as setting up drills and cooking dinner, which further promoted recovery.

Hilary perceived a high degree of support throughout the majority of the RTS strategy until stage six, where Hilary noted a drop off. Hilary was not upset because she felt she did not require much support at this time. Instead, she was focused on re-integrating into her sport and her excitement to be back playing. She also had responsibilities to navigate as the team captain and was not displaying any hesitancy to return, thus signaling little need for support. When returning to sport, Hilary felt ready because her sport-based competency was high, and she knew she adhered to her RTS strategy honestly. Hilary successfully returned in time for her team's season opener.

Emily. Emily was a second-year women's rugby player who sustained a concussion two-weeks after clearance from a previous sport-related concussion. During a pre-season exhibition game upon return from her initial concussion, Emily felt nervous and hesitated when approaching a tackle. Her hesitancy caused her to perform an ineffective tackle which resulted in another concussion. During Emily's most recent concussion, she took a sounder approach, was more careful, and took more time to recover.

When recovering, Emily perceived the most support during stages one and two of her RTS. Emily understood that support agents such as her athletic therapist needed to be more active in her recovery at this time to ensure that her symptoms did not worsen. At this time, Emily focused on her somatic recovery, which influenced how she perceived support from others. Emily believed those who "helped heal her brain the fastest" were most important, as she viewed RTS as a way to get back into rugby. As such, she perceived that her athletic therapist and teammates/roommates facilitated her RTS progress because they provided direct information about recovery (e.g., how to proceed through RTS stages) and personal examples of what helped them recover faster (e.g.,

drink lots of water). Agents like her mother, who do not possess the same health-related knowledge, attempted to provide support by being available for Emily. Yet, this type of support felt no different than what Emily typically received from her mother when she was not injured. As such, Emily felt support that did not help address her physical symptoms was less important.

During stage five (i.e., return to full contact), Emily experienced the least amount of support and attributed this to being "basically fully back." Emily understood this decrease in support to be a logical next step on her road to returning to rugby and did not expect more support at this time, but appreciated the agents who made her feel secure as she returned to contact. Emily's confidence to return was influenced by her concern of potentially experiencing symptoms again and her skepticism towards contact. This was exacerbated by her recent troubles returning to sport following her previous concussion. However, both her athletic therapist and head coach checked in with her prior to her return to full contact and normal games, which gave her a sense of certainty in her recovery that promoted feelings of comfort. In addition, Emily's teammates/roommates discussed symptoms that they experienced during RTS, which reassured her that she would heal quickly and enhanced her confidence when returning to competition.

Fortunately for Emily, the timing of the RTS strategy stages and the makeup of her pre-season schedule resulted in her having more time in-between her initial stage five practice and the return to full game play than with her previous concussion. The extra exposure to contact in a practice setting allowed Emily to ensure her symptoms were fully gone, which in turn promoted her feelings of readiness to return.

Overall, Emily's expectations throughout RTS were impacted by a sense of ownership she had over her recovery. Although many agents performed support

behaviours such as driving her to practice, offering a hug when she was feeling down, spending time with her by doing non-symptom provoking activities, or helping Emily have a positive outlook on her recovery, Emily still felt that her success was in her hands. This ownership over her recovery was helped by her athletic therapist, teammates/roommates, and student trainer, who made sure to emphasize the importance of honesty about symptoms, which made her attune to how she was feeling. Together, her sense of independence and control over her recovery influenced the strategies she used to understand her symptoms and to promote feelings of comfort upon RTS. For instance, Emily described using positive self-talk to mitigate her performance-related anxieties and fear of contact upon her return to normal game play. Emily's recovery felt different and better than her last one and she believed that through self-talk she was able to control her mood and enhance her psychological recovery. Emily successfully returned to rugby for the remainder of the 15's season.

Jodie. Jodie sustained her concussion after colliding with a teammate during a pre-season basketball practice, prior to the start of her second year of eligibility. This was her second concussion within a year, which increased her anxiety related to her concussion symptoms. Jodie experienced debilitating symptoms for three weeks after her impact, which seemed like they would never go away. In the first week of her recovery, Jodie expressed her concerns to her athletic therapist, who referred her to the sports medicine doctors. Jodie felt that the doctor did not take her concussion seriously, as they instructed her to just rest. Jodie wished she was referred to the concussion specialist instead.

Upon the two-week mark of her unresolved symptoms, Jodie informed her athletic therapist that she was not getting better, and this time he sent her to the concussion

specialist. The concussion specialist diagnosed the root cause of her worsening symptoms as a neck-related nerve issue. After the diagnosis Jodie began to see rapid improvement. During the time of her intense symptoms, Jodie felt supported by her head coach, teammates/roommates, and boyfriend because they frequently checked-in, did things for her to prevent symptom provocation (e.g., brought food), and reassured her that her role within the team was safe upon return.

Once Jodie's symptoms resolved, she was able to begin stage two of the RTS strategy. During her initial re-engagement, Jodie felt unsure if she could perform on the basketball court, as she had missed several opportunities to hone her skills during her strategy. However, when her teammates showed excitement that she was back and instructed her how to complete certain plays that she missed, she felt reassured. She also appreciated that people treated her "normally" during her re-immersion in basketball, which made her confident that she was going to successfully return.

As Jodie progressed through stage four and into stages five and six, she avoided contact in practice and games, as she was afraid of potential long-term consequences if she incurred another concussion. Her head coach and teammate/friend noticed her hesitancy and reinforced that she was able to perform as a basketball player, which promoted her feelings of self-efficacy to return.

Overall, Jodie felt satisfied with her support throughout her RTS. Jodie had the most support early in her recovery, especially at stages three and four when her team went on a road trip, and she got to spend a significant amount of time with them. Notably, Jodie perceived that her support fluctuated throughout the entirety of the strategy based on the frequency of interaction she had with agents. However, in times of less frequent interactions, she was okay with it because she could not expect supporters like her athletic

therapist, head coach, and teammates to constantly be there for her, as they had other competing demands. Jodie successfully completed RTS during pre-season and was ready to fully participate at the beginning of the basketball season.

Hannah. During the rugby off-season, Hannah tackled a teammate in practice which resulted in her falling backwards and landing headfirst on the point of her teammate's elbow. Initially she felt fine, but as she continued to participate in practice, she noticed that her world was spinning. Hannah quickly explained what happened to the student trainer present at practice, who then performed a SCAT5 to assess her for a concussion. Hannah then went to the athletic therapist to be officially diagnosed with a concussion.

Early in her RTS, Hannah received a variety of support from several agents. From sports medicine staff, like her athletic therapist and student trainer, she received RTS guidance (e.g., stepwise progression and ways to help symptoms), frequent check-ins, and always being available to answer any questions or to "respond" to any re-occurring symptoms. Both of these agents communicated in a style that promoted a sense of trust and friendship which made Hannah feel validated in her recovery efforts and that they cared about her well-being.

Other agents, such as her family members (i.e., mother, father, sister, brother), made multiple attempts to advocate for and encourage her recovery. Her sister, who was also on the rugby team, made sure to remind Hannah not to push herself too hard or too quickly in practice. Hannah's father echoed this sentiment by discussing her RTS progression plans to ensure that she was not advancing before she was ready. At times her mother offered to cook dinner for Hannah and spent time with her. Hannah also valued the experience-based advice she received from her younger brother, who reassured her

that it was okay to be upset about her concussion and that things would get better. The relatability of this support helped her recover and reminded her to adhere to her rehabilitation and rest when needed.

Hannah's teammates/roommates were also important to her recovery because they included her in social events, while being cautious not to provoke symptoms. They also shared their own concussion experiences, as one of her teammates/roommates was also recovering from a concussion at the time, and thus they were able to lift each other up through their shared experience.

As Hannah progressed into stage three of her RTS, she experienced a re-occurrence of symptoms, and she removed herself from that practice. Given the variability of her strategy, the support she received from her team-related agents (i.e., head coach, teammates) also shifted. Initially in her RTS, she perceived inconsistent support from her head coach, but attributed it to his busy schedule. As she began to re-engage with practice, she noted that he appeared confused when she was not participating in contact drills, which made her feel that he was disengaged from her rehabilitation. Although her coach seemed disinterested in her recovery in the practice setting, he did make sure to emphasize the importance of her involvement with the team by encouraging her to go to team events (i.e., study hall).

As she re-immersed herself in practice, her teammates provided positive feedback which helped shift her focus away from the re-injury anxiety she was experiencing. This distraction helped make her feel confident in her performance. Hannah also highlighted the importance of her own emotional regulation during RTS. She described her emotions at the onset of RTS as "out of whack," but as she engaged in more physical contact throughout the strategy her adverse emotions subsided. Specifically, she felt more

confidence when she experienced no new symptoms in stage four, which prompted a sense of emotional stability that propelled her into stage five.

Hannah felt on top of the world before attempting her first full-contact practice, but then started experiencing re-occurring symptoms. She felt like she was on a rollercoaster of symptom occurrence and the pass/fail outlook she had on RTS shook her confidence and made her feel disheartened. Although she felt like her recovery was now out of her control, she was fortunate that reading week allowed her to take a full week off school and rugby. This extended break allowed her to rest and engage with support agents like her mother, father, sister, and friends outside of the team who encouraged her to stay the course of her recovery. Upon return from break, she felt more confident knowing that she had extra time and was able to successfully complete her second stage five attempt.

As Hannah re-integrated with her team again during stage six she felt a decrease in support. She felt that the lack of visibility of her concussion, paired with her nearly full re-immersion in team practices influenced the amount of support she received from her teammates and head coach. Hannah also noticed that agents outside of her team, like her mother, sister, and friends also provided less support after she had completed stage five. Since Hannah had already experienced several RTS setbacks, this lack of support near the end of the strategy stifled her confidence and increased her fears of both re-injury and long-term consequences of concussion. Upon completion of her strategy, Hannah feared the uncontrollability of contact, as she could not predict what other players would do and wished she had the opportunity for a controlled contact setting to improve her confidence and decrease her fear. Although Hannah was still in her off-season, she successfully returned to normal game play without restrictions.

Shelby. Shelby was set to begin her first year on the university rugby team when she sustained her concussion during the last game of an all-rookie 7's exhibition tournament. After getting hit and experiencing concussion-related symptoms, she finished the rest of the game, and then told her athletic therapist what happened. He informed her to check-in with him at the start of next week if she still had symptoms, which she did, so she began the RTS strategy.

Directly after sustaining her concussion, she noted that her father prioritized her recovery by buying her food and driving her home from the tournament. As she continued in stage one, she explained that her mother provided emotional support and made her soup. Although she perceived the support from her parents to be generally helpful, she didn't feel they were as important as others who could help "heal her brain." Instead, as Shelby moved through the strategy in stages two and three, she felt her athletic therapist and student trainers were most important because they provided information that helped her progress through the strategy.

During stages two and three, Shelby also felt her sister was important. Her sister played a unique role as she was also a member of the rugby team, so she was able to check-in during practice and inform Shelby of what was going on with the team when she was absent. Her sister also had experienced a concussion before, so she was able to provide experiential advice which Shelby felt facilitated her recovery.

Shelby did not perceive much support from her head coach and other teammates and attributed this to her rookie status. In particular, she was aware that these agents were busy, and that she had yet to develop strong relationships with her teammates or hold a significant role within the team in the eyes of her coach. Therefore, she rationalized that their attention was placed elsewhere. Shelby also sensed a general decrease in social

support from most agents as she progressed through her RTS. However, the lack of consistent support did not harm her overall recovery because she was independent enough to take care of herself.

Fortunate for Shelby, in the absence of support from her head coach and teammates, her student trainers filled the void. Shelby had a close relationship with the trainers and felt that their support made her feel valued and safe during her transition to contact at stage five. During stage five, Shelby felt mostly ready, but was a little hesitant as she was fearful of getting hit again and feared the potential long-term consequences if she became re-injured. She loved rugby but was not willing to risk her brain to play the sport. Shelby also worried that she was not going to meet her head coach's performance expectations when returning. As such, she felt anxious and engaged in negative self-talk, which made the problem worse. However, her sister and mother helped alleviate her anxieties by validating her experiences, demonstrating care for her, and checking in. Stage five was unique for Shelby because her RTS strategy occurred where there were no more games in the current rugby 7's season. Thus, she was able to be cleared to return after successfully completing stage five.

Brittany. During a rugby 7's game, Brittany was kicked in the head during a ruck and head-butted in a subsequent play. She continued to participate until she was subbed off near the end of the game. Initially, she did not feel like she had a concussion, and she did not want to give any indication of injury to the student trainers or athletic therapist. The rugby 7's nationals were on the horizon and she didn't want to raise any red flags while she was still unsure.

When Brittany returned to classes, her symptoms worsened and she decided to disclose her symptoms to the athletic therapist, who then initiated her RTS strategy.

During stage one, Brittany struggled with intense and constant symptoms. At this time, her mother, father, sister, and teammates/roommates checked-in frequently. Notably, Brittany's symptoms hadn't resolved for several weeks. She became anxious because nationals were approaching, and she was uncertain of how her symptoms should progress. Fortunately, Brittany's mother was able to reassure her that her symptoms were normal and encouraged her to stay committed to her recovery. This was not the case with her father, who provided advice that inadvertently encouraged her to rush her recovery when discussing getting better in time for nationals.

Brittany received the most support during stage one of her RTS because it was lengthy (i.e., four weeks). Although her symptoms were still present, Brittany felt that she could start engaging in social activities with her teammates, which promoted discussions between her athletic therapist and teammates about Brittany's commitment to the strategy. Brittany perceived these conversations to be harmful, as they caused her athletic therapist to approach RTS discussions with her judgmentally. Brittany struggled to reconcile her resonating symptoms, her support agents' reactions to her RTS, and her desire to attend the upcoming nationals tournament. Brittany really wanted to start stage two of RTS early; however, after her teammate/roommate described her own adverse experience with returning too early, Brittany decided not to advance in her RTS before she was ready.

During stages two, three, and four of RTS, Brittany found it helpful when her teammate/roommate consistently aligned their workouts with hers to accompany her during various RTS stages. At this time, her student trainers were checking-in constantly which made Brittany feel like they truly cared. Brittany's coach didn't check-in very often, which she attributed to being a younger player on the team and his busy schedule

ahead of nationals. Brittany's athletic therapist provided important information about her RTS and treatment for her neck. Her athletic therapist also attempted to discuss Brittany's feelings toward RTS, but these conversations were unwanted. As Brittany became more engaged with practices, her teammates expressed excitement for her return, which made her feel a sense of normalcy and reassured her that she could perform at the level required for nationals.

Throughout her recovery, Brittany perceived support to be most important when it matched her needs. For instance, when she was emotional, she perceived counselling-like support from her sister to be most important, yet when she was hoping to recover in time for nationals, her athletic therapist's role in progressing her through RTS was valuable. Notably, Brittany felt that the level of support decreased towards the end of her strategy. Brittany believed the decreased support was a result of her re-immersion in sport and the fact that she did not appear to require support (i.e., lack of visibility).

As Brittany progressed to stage five, her athletic therapist designed a 'controlled' contact stage, which allowed her to participate in contact drills with a single teammate. This setting increased her confidence, and reduced some of the fear of re-injury that would have been present in a live rugby setting. After this contact session, Brittany expressed that she was ready to return. Rugby was a large part of who she was, and she just wanted to be back. Although Brittany completed stage five and was cleared to return, she was not included on the roster to travel to nationals. She was disheartened by missing this event; however, her coach reassured her that his choice was rooted in prioritizing her recovery and ensuring that she was healthy for the rest of her rugby career. Notably, Brittany did acknowledge that had she participated at nationals, she may have worsened

her injury, as although she was cleared after stage five, she still felt some minor symptoms.

Alice. Alice was a second-year sprinter for her university track and field team. She sustained her concussion during her pre-race warm-up at nationals when she collided full speed with a stranger who was walking across the track start blocks. Alice blacked out on contact and was unsure how she ended up on the ground. Therefore, she continued to run her race that day. The adrenaline dampened her symptoms before the race, and it was not until after she finished that she experienced noticeable symptoms. When her symptoms increased, she told the student trainer on site, who then did an initial assessment and referred her to see the athletic therapist. Alice received a lot of support from her head coach and teammates at nationals, who checked in with her during the bus ride home.

Upon her return from nationals, Alice was officially diagnosed with a concussion by the sports medicine doctor. She perceived that the doctor did little for her recovery at her initial appointment. Alice believed a scan (i.e., MRI) was warranted because she was experiencing back pain; but she did not receive one. Alice stopped attending practices and perceived that the support from her team ceased, although Alice was unbothered by this change. Alice wanted to keep to herself during her recovery, but did appreciate that her student trainer, athletic therapist, and father were checking in on her throughout the strategy.

During stage one, Alice experienced the most support but felt annoyed by the abundance of information and check-ins she was receiving from agents. She needed time to digest the information before hearing more. Alice felt overburdened because she knew so little about concussions and was now being flooded with information. Concussions in

her sport are rare and she wished that track and field athletes were provided with more information prior to injury. She believed this would have helped her recover better. Although she was frustrated at times with the frequency of information and check-ins she received, the information that her support agents provided did help improve her understanding of the concussion recovery process.

During stages two and three, Alice often sat in the athletic therapist's training room to hang out and gossip, which she felt lightened the mood surrounding her concussion. She liked these hang outs because they fostered a social outlet while she was in a portion of the RTS strategy that involved few interactions with other agents. Her father also played an important role at this stage by emphasizing to her the importance of her recovery and highlighting the potential long-term concussion consequences if she did not take her recovery seriously. Moreover, both her father and athletic therapist encouraged her to go to counselling to discuss the negative emotions she was feeling related to her concussion recovery, which she found beneficial.

Due to the nature of track and field as a non-contact sport, Alice was cleared to return following her completion of stage four. Notably, Alice felt ready to return at this time, and attributed her readiness to the absence of concussion symptoms.

Jackson. During the last week of regular season basketball, Jackson sustained a concussion on his way to practice when his teammate kicked a soccer ball into a ceiling light, which fell and struck him in the head. Jackson began his RTS while his team played their final games of the season. In stage one, Jackson appreciated that his teammate/friend and girlfriend spent a significant amount of time with him, which facilitated his recovery because he could do activities that did not provoke symptoms. He also valued the discussions he had with them about his recovery concerns.

Jackson was disappointed that he couldn't play basketball early in RTS, because he wanted to be on the court helping his teammates in the final stretch of the season. However, his athletic therapist, teammate/friend, and head coach all reassured him that although he was missed, he had more years of basketball eligibility ahead of him, and that his recovery was of utmost importance. While this helped reassure him, Jackson still struggled to adhere to the RTS strategy. Since he had never experienced a concussion before, he thought that he could continue his activities as usual. Jackson quickly learned this was not the case with a concussion, as his symptoms were not resolving.

When his athletic therapist, girlfriend, and head coach found out that he was ignoring the RTS stage one recommendations (i.e., rest, minimal stimulation), they were quick to tell him that he should be taking his recovery as seriously as possible. His athletic therapist gave him strategies to mitigate symptoms, his girlfriend highlighted the potential of long-term consequences like CTE, and his head coach temporarily banned him from the gym to ensure that he took care of his symptoms. In turn, Jackson's symptoms soon lessened, and he recognized that these agents' efforts were critical to his recovery.

As Jackson moved into stage two and three, he was re-integrated with his teammates and family, which helped his recovery. He liked being around individuals that he was closest to. Jackson wished he received more emotional support from his head coach but attributed this lack of support to the quality of relationship they had. Lucky for Jackson, this phase of his recovery fell during reading week break, so he was able to go back to his hometown to see family and visit friends. While he was at home, his mother did everything possible to ensure he was well taken care of. Moreover, his visits with

extended family recharged his social battery, and gave him the motivation to continue with the RTS strategy.

Jackson continued to progress through RTS stages during reading week outside of the university, with intermittent guidance from the athletic therapist, who often texted Jackson to check-in and explain the next RTS step. Jackson completed stage four by playing non-contact basketball (i.e., one-on-one, shooting etc.) with his teammates/friends. His teammates/friends were good at asking how he was feeling throughout RTS. Moreover, several of his teammates/friends had experienced setbacks in RTS due to rushing their recovery and stressed the importance of Jackson taking the time to fully recover.

The next day, Jackson completed stage five with these same teammates/friends by playing five-on-five at a local gym. Jackson viewed his progression through the RTS strategy as a testament to his ability to overcome challenge and come out better on the other side. Bearing this in mind, he was worried that his concussion recovery had "taken everything out of him." However, his teammates/friends reassured him that he was still capable, as they jokingly heckled him as he made shots. Jackson's girlfriend watched the five-on-five game and having her there to see him succeed in the face of challenge boosted Jackson's confidence.

Overall, Jackson felt the most support at stages three and four. Social connections were particularly important for Jackson during his RTS, so re-immersing with his teammates, family, and teammates/friends was most important to him. Since Jackson incurred his concussion at the end of the season, there was no return to normal game play stage. Thus, he was cleared to RTS without limitation after the completion of stage five.

Upon this clearance, he felt gratitude for the support he received during his recovery and felt it was the perfect amount.

Charlie. Charlie was in his senior year of university track and field when he sustained his concussion in the pre-season. Although his concussion did not occur in sport, he participated in the RTS strategy and had several experiences with social support. Charlie had difficulty progressing through the RTS strategy and participated in the strategy for 7 months. Charlie was eventually diagnosed with persistent concussion symptoms. Charlie's persistent symptoms involved a fluctuation of support over time.

During stages one and two of his RTS, support was frequent and met his needs. Agents like his mother, athletic therapist, teammate/friend, teammates, and roommates consistently checked in to see how he was doing. Further, his athletic therapist and teammate/friend made aspects of recovery fun by lightening the mood, which made Charlie feel more open to recovery. During stages two and three, Charlie began to re-integrate with his sport and he felt his support grew. Charlie's athletic therapist provided advice (e.g., take Omega-3's) that helped with his RTS progression. Others, like his injured teammate empathized with Charlie over their shared injury experience. Hearing his teammate's experiences with concussion decreased his anxiety related to long-term consequences of concussion and normalized his recovery experiences. In general, being around his teammates at practice and having his roommates at home during this time fostered feelings of social inclusion and made him feel the most supported during his RTS.

Charlie struggled with re-occurring symptoms and was held at stage three for several weeks. However, the athletic therapist progressed Charlie at a pace that allowed him to manage his symptoms. More specifically, Charlie participated in shortened

versions of RTS activities (i.e., 5-minute bike), which allowed him to build his fitness stamina and confidence. These short sessions also decreased his fear of performing poorly upon return. As he progressed through stage three, the season approached holiday break, which allowed him to rest, reset, and decrease his symptoms substantially.

Upon the team's return from holiday break, he advanced to stage four and was optimistic about recovering in time for the first meet of the year. Unfortunately, during his stage four run, Charlie collided with a coach who was on the track. This collision sent his recovery in reverse. Charlie experienced symptoms akin to the onset of his concussion and spent the next several weeks back at stage one. Charlie felt there was no upward momentum, and his motivation to pursue his recovery was slipping away. The RTS strategy felt like a monotonous chore.

The longer that Charlie was in the strategy, the less support he perceived. He noticed that some people, like his head coach, never checked in, which made him feel frustrated and isolated. Other agents, like his mother, teammate/friend, and roommates checked-in, but less frequently than before. Although the number of check-ins decreased, he did not expect constant support from agents, because he knew everyone was busy and he had learned to cope with the constant symptoms. Moreover, the way these agents interacted with him still made him feel like their support was effective. For instance, his support agents attempted to include him in activities (e.g., movie nights with roommates) around the six-month mark, because Charlie was able to perform daily tasks with only mild symptoms. Charlie appreciated that while his support agents were cautious about provoking his symptoms that they did not baby him. This made Charlie feel like he was not broken or different.

As the track and field season ended, Charlie's 7-month long recovery felt stagnant as his symptoms had not improved, and he accepted that he was not going to return to track that year. Since the sport season had ended, Charlie was no longer a university athlete, and he lost his university-related support network. Charlie's athletic therapist was no longer available to provide resources and it was now his responsibility to manage his rehabilitation. Charlie felt abandoned and had no answer to solve his concussion symptoms.

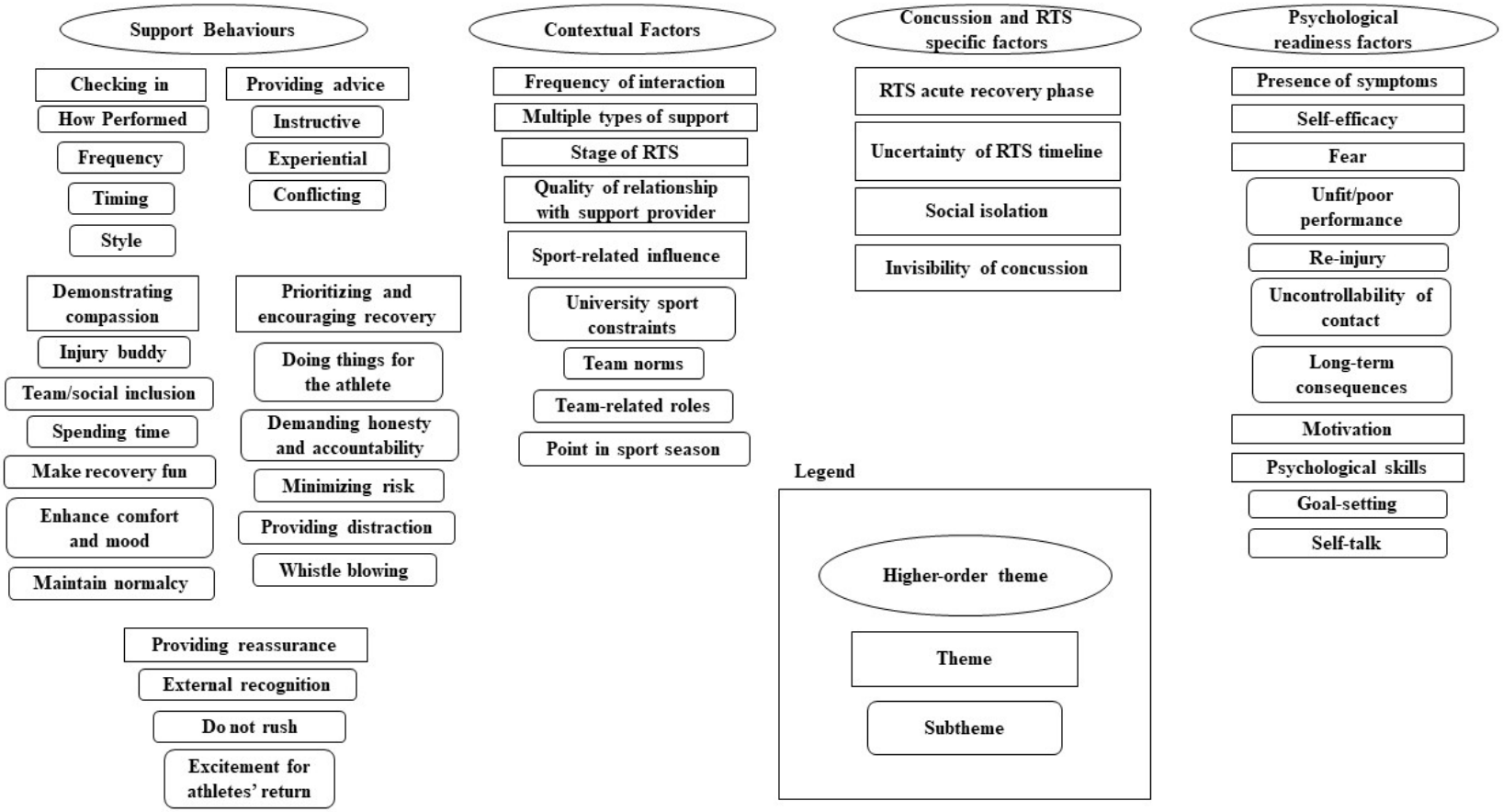
Although Charlie felt social support was valuable during his concussion healing journey outside of university sport, he did not believe it was going to be the reason he recovered. He felt that moving forward, the most important piece of his recovery would involve finding an answer to eliminate his ongoing symptoms. Charlie finished his final year of eligibility and has yet to recover from his concussion. He no longer has access to any of the supports provided by the university.

Cross-case Synthesis

The goal of the cross-case synthesis was to analyze the data across all cases to generate themes that represented shared experiences. Four higher-order themes (i.e., support behaviours, contextual factors, concussion and RTS specific factors, and factors that influence psychological readiness during RTS) represented the psychosocial and contextual factors that influenced athletes' perceptions of social support during the concussion RTS strategy. See Figure 10 for a thematic map.

Figure 10

Thematic Analysis Map



Social Support Behaviours. There were five specific social support behaviours (i.e., checking in, providing advice, demonstrating compassion, prioritizing and encouraging recovery, and providing reassurance) from support agents that athletes perceived during their recovery.

Check-ins. Athletes explained what a check-in was and what made them effective or not. Check-ins were attempts by support agents to assess the status of the athlete's recovery or demonstrate concern. For example, Alice's father would, "always call just to see how she's doing with the whole concussion, school, and all that." Check-ins could be direct or indirect in nature, with most agents performing direct check-ins. For instance, Shelby's mother communicated with her in person about her recovery and "asked how I was doing when I went to her house." Similarly, Jodie's head coach would "text or call every day and be like … 'how are you feeling,' 'is there anything we can do to make it better'?"

Other agents indirectly checked in. For instance, Hilary's teammates asked her teammate/roommate about her recovery, who then relayed the message to her. As Hilary recalled:

> I don't think any teammates reached out to me, like texting me or anything to see how I was doing … but [my teammate/roommate] said quite a few people reached out to her to ask how I was doing and how I was feeling. I don't know if they didn't want to overwhelm me, or it was just easier to ask her versus maybe provoking me.

The athletes noted that there was a sweet spot for how often they wanted people to check-in on them. For instance, Charlie appreciated that his mother checked in on him, but found it was too much at times:

> [The check-ins] got a little overbearing, where it's like 'ugh, my mom is calling me again,' like I just talked to her twice already today. It did fade over time, but at the beginning you're just like 'oh, she's calling again,' like you get a little annoyed, not because you don't love her or anything, it's just too much.

In contrast, some athletes felt ignored or that their agents did not care when they checked in infrequently or failed to check-in at all. For example, when talking about her coach checking in less regularly at stage two Hannah said:

> I didn't really see him much, and he didn't check-in much. I walked by him in the hallway one day and he was like, 'head's better today?' and I was like, 'yeah, did my stage two so I'm getting there,' and he's like 'okay, good' and little things like that, but it wasn't – he didn't seem as concerned as before.

Athletes also indicated that the timing of check-ins mattered. For instance, Brittany found it helpful when her student trainers checked-in during practice because it helped her reflect on her own symptoms:

> Once I was getting back, [the student trainers] made sure to talk to me. Like they checked in on me three- or four-times during practice on Thursday and every time I went and got water they were like 'how are you feeling, do you feel good, are you sure?'… It was helpful, like I feel like it's their job, but it was good to check in on me during water breaks because I'm like 'oh, how do I feel?' let me actually think about it.

Other agents performed check-ins at inopportune times. As Hannah noted, agents need to check-in at times when athletes were ready to receive the check-in:

> Within those check-ins, making sure that [the athlete is] at a place where they're comfortable – like sometimes when people will come check-in, I'm in the middle

> of doing an assignment and they're like, 'how's your head?' and like that was really weird, [because] it was like 'oh, it's fine right now,' but now it hurts because you're yapping in my ear, so those kind of things—making sure that it's well-timed.

How agents checked-in was also important. For instance, Brittany didn't appreciate how her athletic therapist asked about how she was feeling:

> A few times he made everyone leave [the training room] and closed the door and [was] like 'how are you feeling, let me know,' he's always like, 'you're hard to read,' [and] … he was trying to see what emotions I was feeling … I don't need that.

Conversely, Charlie expressed how his teammate effectively executed check-ins:

> They were the one just being like, 'how you doing champ?'… they provide the most social support while still caring, but also trying to keep things the same. So not babying me, like [not], 'oh, how you doing every day?' they blended it into a conversation really well.

Providing advice. Another support behaviour that athletes spoke about was the provision of advice. Agents typically provided instructive or experiential advice. Instructive advice usually involved information related to how to recover from the concussion. For example, Jackson's athletic therapist provided instruction on mitigating symptoms during RTS. As Jackson said:

> I've never had a concussion before, so I thought that you know a little headache I could pop a couple Tylenols, Advils and then still be fine, go outside and chill with my friends, but it wasn't the case … [athletic therapist] kind of got on me about going out and just told me to keep a level head, stay home, stay away from

as much light as possible, and walk around with sunglasses on and drink a lot of water, stuff like that.

Instructional advice was also provided to help facilitate a smooth return once the athlete was cleared from the strategy. For instance, Jodie's coach informed her of her team's current activities to help her transition seamlessly back to sport. As Jodie described:

> I was pretty worried about missing stuff in practice, so if [head coach] put in a new play, a new set, or a new zone in practice he'd send me the film right after, like he'd send me stuff like that, [which] helped me stay up to date with the team.

Agents also provided experiential advice that was rooted in their own concussion experiences or from what they witnessed with someone else's recovery. By hearing other's experiences, athletes were able to rationalize their feelings. For instance, Hannah described how she benefited from her brother sharing his concussion experience:

> In the beginning he was like 'oh, I've hit my head before, I get it dude, it sucks,' and he gave me that like it's okay to be upset about it feeling … it was like 'oh, I'm not crazy,' this is actually happening and this has happened to other people, so it's not absolutely insane that it's happening to me, like this is something that happens to people and it's not the end of the world for me.

Other's experiential advice also helped promote adherence. For example, Hilary explained how hearing her boyfriend's horror story about his concussion prompted her to stay the course of her rehabilitation schedule:

> He had a really bad second impact concussion himself, so his self-reflection—his information and him [explaining] how bad it could be if I did choose to play while having a concussion … like he literally forgot how to read and write, and had to

> spend four days in a complete black room, no stimulus, nothing … [so him] talking about his personal experience and how shitty it was, just made it really real that it could happen to me.

Although athletes typically perceived advice from agents as helpful, it was not always the case. In one instance, Hilary highlighted how her teammate/roommate and teammate/friends' advice conflicted with her own beliefs about 'properly' following the RTS strategy. Specifically, they said she could attend social events and potentially play before she was ready:

> At the beginning [teammate/roommate] was like 'I think it would be fine if you came to those things' or 'I think it would be okay if you did these things' when I probably shouldn't have … like to an extent it seemed like [teammate/roommate] was going to be okay with me playing with a concussion … it would have been best if [teammate/roommate and teammate/friend] had just been like 'no, you shouldn't play' instead of being like 'yeah, maybe you can' or like 'I really want you to play,' like they didn't say that that's the wrong thing to do.

Demonstrating Compassion. Another important support behaviour for athletes was when agents attempted to understand what they were experiencing and showed they cared for them. Shelby felt cared for by her athletic therapist because he tried to learn what she was going through, as she said, "when he's talking to me, I felt like his attention was on me, like he cared about me, cared how I was doing."

One thing that facilitated other agents' ability to understand and relate to the concussed athletes was if they were injured themselves. In fact, several athletes spoke about having an "injury buddy" who was also actively injured, either with a concussion or another type of injury. These injured athletes often came to rehabilitation activities and/or

sympathized with the athlete based on their shared injury experience. For example, Emily described how another athlete with a knee injury sat with her at practice. She explained, "she wasn't playing either, so we were on the sideline together, so I feel more emotional support on the sideline, just chatting with me and stuff … it was nice, instead of standing by myself on the sideline watching."

Similarly, Shelby expressed that when her concussed teammate discussed rehabilitation with her during practice it made her feel validated in her experience:

> One of my teammates who also has a concussion, I was talking with her during one of the drills … so that was nice, she's in the same boat as me … it was just, I knew she understood too, she was feeling the same way, or similar.

Another way support agents demonstrated compassion was to include the concussed athletes in non-symptom provoking sport-related activities (e.g., team discussions) and/or non-sport related social events. For example, Hannah's head coach invited her to stay involved with the team in a mentorship capacity since she could not participate in a typical fashion:

> He did like encourage some social stuff, he's like 'oh, if you're not at full level for practice you can use this time to work on the social things with the team,' like we recently went over some of our core value stuff, so we were talking about that and he's like 'you can put yourself in that spot' or even I organize our mentorship stuff for all our younger players, so he's [given] other things too, he's supported me in that way.

Likewise, Jodie described how her teammates/roommates and teammates made an effort to engage with her both at home and on team road trips, so she didn't feel alone:

> I'd come out in the kitchen when they were there and drag myself out there and be like, 'hey, how was practice today' and they'd talk to me and make me feel like I was part of the team and stuff … [they] just like invited me, I went and hung out in their hotel room after and they talked about the game and stuff, made me still feel included.

Athletes also described the importance of agents just being there and spending time with them during their recovery. For instance, Alice's athletic therapist allowed her to spend time in his office whenever she wanted:

> Well, I was always in his [training] room … [it was helpful because] I'm interacting with somebody, rather than just being in my room … normally there will be other athletes in there, we would all have a conversation about something stupid or he'll be on his computer, and I'll just be sitting there on my phone listening to music or something.

Similarly, Hilary's boyfriend made sure to spend time with her while she was in the acute symptom stage:

> [He] came over and [was] that really constant support, anytime I asked … because I couldn't go to practice, he would spend the morning with me, which was really nice instead of me being alone literally all day … [him] just being there, it was nice having him there and having that support versus feeling alone.

Some athletes also spoke about the importance of agents making their recovery fun. For instance, Alice's athletic therapist lightened the mood, which helped her manage her adverse feelings about her concussion. She stated, "it helped me not go into a deep depression type thing … I make silly jokes, or he makes the joke and it's just refreshing."

Similarly, Charlie's teammate/friend joked with him during his stage two, which made his recovery more bearable:

> Like everyone's training and you're just watching them run, you just feel bad, but you know when [teammate/friend's] like, 'oh how are you doing on your trusty steed?' you know like giving fun names for the bike, so it was stuff like that, I was like 'okay, that's funny' and it kind of just made [recovery] more bearable.

Athletes also described that support agents were important for enhancing their comfort and mood. This was often done by being physically present at and/or consoling them during uneasy times (e.g., return to game). For example, having her athletic therapist at her first game back eased Emily's worries about returning as she said, "he was at the game, I felt comfortable with him there, knowing if I hit my head again, he would be there … I feel like he was the most important one to have there in that situation." Similarly, knowing that his athletic therapist was there to listen and console his emotions helped Jackson's mood:

> I was really struggling with [emotions] at first and he was pretty much just somebody I could talk to about everything I was going through around that moment and he helped me get through it … like I would come in [to his office], and I'd be just down bad and upset or sad that I'm going through this and he was like, 'yo, it's going to be fine, it happens, you just got to stick through it.'

Several athletes also discussed how support agents made them feel normal during RTS. For example, Jodie's coach and teammates ensured she felt as normal as possible during her return to contact:

> I just wanted to feel normal, not like they were taking this bubble wrapped object and placing it on the court, so I liked that [head coach and teammates] were all

just like ‘ok, you’re good to play, let’s do this’ and then still checked in after, but like not a bubble wrapped object.

In the same vein, Charlie expressed that his teammates’ effort to maintain a consistent relationship during RTS made him feel normal:

> The relationship, it was the same – kind of like I didn’t have a concussion, that’s the way I was treated, so that was nice … they kept things going the way it was before [the concussion]. While a lot of other people, their relationship changed a little – it made me not feel broken, or different per se.

Prioritizing and encouraging recovery. Another important support behaviour was the prioritization and encouragement of athletes’ adherence to their recovery. Some agents prioritized athletes’ recovery by doing things for them that promoted recovery. For example, Shelby described how her family often drove her around:

> [My sister], she’s on the team with me, so she just helped me [since] she drove me to practice a few times … [My mom] gave me soup … [My dad] drove me home [after my concussion] so I didn’t have to drive, so I could just put on sunglasses, put the hood over my eyes and sleep it out.

Other agents demanded honesty and accountability from the athletes and insisted that they were truthful about their symptoms/status of their recovery. Hilary explained how her mother and boyfriend kept her accountable:

> [My mom] was definitely the most constant support, like asking me how I was doing, [saying], ‘be honest with me, are you lying to me?’ really making sure that I was ok … [and] I was really worried I wasn’t going to get to play and [my boyfriend] was like ‘it’s not worth it, you only get this one brain, you need to have

that brain working every single day, not just for this game … you have to be honest with yourself about how you're feeling.'

The athletes also appreciated when their support agents helped them minimize risks. For example, Jackson's head coach ensured that Jackson was away from the team so that he could focus on his recovery. Jackson described, "[head coach] knew that I wasn't going to stay away from the gym, so he kind of banned me for a period of time, and then once I started feeling better, he's like, 'ok, now you can come back.'"

Other agents helped athletes manage their recovery by providing a distraction. For instance, Hannah found it helpful when her student trainers diverted her attention from her symptoms:

> They were on the sideline when I'm just standing there, so they were really helpful and like making me still feel like I was a part of the team, and little things like asking me how my day was, or [telling] stories about something, so that I wasn't completely focused on just my concussion all the time … they were kind of trying to take my mind off it too, which is good because distraction was great at the time because my head hurts and I don't want to overthink this.

The last behaviour for prioritizing and encouraging recovery was whistle blowing, which was not always appreciated by the concussed athletes. In Brittany's unique case, her teammates informed her athletic therapist of behaviours which they deemed were unsafe or irresponsible recovery practices:

> We went to the library on Sunday, it was like the second week of my stage one, and I thought I was getting better because I hadn't done anything all week, and then I got a huge headache. So, then I was like 'oh, my head hurts' and then the next day I [went] to [athletic therapist's] office and he's like, 'well, you're not

> taking it seriously,' and that was from [my teammate], which was weird, like we could have talked about it together instead of [her] going to [athletic therapist], that doesn't help me, like support me, that's not really supporting my health.

Notably, Brittany found this unhelpful as it influenced both how her athletic therapist interacted with her and her willingness to access support, as she said:

> It just made me not want to discuss things with [athletic therapist] or like tell him how I was actually feeling … like since I returned my neck still hurts sometimes, and I'm like oh I should go get cupping, but I don't want him to be like 'oh, well you're still feeling symptoms.'

Although her teammates may have had good intentions when discussing Brittany's recovery with the athletic therapist, as she said, "I feel like it might have just came up … it probably [was] concern for me, [or] maybe just confusion on the timeline," Brittany still felt the need to hide how she was feeling and potentially rush her RTS because of the conversations agents were having behind her back:

> I feel like I didn't really communicate with anyone how my symptoms actually felt … like it didn't rush me, but it made me double think everything, like I turned off my Snap Maps on Snapchat so people weren't like 'oh, she's on her phone all the time' because I don't want people saying anything … I feel like I wanted to get back quicker because of what [teammates] were saying, because they weren't saying it to me, so it just felt like they were thinking, 'well, why isn't she back yet?'

Markedly, with respect to the agents' ability to prioritize and encourage recovery, there were also instances where agents failed to do so, which athletes perceived as unhelpful. For instance, Hannah expressed how her head coach often "forgot" about her

injury, which negatively impacted her perception of support from him, as she said, "sometimes with injuries, I don't know how seriously he takes them … part of me wishes he was a little bit more aware of injuries and stuff because that would have made me feel better."

Providing Reassurance. The last support behaviour that athletes received from their agents was reassurance. Agents often attempted to remind the athletes of their ability to overcome their potential doubts related to concussion or the RTS strategy (e.g., team status upon return, long-term consequences of concussion, performance abilities etc.). There were three general ways that agents provided reassurance for athletes. First, athletes found it helpful when agents commented on their abilities/place on the team/value upon return. For example, Shelby felt better when her coach praised her performance:

> My coach, I know there's expectations there … [and] it was the first time where his attention was on me … we were doing passing, so he talked to me about passing, [he said], 'that was a good pass, well done' just overall, felt good.

Likewise, Jodie was concerned about losing her spot in the line-up upon return, but appreciated when her boyfriend reassured her that she would still have her spot when she returned:

> I was stressing one day about not playing and he literally walked me through the lineup one by one. He's like 'she's not playing over you, you guys might play the same amount, but if you work harder, you'll play more.'

Other agents reassured athletes by telling them not to rush. For instance, Hilary's father told her to take her time, as she recalled how he said, "you have to rest, recover and

get back to it when you can." Similarly, Brittany's teammate/friend emphasized that rushing back would not help her. Brittany noted:

> At one point I was like 'I need to start biking, I just need to start doing something' because not doing any physical activity was one of the main things that I was like 'oh fuck, I just need to do something,' and she was like 'you're not ready for the bike' she was pretty straight up with me … like that kind of reeled me back and helped me take the time I needed.

The athletes also liked when their support agents were excited for their return. Jodie explained how her teammates' excitement made her feel wanted as she said, "everyone was super excited when I came back, which felt really good … just [saying], 'oh, we miss you,'[was] just reassuring, like 'okay, you still want me around, this is good.'

Contextual Factors. When understanding athletes' interpretations of support, it was important to consider their unique contextual factors as well as sport specific influences.

Frequency of Interaction. When speaking with athletes about the context of their support, athletes explained that the people they interacted with most were often the most important. For instance, Jackson described that he felt his girlfriend was important to his recovery because he interacted with her so often:

> My girlfriend definitely played a big part in the mental aspect, for one she is on the most important list because we're together 24/7 so due to that she does bring a lot of importance and value, so she definitely helped a lot.

Conversely, Jackson described how he listed his athletic therapist as being less important because he interacted with him seldomly. He said, "I listed [athletic therapist]

in less important, only because of the fact that he's not with me consistently throughout the day, you know what I mean? I'm only seeing him partially throughout the day." Brittany helped clarify why she ranked those who interacted with her less as being less important, "I don't think they cared about me less, but I just didn't see them as much, they weren't around as much kind of thing."

Provision of Multiple Types of Support. In addition to the frequency of support, athletes also noted that agents who were able to provide multiple types of support were most important. For instance, this was evident when Hannah explained why her parents (i.e., mother and father) were ranked lower than other agents. She explained, "I feel like other people had filled out more categories, they also provided tangible and esteem support and stuff, whereas with my parents it was only the emotional side of things."

Athletes' interpretations were also influenced by whether the support being provided by agents matched their needs. Since many athletes wanted information about their concussion, the athletic therapist was often highly ranked. As Jodie elaborated:

> I just hate sitting out. I hate watching people do what I want to be doing, so I wanted to do [the RTS strategy] as fast as possible, and I mean I want to be careful with my head 'cause it's important but as fast as I can get it done, anything I can do to make sure that my symptoms are gone … I guess that's why I put [athletic therapist] as most important, 'cause [getting] better as fast as possible was most important to me … 'cause they were helping me progress, giving me advice on how to heal my brain the fastest, so I thought that was most important.

Conversely, Emily ranked her mother, who provided emotional support, as being low in importance because what she needed was information:

I feel like she's always that supportive to me, so not to sound rude to her, but it didn't make a whole lot of difference. I feel cause she's always that supportive, it wasn't more than anything, and I feel she doesn't know a whole lot about [concussion], so I don't know how helpful she is in my actual recovery for it.

Shelby echoed this sentiment when talking about her mother:

I think that how she helped me was important to me and it made me feel good, but I just think the priority was healing my brain, and that [her support] didn't necessarily heal my brain … it just helped me feel supported.

Stage of RTS. Athletes also stressed that the stage of their recovery influenced how support was perceived. Athletes discussed how the amount of support perceived was influenced by which RTS stage they were in. Athletes often identified that they perceived the most support from various agents upon initial injury. For example, Shelby expressed that she had the most support in stages one, two, and three because the injury was new, and agents wanted to make sure she was alright:

That was the most high-risk area, like when I was most affected, hurt, words like that, or I would say more vulnerable … I also think it was fresh, so fresh in my mind, fresh in other people's mind, so they think about it, think about me.

Although some athletes reported consistent support throughout their recovery, some said their support fluctuated. For instance, Hilary stated she felt the most supported when she first sustained her concussion, but then support decreased as she re-engaged in practice (i.e., stage 3):

People were the most empathetic and reaching out and seeing how I was doing when it first happened versus as it progressed, because once I started practicing people aren't thinking about that, they're not wondering how my head is doing,

> it's just like I was right back into full practice and when it was a contact drill, I just removed myself and did fitness on my own.

Similarly, Hannah explained how she felt support decrease as she moved through the strategy towards stage six:

> I feel like I started to slip through the cracks a little bit more as I went on through it … part of stage six felt like it doesn't even exist, cause like I did stage five, so I already had done it, so I feel like a lot of other supports from my family and stuff dropped off at that point because it's like 'oh you're clear, you're fine.'

In contrast, both Jackson and Charlie described that they felt more support when they re-joined their teams. Jackson noted, "I'd say for stage four, I started integrating myself, more socially, so I guess a lot more people were actually there for me for the most part." Charlie concurred:

> When I felt the most support would have been when I was returning to practice because I was closely related with everyone, so it's easier to talk to the teammates, saw my roommates when I went home, I'd be in touch with [athletic therapist] and I was talking to my mom on the phone … so I definitely felt like 'OK, I'm back in the community'.

Overall, athletes noted a decrease in support as they progressed through RTS as Charlie summarized:

> The last [couple months] there's no real support. Everyone [has] kind of just forgotten. And if I go and be like, 'oh yeah my head's hurting' they're like, 'oh yeah, how are you doing?' But there's no reaching out, like before I used to get texts, 'oh, how you doing?' or if they see me 'oh, how's your head?' But now it's like they don't check-in.

The stage of recovery could also influence the type of support athletes wanted. For example, Hilary explained how informational support was most important at the start of her recovery:

> I think first sustaining a concussion you're most upset, you know? That's the last thing you want to have happen, especially when it happened, I was hoping I wasn't going to get diagnosed. And so, getting that diagnosis, the support was initially important, and then throughout the recovery it was important, but mainly at the beginning was when it was most important, like as soon as I started biking and stuff it was less important to me.

Quality of Relationship with Supporter. Multiple athletes indicated that their perceptions of support were influenced by how close they felt to their support agents. For instance, some athletes saw their various health-related support staff (i.e., student trainer, high performance staff, and/or athletic therapist) as friends, which enhanced their support relationship and positively influenced their perception of support. As Charlie explained, "my athletic therapist was like a friend, but a medical professional … everyone wants to be in his little office and he's always so busy, but he takes the time to chat."

Several athletes also explained how their close relationship with their student trainers facilitated their recovery. For example, Brittany expressed:

> I didn't talk to them too much about the concussion, but I do see them as people that I can talk to about it, it was easier to come to them for things too … like I have class with my one trainer and you see them outside of that as well, you'll see them at the bar and things like that, so I feel like being in similar stages of life, like they're a student too and we kind of have the same experiences so I feel like they understand, obviously they're not as knowledgeable as [athletic therapist] but

> they can better understand how I would be feeling and they see the team dynamic, so they have a better understanding of the whole experience.

Other athletes expressed that their lack of close relationships with agents and/or their lack of desire to be close to specific agents (i.e., healthcare professionals) was a barrier to effective support. For instance, Jackson wanted more emotional support from his head coach, but felt the status of their relationship did not facilitate this. He said:

> I want[ed] [more] emotional support, but that's just who he is … because our relationship between us is player and coach related, but it would be nice, like I look at him as a brother figure, like a big brother, so it would be cool to have that kind of relationship with him."

In another example, Shelby explained that she may not have received support from her teammates because of their relationship outside of the team-environment (i.e., in class). She said:

> No one else is in fine arts, so I think there's also that because a lot of the girls hang out in the PE building, have lots of classes together, so I think that's a factor … and I think the girls in general, they're obviously human, but you don't really think that they are like another person when you just see them in rugby, you just see them in practice and you don't see them outside of that in school, struggling with stress and life, so I don't have that perspective of them and they don't really have that perspective of me.

In one unique case, Brittany emphasized that she did not have a friend-like relationship with her athletic therapist, and his attempts to have this type of relationship were negatively perceived:

> There are things I got from him that I didn't want … I think I just wanted more professionalism, like that's how I am with my trainers too and my coaches, and I know a lot of people are like 'oh best friends,' but I'm like you're my trainer, like I'm not going to shoot the shit with you … like you can be friendly, but it's not like friends.

Sport-related Influence. Athletes' recoveries were impacted by the overarching culture of university sport, as well as sport-specific factors such as sport-specific norms, team-related roles, and the point in the sport season. Athletes described that the support they received from certain agents was influenced by their agents' attempts to balance other responsibilities related to their membership within the university community. For example, when discussing her teammates Shelby stated:

> I just think right now, people are under a lot of stress, their focused on their performance in school and athletics and money and roommates or relationships. I just think we're all, myself included, just a little self-centered, and that's a totally understandable decision.

Similarly, when speaking about their coach, several athletes articulated that they did not expect them to provide support when they were busy. As Jodie explained:

> During [stage five and six] it's when he's prepping for games and obviously, he doesn't have as much time to be like 'how are you?' you know what I mean, he's not that point person. That's where he's going to delegate it to captains or trainers because he's prepping for a game and is coaching.

Hannah also understood that her coach was busy, but wished it were different:

> Obviously [head coach's] dealing with a lot of stuff and I'm not on his 7's team right now, which is totally fair because that's his main priority … so he gets

> spread more thin during this time of year, so I understand if he didn't constantly check in with me on how my head was doing … but it would be nice if there was someone in that authority role that would have checked down even though I'm not currently playing.

The athletic therapist was also constrained in the amount of support that he could provide, due to the confines of their workload. As Jodie noted when talking about the sole athletic therapist for the entirety of the institution's athletics department, "I always could go in and check in with [athletic therapist], but obviously he's dealing with 186 athletes, so obviously I can't ever be his number one priority."

A few athletes also spoke about the transactional nature of university sport. For example, when discussing the lack of support from his head coach, Charlie described how his year of eligibility impacted the support he received:

> It's kind of like a varsity thing, cause it's like what you get four or five years? If you're not in the same sport, or you're moving quick after five years, you're kind of just out of the program and they move on to another sort of athlete.

Within the university context, each sport (e.g., rugby) and/or team also possesses unique customs (e.g., toughness) that influenced the support athletes received during RTS. For instance, Brittany expressed that the commonness of injury in rugby may have influenced her team members' beliefs related to injury and its seriousness:

> I think it's just how it is sometimes, like with rugby, a lot of people are injured, a lot of the time. Like checking in, I feel the need for it is like not a huge deal … like sometimes if [the injury] is serious then you're going to check on them a little bit more than like a pulled hamstring or something.

Hannah echoed this sentiment, but noted that having a large team helped contribute to her feeling supported:

> I feel like having a big team was really helpful too, because one I feel like it allowed me to realize I'm just one little thing on this team and my injury is not a huge deal kind of thing, so it was able to minimize it for me. But also, because there were so many people that were just there or so many people that had went through [concussion], it was just like I have options and I have people around me, whereas if I was an individual athlete that wouldn't happen.

Hilary also described that the emphasis on toughness in rugby, likely made her feel like she didn't need support:

> Like stage six, because I'm back in the game, I didn't really feel like I even needed that support. Like on other injuries, returning to a game I think some people probably do, but I think that because of my confidence in the game and the way that I have been taught to put my body on the line, like I literally finished a game with a torn MCL, it's just part of the game and that doesn't bother me.

In addition to sport-specific norms, team-related roles also impacted support. Several athletes said their unique team-related role (e.g., leader, key player, rookie etc.) impacted support needs and/or the agents' support behaviours. For instance, Hilary spoke about how being a captain made her feel secure in her position, and thus, required less support:

> I'm in a pretty secure role on the team, I know my place. I'm a leader on the team … I knew that me missing those two weeks, I was still going to start, and I was still going to be in my leadership role, that wasn't going to be taken away. I think if I had been in my younger years and I was maybe a bit unsure of my role and I

> sustained a concussion at this time of the season, maybe I would have been like 'that might have just fucked me for the rest of the year,'… and I think then that [support] would have been really important.

Shelby also spoke about how her role influenced the amount of support she received. As a rookie, she perceived less support was warranted for her recovery:

> I just never felt supported by [head coach], and I understand he's a busy guy and has many other girls to look after … I also think it has to do — I'm a rookie, I'm not a fourth year, I'm not a fifth year – I just never expected [support] really because I knew he was a busy guy, had lots of other girls, and I'm just a baby [referring to young player].

Brittany, a second-year player on the same rugby team echoed Shelby's sentiment:

> I've seen [head coach] with other people when they've gotten injured and obviously I'm still a younger player and I didn't play too much — like last year, I think our captain got a concussion and [head coach] was always bringing it up and always thinking about it and always talking to her and things like that, so I feel like it was definitely a little bit different from me being a younger, less valuable player — he cared less.

The timing of the concussion in relation to the point in the season (e.g., approaching nationals, start of the season, off-season etc.) was also important to consider. For instance, Hilary worried that because she sustained her concussion in pre-season that she would not be fit to play in the rugby season opener, which influenced the support she required:

> I felt a bit out of shape after not practicing for a week and a half — [my mom] reinforced like [I said] 'I'm going to be out of shape' and she's like 'you're going

> to be fine,' you know? She was helpful with that, because I'm like 'I'm missing two weeks, I really need these practices,' and she's like 'you'll be fine, you'll jump right back into it, it'll be fine.'

Another athlete, Brittany, sustained her concussion right before the rugby 7's nationals, which influenced how her father provided support:

> I don't know, it was a weird recovery with timing for nationals because I literally got cleared on Friday and [head coach] is putting out the roster today, so I think maybe [my dad] rushed – like he put the idea in my head to rush because I wanted to go and when I was talking to him about it, [my dad] was like 'well, if you do go to nationals, we'll see you there,' because they live a five hour drive away.

Concussion and RTS Strategy Specific Factors. There were four distinct factors related to the concussion RTS strategy itself that influenced the social support behaviours athletes perceived from agents across their recoveries: stipulates of the RTS acute recovery phase, uncertainty of RTS timeline, social isolation, and the invisibility of concussion. Athletes discussed how the strictness of the RTS strategy influenced their reporting behaviour. For instance, Brittany was hesitant to reach out to her student trainers or athletic therapist because if they suspected a concussion she would be removed from sport:

> I didn't know if it was a concussion or not, and I don't like to talk to the trainers or anything about being hurt because in the past it's been like 'oh, my leg hurts' and then it's like 'oh, sit out for a week,' so I didn't want to say anything.

The strict nature of the RTS strategy also discouraged some athletes to report symptoms even after their diagnosis because they feared having to return to an earlier stage. Hilary discussed her fear of being held back in the strategy:

> I feel like [because of] his ethics as an athletic therapist I would have to go backwards in my stages, like I wasn't going to let myself compete if I was still having symptoms, but I wanted to see how the bike went, I didn't want to go backwards because my timeline was so tight, and so that's my main reason for not going to him.

Several athletes expressed that the uncertainty of their rehabilitation timeline had a negative impact on their perceptions of support. For example, even with a streamlined RTS strategy with no setbacks, Hilary still struggled:

> The hard thing with a concussion is there is no timeline, and that would be the part I struggled with the most, like being told that initial date and then having that change, it's hard … I didn't have to go back any stages, I didn't really have to learn about what would have happened if I went back or how that would have felt … but I think if I didn't get past stage five, and missed that game, my support probably would have felt different.

Within the strategy, several athletes highlighted the acute recovery phase as being particularly problematic because they felt alone. For instance, Jackson felt the support he received from his athletic therapist was stunted because he had to stay home alone to avoid any stimuli that might provoke his symptoms:

> [Since] we're only talking about during the protocol, I guess 'cause it's a head injury – so typically for everything else, [athletic therapist] has taken care of me for other minor injuries I've had, [but] due to my concussion, I haven't really been at the university a lot, or I just had to stay home, stay to myself a lot.

In fact, the entire RTS strategy appears to promote unpleasant feelings of isolation due to the removal of athletes from usual social activities (e.g., practice, non-sanctioned team

events). For example, Hilary spoke about not being able to attend team functions due to her concussion:

> There were certain things that our team had, like functions and I was either not able to fully participate in how I typically would have liked to, or I didn't get to go, because our team went to Top Gun and I didn't get to go … my entire team went and obviously [that] would've been literally the worst thing I could have done for myself, but I was sad I didn't get to do that.

Charlie described how missing practice made him feel alone:

> [There were] definitely times when you're just like in your room and you're just like 'oh, this sucks' and everyone's at practice and you're like 'ah 4 P.M., everyone's starting now,' and just sitting, lying in bed like stuff like that … I didn't expect it to be as hard as it was.

Because of how prevalent feelings of isolation were, athletes noted the importance of support agents going out of their way to spend time with them, as Jodie elaborated:

> When I have a concussion I kind of feel like I'm separated from the world, just 'cause you have to be so alone all the time and you can't really be in loud spaces like you're used to, you can't be with your whole team like you're used to being, so just having [my boyfriend] around made me feel more connected to the actual world.

The invisible nature of concussion injury also appeared to influence when/how agents provided support. For instance, Hilary described how there were expectations of injured athletes on her rugby team, but these expectations were unclear for her concussion injury:

> It's weird because if you have a lower body injury at practice, you can still pass. You're expected that you can be doing push-ups. If you have an upper body injury, you can be running all practice. But a concussion, I was like, I can't do anything, but I would be walking around providing feedback, like helping. [My head coach] would have me lead drills, and doing those things was probably straining, I probably should not have been doing that.

Due to the lack of clarity of how she could stay involved with her team while rehabilitating her concussion, Hilary's head coach told her to participate in a different capacity than a typical practice (i.e., lead drills). Although this instruction may have been good intentioned as an effort at inclusively providing support, it provoked Hilary's symptoms.

Several athletes also articulated how the invisible nature of their injury made it difficult for agents to provide support they needed. For example, Hannah expressed that many agents provided support early in the strategy when cued to by her visible symptoms (e.g., squinting), but as she progressed and showed less symptoms, her head coach and teammates provided less support because they were no longer prompted by a symptom:

> At the beginning you can be like 'oh yeah, I'm really nauseous right now' or 'my eyes are really bothered,' those are physical symptoms that other people can see and address and try to help you out with, but moving on from there when you don't have those symptoms anymore all the time, it doesn't mean that it's still not a time where you need support, which I think is what people had turned to, they're like 'oh, well she's getting back, she doesn't have all the symptoms all the time, she doesn't need as much.'

Factors that Influence Psychological Readiness to RTS. Within the parameters of their concussion and RTS strategy, athletes discussed five factors that influenced their 'readiness' to RTS: presence of symptoms, self-efficacy, fear, motivation, and psychological skills.

A common theme for athletes was that they felt ready when they were experiencing little or no symptoms and less ready when they were experiencing symptoms. As Jodie said, "I never had a return to symptoms, like I felt overwhelmed by basketball at times, but I don't think that has to do with a concussion … I think of it just like 'am I good to play without symptoms?'" Hilary echoed this notion, "I was symptom free, that's definitely the biggest one." Interestingly, athletes expressed that they did not need support when they weren't experiencing symptoms. For example, when discussing her support needs in relation to symptoms Emily stated, "I just didn't need as much [support], I was better, I wasn't having any symptoms, so I didn't need emotional support necessarily, just because I was already pretty self-sufficient."

Although support did not appear to play an instrumental role in mitigating athletes' physical symptoms, it was helpful for athletes to be able to discuss their feelings related to their symptoms if necessary to facilitate readiness. For example, Alice found it helpful when her athletic therapist discussed her symptom-related recovery concerns with her. She stated, "I just felt like if I started [the strategy] too early, all the symptoms would just come back … [athletic therapist] just told me to take however long rest I need[ed] before continuing so it doesn't act up again."

Athletes' readiness to return to sport and their return to performance was influenced by their self-efficacy. Although several athletes discussed this concept as 'confidence', they emphasized the importance of believing that they had the *ability* to

achieve their desired performance standards upon return. For instance, Jodie discussed how feeling ready to return involved "feeling like herself," which included performing at a certain level:

> I definitely still haven't felt like myself fully, not in terms of a person, but as a basketball player, just 'cause I'm still getting my legs under me, but I finally felt like I found it yesterday. Like getting back into offensive rebounding, taking my shots, stuff like that. So, I finally feel that confidence is coming back … for me as an athlete it's rep based, if I've taken my shot 100 times, I know I'm going to make it in a game so then I feel confident shooting it, but if I haven't taken that shot 100 times, I'm not as confident in it.

Interestingly, Jodie emphasized that support was not necessarily required to help her feel ready with respect to her meeting performance standards upon return. When asked if anyone helped her feel ready she said, "obviously no one's going [to] be like 'hey, do you want to get in the gym extra?' so that's why I feel that part kind of came from me … you don't want to feel like 'yeah, it's all me,' but I feel like in terms of figuring out when I was ready to come back, mainly [me]."

Athletes' feelings of readiness to return were also dependent on their feelings of self-efficacy related to completing the RTS strategy itself. For instance, when asked what contributed to his confidence during the strategy, Jackson described feeling ready because he overcame the challenge of RTS:

> I think confidence played a really big part … I guess the morals and beliefs that I have … some of my favourite movies [are] the Rocky movies, and it's kind of something I was watching throughout this whole process, and just studying how to

> overcome a major obstacle and come back on the other end even better than when you went into it … the redemption arc.

Hannah elaborated on how successfully completing the strategy boosted her confidence:

> I think it's weirdly that feeling of success of getting through [the strategy]. Cause when you don't, when it doesn't go well, it's like 'oh I failed, I didn't get it' and I don't know if that's the athlete in me of like winning [vs.] losing thing, but it felt like achievement, like that confidence boost from doing well.

With respect to the athletes' self-efficacy related to overcoming the challenge of RTS, support agents appeared to play a larger role. For instance, Jackson felt more ready when agents recognized his achievement:

> Just having [my girlfriend] there was cool, having her see me do that, it was a confidence booster … coming from people it was like the cherry on top, because yeah, I was coming back, but then having everybody else be like 'oh shit, he's back, back' it was like 'ok, alright, I'm good.'

Hannah concurred:

> I think the gaining confidence part, it mostly comes to like the people that [were] around me at the time … like in a drill, it's those little things where someone throws you a really nice pass, and then you make a really nice pass, and then your group did very well and you're just like 'wow, we're doing so well together,' like things are so good, it's so smooth and having those little positive moments, like whether someone else says something about it or not … either I recognize it or someone else recognizes it, those [moments] are really helpful in building that confidence back.

Fear was another theme that emerged around athletes' feelings of readiness to RTS. More specifically, athletes described feeling less ready when they feared: being unfit/performing poorly, re-injury, the uncontrollability of contact, and long-term consequences. Hilary described how the restricted physical activity during the RTS strategy made her worry about her fitness levels, "I'm not afraid of contact at all, it was more, literally I was worried I was going to be out of shape, knowing I'm going to have to play 80 minutes and I haven't practiced in a week and a half." In another example, Jackson lamented about his lack of movement:

> I was a little bit nervous, just 'cause I've been sitting on my ass for like three weeks, so I didn't go into [return to contact] expecting anything, but I was nervous more so because I was sitting on my ass for three weeks, like the contact, I feel like I'd get right back into it.

Athletes described that their support agents were able to help alleviate some of these feelings. For instance, Hilary's teammates/friends engaged in rehabilitation activities with her, which mitigated some of her fear:

> On stage four, my [teammate/friend] – I was doing a non-contact practice and our team was doing some contact drills and I wasn't able to do them obviously, so I asked her if she would run some fitness with me and do some fitness exercises, and she did with me 'cause she also couldn't do contact, so that was nice to have that support from her … [it helped] probably my social recovery and also my physical, especially feeling like I had gotten out of shape, not participating for a week and a half, so that was nice having someone willing to do that with me.

Jackson had a similar experience:

> [Teammate/friend] was working out with me the most out of all my friends, it definitely helped me get back into shape and get back into my usual self I'd say, because I don't think I've taken that long of a break from not doing anything physical in a long time … like his main focus was he wanted to you know, get better himself, but he also wanted to make sure that when I come back, I'm back to me, you know?

In addition to fearing that they would be unfit, athletes spoke about fearing re-injury when they returned to contact or competition. For instance, Jodie said:

> I was definitely scared, I got hit by my own teammate, I don't want to get hurt again, [so] … in practice it was all good 'cause I know how people move, so that first day [of contact], even though I was like 'I don't want to get hit,' I knew who to avoid and where not to run at to avoid getting hit … like there's different levels of contact in basketball, you can be a scrapper where you're in on everything, or you can be a guard where you float around the outside, so I was just more of a floater those days.

Hannah also expressed fear as she perceived she was at an increased risk of re-injury:

> With rugby, I feel like people hit their heads a lot, it happens, it's a contact sport. So, in that sense, it's a high probability that it'll happen to someone … I feel like your brain just doesn't heal overnight, which is really annoying. It feels easier because my brain's already been damaged … like if you get in a car accident and you crack off part of your bumper, but then you get in a car accident again and there's no bumper there, the inside of your car is going to be more damaged. So, it's kind of like I've broken down that barrier of the first one already.

Notably, both Jodie and Hannah did not feel their support agents could assist with their feelings related to fear of re-injury. When asked if she talked to anyone about her fear, Jodie said:

> Not really, no. I talked to one of my teammates about it, we checked in at half, 'cause we always check in at half. And I was like 'how do you feel you're playing?' [and] she's like, 'I think I could be doing this better,' and she's like 'how do you think?' and I was [like], 'well, I'm playing scared' because I didn't want [opposition player] to hit me in the head.

Conversely, Brittany's athletic therapist helped her manage her fear by designing a 'controlled' contact setting that facilitated her feelings of readiness:

> [Athletic therapist] gave me the workout [for stage five] … it was 20 tackles and then I got tackled 20 times, and then 20 shoulder drives, and then [I] got driven back 20 times. That was a whole thing, and then 30 minute leg sprints … [controlled tackles] don't really compare [to practice], like one of them is you're getting tackled from standstill onto a crash mat, and if we were doing it like a practice, inside [we do] drills like hitting bags, outside we could be playing a game and then you could get rucked over, so it's pretty live. So, I feel like doing it controlled was just more comfortable … [if it were live] I would have been a little more hesitant just because you know it's running and then you don't know where [contact] is coming from or sometimes you'll be up against one of your forwards and you're like, 'ah, get away from me, don't hit me, my head still hurts'… it's different because you don't want to get your shit rocked when you're just easing back into it.

Lastly, several athletes' fear of the long-term consequences related to concussion influenced their feelings of readiness to return. For instance, Charlie, who experienced persistent concussion symptoms, expressed how he feared his ongoing symptoms would impact his academic goals:

> Sometimes I'm like, 'oh, I am not 100% cognitively there,' there are times where I'm like, 'what's four times four?' like I don't know, it's just like, 'oh, am I going to have long-term effects of this?'… and I'm applying to [grad schools]. I don't know who's to say come January, if I get in, when it starts [if] I'm going to be ready … that's kind of a fear, and who's to say I'm not going to have these for, not the rest of my life, but a long period of time.

Similarly, Shelby described how thinking about long-term consequences influenced her perception of returning to the sport:

> It's kind of dramatic, but [the fear] is just like is my brain going to work again the way it was, is it going to happen again, do I really want to go back into rugby and risk the chance for another one? Just the effects on my ability to focus, like I still can't focus, I just feel like not there, or losing my ability to function as I do now, the independency … I'm just worried about how my brain would be for the rest of my life, how I do in school, even if just a small bonk during a contact practice would screw me over again, I was just thinking long-term and how that would affect everything I do from here on out … for me, rugby is not life, I'm not so passionate about rugby, and so it was like, 'do I sacrifice my brain at age 19, for the rest of my life, for rugby?' And it was an obvious no, not worth it. So just hesitant, fearful, worried about screwing it up again.

Several athletes noted that their support agents could influence their fear of long-term consequences both positively and negatively. For instance, Jodie's concussion specialist promoted hope related to long-term effects of concussions by discussing her diagnosis:

> I was terrified, I don't know why [I was] having such bad symptoms for this long … so I was really scared that I had a terrible brain injury and I wasn't going to be able to come back to sports, so that was really anxiety inducing for me, and then just finding out [from concussion specialist] that it was my neck and seeing almost 100% improvement in like five days … it actually gave me like hope, I was like 'I'm not crazy.'

Conversely, Alice's sport medicine doctors failed to provide support that reduced her fears:

> Initially when it happened, [I was worried because] the mid-section of my spine was really hurting … so just to be on the safe side, to make sure I haven't messed up anything, like fractured anything like that, [if they sent] me to get an MRI, cat scan, whatever … just to be on the safe side of things.

Motivation was spoken about by several athletes as something that was related to their readiness. More specifically, athletes expressed how their motivation fluctuated due to factors that were out of their control (e.g., RTS strategy caveats) as well as factors within their control. With respect to factors out of their control, Charlie experienced a second impact during his concussion, which influenced his motivation to pursue his recovery:

> The first impact I was like, 'OK, I need to get back, I can get back, I'll be good.' And then the second one was like, 'I just want to finish school, I just want to kind

> of get through it,' sports was just done because it seemed it was going to be longer than we had hoped for, so motivation was killed to even get back and do sports, so the return to play kind of turned into a task.

As a result of Charlie's second impact and subsequent persistent symptoms, his social support waned, which further perpetuated his lack of motivation to recover, as he said:

> It got to the point where people are checking in on you maybe every once in a while, but even [with athletic therapist] it dwindled, just 'cause he's busy doing other stuff – he kind of forgot I guess … and it was at the point where [he's] like, 'I can't really do anything for you'… there [were] no real adjustments he could make … it was tough to just want to do anything, like it was so much easier to just sit in bed all day, but then you're like, 'oh, I got to get up and do something,' it didn't just affect sports, it kind of affected school, even though the support is like with the return to play, just overall it killed everything … so you're just battling to stay mentally positive, instead of sulking and doing nothing, and that's where the support systems would have been like the biggest support, but because [recovery] was so long, the support dwindled.

In contrast, Brittany described how a conversation with her mother made her feel she had control, which motivated her to stay the course:

> [The conversation] just made me feel like it wasn't weird that I was taking so long to recover, [it] just helped me take myself out of my own situation and kind of let me know that I'm healing in a normal way, like other people have healed the same way. Just since I never had any experience with concussions … and knowing that it's different for everyone … helped me stay on track a bit more, because at that

time I was like ‘well, if it’s never going to get better, I should just get going with school and stuff,’ but it helped me hold off a bit longer.

One common tool that was discussed amongst several athletes to mitigate the adverse nature of these factors was the use of psychological skills. More specifically, athletes discussed how the use of either goal-setting or positive self-talk influenced the presence of their symptoms, enhanced motivation, and self-efficacy, and/or reduced their fear. For instance, Charlie described how setting goals with the athletic therapist helped reduce the frequency and intensity of symptoms:

> So the incremental goals was like every day we’ll do five minutes this day, five minutes this day and build that way … like it’s slowly building up instead of going 30 minutes, feeling like trash for two days and then try[ing] 30 minutes again … ‘cause you don’t necessarily know your tolerance when you’re coming back from the concussion, so doing 30 minutes right off the bat you’re like ‘oh my God, that was awful.’

In addition, this use of incremental goal-setting also promoted his self-efficacy to return prior to his second impact and reduced his feelings of fear. When discussing self-efficacy, Charlie expressed how having measured goals enhanced his feelings of self-efficacy related to his fitness upon return:

> Definitely the measured goals because how else am I supposed to know if the symptoms will disappear, but my fitness would struggle right? And [athletic therapist] built me so that my return to play was better because I was slowly integrating fitness, which is what it’s supposed to be, but because mine was so prolonged [it] worked way better for me so that when I got back to track, yeah I was still a little out of breath, but I had done enough stuff that I wasn’t that crazy

far behind them. I wasn't as fast as them, but I was still fit enough where if I went to a competition, it'd be okay.

The athletic therapist's use of smaller measured goals during Charlie's recovery also promoted his motivation to recover (i.e., prior to his second impact):

> During the beginning when everything was more rough, you're like 'oh man, I'm tired I don't really want to even go do my 10 minute bike, like I could just quit the sport right now,' but then I would still have the concussion symptoms and you're kind of down on yourself, and the goals were definitely the path, the yellow brick road, like this is where I'm going … [goal-setting] forced me to clean up my sleeping and make sure [I got] three meals, getting enough nutrition, it was kind of like doing an off-season, building back into coming to running which was great actually.

Charlie also expressed how the incremental goal-setting throughout his extended recovery reduced his fear related to his fitness and symptoms:

> Way less fear, 'cause after an injury you're kind of scared to go back, but there was less fear to go back because you're like, 'oh, I've built my way,' and I feel like I have a foundation instead of just six return to play days and then you're just back in it, you know you're a little worried if [you're] fit enough … [I thought] it was never going to get better, like the world [was] caving in, but then when you're like, 'OK, I did 10 minutes today, did some rehab, I'm feeling OK,' you just build that way … so like the symptoms is kind of where the fear comes, and [you think] you're never going to get over this hump of headaches, so I just [felt] more prepared.

When discussing self-talk, both Emily and Shelby expressed how it related to feelings of self-efficacy and fear during their RTS. For instance, Emily used positive self-talk to feel more confident in her performance:

> In my head, I'm a real self-talker, and I feel like this time I've been more positive talking to myself like, 'oh, you're doing OK' 'cause I'm a very anxious person [and] the last one that I got hurt, I was not very positive the whole time, but this time I have been good at keeping positive the whole time, being confident in myself and that always helps my actual physical performance … [if] I talk to myself in a more positive way I can get myself to be more confident in myself and one good play usually gets me going.

Emily also used self-talk to mitigate her fear of contact with her opponents:

> When I think about [contact] too much it makes me nervous and I go up very hesitant, I get a little scared but … I just try to distract myself, think about other things. Not focusing on [fear], being like 'oh, you're better than them, you don't have to be scared, they should be scared of you,' that's what I like to tell myself.

Self-talk was not always helpful for athletes, as athletes spoke about how negative self-talk harmed their concussion recovery. Shelby expressed how her negative self-talk made her fearful and anxious about the long-term consequences of concussion:

> One thing that made it worse was just me, just the way I was talking to myself during that time, my negative outlook on current life, it's kind of always been there, but I think it worsened from my concussion … like someone would say something maybe insensitive, and then my mind just ran with it and made it worse and worse.

Notably, athletes didn't feel their support agents were important for their self-talk. For instance, when asked if any support agent helped with her self-talk, Emily stated that it was her responsibility:

> I think just myself. I just knew that if I want[ed] to keep playing and not get hurt again, I need[ed] to switch the way I was thinking 'cause I go down those spirals if I don't. So, I need to, I want to play, I know I want to play, so I have to do whatever I can [to] try and stay more positive for myself … I feel like other people telling me those things doesn't do the same for me as just me saying it, but I feel like I can talk to myself in the best way … I know myself pretty well.

Chapter 5: Discussion

The purpose of this study was to to explore concussed university athletes' lived experiences and perceptions of social support during the RTS strategy, and whether this social support influenced athletes' return to sport. Relatedly, we sought to understand: (a) who the agents providing social support were? (b) how the agents ranked in importance relative to each other? (c) how social support changed throughout RTS? (d) what types of social support did agents provide, and (e) what type(s) of support, agent(s), or combination(s) of the two influenced athletes' RTS.

Who are the agents that provide social support to athletes during the RTS strategy?

In the current study, athletes used concentric circles maps to depict which agents in their social network provided support at each RTS strategy stage. Athletes with typical recoveries identified an exhaustive list of 16 different agents who were important to their concussion recovery. Similar to past studies, athletes listed members of the sports medicine team (i.e., athletic therapist, student trainer, concussion specialist; Black et al., 2017; Deal & Shields, 2015; Mainwaring et al., 2010; Okonkwo et al., 2014), coaching and performance staff (i.e., head coach, assistant coach, high performance staff; Caron et al., 2021; Judge et al., 2012; Steins et al., 2022), family (i.e., mother, father, brother, sister, significant other; Kita et al., 2020; McGuckin et al., 2016; Steins et al., 2022; Sanderson & Cassilo, 2019) and peers/teammates (i.e., friends and teammates; Caron et al., 2021; Kita et al., 2020; Steins et al., 2022).

Novel to this study, was the nuanced exploration of how the student trainer, high-performance staff (i.e., strength and conditioning coach) and the concussion specialist supported athletes' recoveries. While the acknowledgment of these agents is not new to the sport injury, concussion, or even social support literature, most studies only discuss

what student trainers, high performance staff, and concussion specialists do to facilitate physiological recovery modalities (i.e., monitoring symptoms, modifying workouts, extended symptom care etc.; Black et al., 2017; Judge et al., 2012; Stillman et al., 2017). By utilizing a combination of methods (i.e., concentric circles mapping, the PASS-Q, and interviews), athletes in our study were able to not only speak about what these support agents did, but also how these agents supported them effectively. For instance, athletes described how the student trainers, high performance staff, and concussion specialist's abilities to provide support (e.g., tangible assistance, information about rehabilitation etc.) was dependent on the closeness of their relationship with athletes or the 'soft' skills (e.g., distraction) they possessed. Understanding how to properly provide support is important because concussion lends itself to a host of emotional and psychosocial sequalae that may overlap with physiological symptoms (Caron, Schaefer et al., 2017; Kontos, 2019). As such, members of the medical support team may also have a psychosocial role to play, one that requires them to draw on clinical/counselling psychology skills. Taken together, these results suggest that student trainers, high performance staff, and the concussion specialist may benefit from developing a 'therapeutic alliance' with athletes. More specifically, these agents could access psychological training that allowed them to provide support typically within their scope (i.e., information), while also sharing a personal bond that allows athletes to feel secure addressing psychosocial concerns which may allow agents to work collaboratively with the athlete to achieve their physical and psychological RTS goals (Williams & Douglas, 2022).

For student trainers specifically, athletes in this study discussed how factors (e.g., I see them at the bar, I have class with my one trainer) contributed to the quality and the closeness of their relationship with the student trainer. Due to their shared student traits,

athletes felt more comfortable discussing challenging topics (e.g., symptom disclosure) with student trainers as opposed to agents in a more powerful role, like the athletic therapist and coaches. Previous research has noted that since student trainers report directly to the athletic therapist, it may be advantageous for them to harness their strong peer-relationship to aid in the detection of musculoskeletal injuries before they become more serious (Deal & Shields, 2015). Given the unique contextual components of concussion (e.g., lack of visibility, reliance on self-report of symptoms; Bloom et al., 2022) and the student trainers' rich immersion within the athletes' sport environment (Deal & Shields, 2015), the student trainer and concussed athlete relationship may be especially important for the prevention of maladaptive athlete concussion behaviours (e.g., lack of symptom disclosure, sandbagging; Kroshus, Garnett et al. 2015; Schatz et al., 2017).

Parents were also important social agents during athletes' RTS. While the identification of parents was also not novel to our study (see also, Kita et al., 2020; McGuckin et al., 2016), the importance to which they were portrayed was. Previous research has highlighted that because university athletes are often away from home, there is a reduced sense of parental influence on concussion recovery (André-Morin et al., 2017; Schmidt et al., 2020; Yang et al., 2010). Conversely, in this study 75% of athletes identified mothers and 62.5% identified fathers as important support agents during their concussion RTS. One explanation may be the previous methods used to assess support. For instance, Schmidt and colleagues (2020) administered surveys to parents and student-athletes that examined the influence of parents' knowledge, attitudes, and responses to concussion scenarios based on their student-athlete child's concussion care-seeking intentions and behaviours. More specific to support, Yang et al. (2010) assessed social

support at baseline and three months after injury by having collegiate athletes complete the modified 6-item Social Support Questionnaire with a forced choice response to items of family, friend, coach, athletic trainer, physician, counselor, or other. Yang et al. (2010) painted family broadly, which may have challenged athletes when discerning between their parents, siblings, or other family members. Having athletes simply list important support agents on the concentric circles in this study may have allowed them to emphasize parents' role as alternative forms of support without the restriction of survey-based measures.

Another novel contribution of this study was the ability to distinguish between support offered from athletes' mother or father at certain RTS stages. While the previous work has typically explored the role of parental support as a unit (i.e., parents; Kita et al., 2020; McGuckin et al., 2016), our use of concentric maps and open-ended boxes allowed athletes to discuss their unique roles. In our results we found that mothers checked-in frequently, provided comfort in times of distress, and offered to do things for athletes (e.g., make food). Meanwhile, most athletes said their fathers provided less support, except for concussion and recovery-related information, which was provided more than from mothers.

Another notable finding was that one father encouraged their university athlete child to rush their recovery. McGuckin and colleagues (2016) also found that youth athletes expressed feeling pressure to RTS from their father, albeit this was when their father was their coach. One explanation for this maladaptive support from fathers could be their understanding of concussion. Given athletes' fathers relied on their past sport experiences when providing advice and that concussion research has rapidly evolved over the last 30 years (Guskiewicz & Walton, 2020), fathers may be providing out-dated

advice on how to adequately recover from concussion. Taken together, these findings suggest that concussion knowledge and education that is targeted at parents may be better suited if it is specifically tailored to mothers' or fathers' unique support types, roles, and limitations.

Our methodology also allowed athletes to differentiate amongst different types of peers and teammates, which to our knowledge has yet to have been done. Notably, related to different types of teammates, athletes described qualitative differences between regular teammates, teammates who were also friends, teammates who were roommates, teammates who played similar positions, and friends who were not teammates. Although previous social support and injury research has discussed teammates and friends exclusively (Kita et al., 2020; Steins et al., 2022; Yang et al., 2010), different levels or combinations of the two roles have not been explored within concussion literature.

Related to general teammates (i.e., not teammates who are friends or roommates), our athletes had mixed feelings about the support they provided. In our interviews, several athletes described examples of beneficial support (e.g., check-ins, excitement for their return), while others emphasized the lack of support from teammates, poor quality support, or unwanted support. A notable unwanted support from teammates was "whistle blowing". Similar to Caron et al.'s (2021) study, some teammates perceived the concussed athletes' recovery efforts to be lackadaisical, which in our study, resulted in informing the athletic therapist. One athlete explained that although their teammates' whistleblowing was well-intentioned, it was an undesirable form of support and undermined their recovery efforts.

Our results showed teammates whom athletes were closer with (i.e., teammates/friends) were amongst the most important social support agents in terms of

their ranking and that they provided a wealth of support behaviours (e.g., prioritizing recovery, participating in rehabilitation activities) throughout athletes' RTS. Teammate friendships have been shown to have a positive influence on maladaptive behaviours in sport (e.g., disordered eating; Scott et al., 2020) and help-seeking behaviours (e.g., Miller et al., 2023). Similarly, several athletes in our study expressed how teammates/friends emphasized the importance of their recovery at times where the athlete may have wanted to behave maladaptively to their recovery (i.e., rushing). While other agents outside of the team (e.g., parents, athletic therapists) also emphasized this, it appears that the athletes' teammates/friends' statements held more weight. Together, this body of literature elucidates the positive role that teammate friendships play in mitigating adverse behaviours, which may have implications for the concussion RTS literature as it relates to potentially promoting RTS adherence or decreasing symptom under-reporting.

With respect to teammates/roommates, it is common for university athletes to live with their teammates. Relatedly, we found that athletes identified teammates/roommates at nearly 60% of their RTS stages, and in their interviews, athletes often depicted the positive role (e.g., promoted social inclusion, did things for the athlete) that their teammates/roommates played during their RTS. Interestingly, previous research has shown that the teammate/roommate relationship can be adversarial during concussion recovery, due to the concussed athlete and teammate/roommates' shared understanding of the team-related demands outside of their home (Caron et al., 2021). This may explain why in our study, Hilary received advice from her teammates/roommates that contradicted her beliefs about how to properly recover from her concussion. Taken together, these results highlight the need to further explore the intricacies of intra-team

relationships as they relate to the provision of support behaviours for concussed athletes and how behaviours from these agents influence athletes' adherence to their recovery.

Athletes in this study also listed a novel agent to sport and injury literature, the athletes' significant other (i.e., boyfriend/girlfriend). Significant others were ranked high in importance and demonstrated several support behaviours (e.g., spending time, reassurance) that athletes found helpful during their recovery. Previous research has indicated the broad importance of romantic relationship social support for student-athletes, unrelated to injury or concussion (Eggleston, 2022; Morgan & Giacobbi, 2006). Considering university athletes are exposed to a plethora of stressors, such as injury (Lu et al., 2012), and social support from healthy romantic relationships has been shown to mitigate adverse responses to these stressors (Ledbetter et al., 2020), our finding that university athletes benefited from social support from significant others, especially during times of isolation from coaching staff and team-related (i.e., teammates) agents, shows a need to further explore this body of research and its applicability to psychosocial SRC rehabilitation.

How do the identified social support agents rank in importance during the RTS strategy?

In the past, athletes have identified social support agents by simply choosing agents from a list (Yang et al., 2010), completing a single social support measure (Covassin et al., 2017), or identifying them in an interview (Caron et al., 2021; Kita et al., 2020). In our study, we did all three and asked athletes to rank agents based on importance. When considering how important support agents were and how often agents were ranked, the athletic therapist was ranked at the top of our list. This finding is not surprising, given that athletic therapists are typically involved in overseeing the duration

of university athletes' concussion rehabilitation (Black et al., 2017) and have been shown to provide beneficial emotional and informational support for concussed athletes in the past (André-Morin et al., 2017). Our athletes justified the athletic therapist's rankings in their interviews, noting that the athletic therapist was seen frequently throughout their strategy and was responsible for "getting them back in the game" via advice and managing their progression.

When discussing the rank of other sport-medicine agents, one surprising finding was the rank of the student trainer as second most important. Other authors often describe student trainers as accessory support agents behind athletic therapists and sports medicine physicians (Black et al., 2017; Deal & Shields, 2015). In our study, athletes' saw student trainers as instrumental supports during their concussion RTS and discussed various support behaviours (e.g., checking-in, maintaining normalcy) that enhanced their importance rankings. Likewise, Deal and Shields (2015) noted that student trainers had clear "authoritative" and "treatment" based roles during musculoskeletal injury rehabilitation, but their influence was enhanced by their peer-like relationship with the athletes. Together these results suggest a unique place for student trainers in athletes' concussion recovery, with added value being found with their ability to connect on a different level with athletes.

Another interesting finding was that some agents rarely engaged with athletes, which lowered athletes' perceptions of importance. However, when these agents were present, they were deemed to be very important. One example was the assistant coach. In interviews, athletes described how their assistant coaches demonstrated support behaviours that athletes perceived to be effective such as checking in, providing reassurance, and demonstrating compassion. Another example was the concussion

specialist. Although only mentioned by one athlete, when present the concussion specialist provided information that propelled the athlete's recovery. Fortunately, the use of interviews in conjunction with listing and ranking agents, and surveying support types, allowed us to better understand how agents who were rarely listed played an important role during athletes' recovery.

How does social support change throughout the RTS strategy?

Due to the prospective nature of our study, we were able to identify changes in athletes' support with respect to agent, type of support, agents' level of importance, and support behaviours throughout RTS. From our quantitative results, it is clear that social support decreases over the RTS strategy with respect to agent and support type. One explanation for this that was found in athletes' interviews was the salience of athletes' concussions. Athletes perceived more social support at the beginning of the strategy when symptoms were visible (e.g., squinting at screens) and the injury was fresh in agents' minds. However, research has shown that the invisible nature of concussion reduces the potential cues to signal that an athlete needs support (Bloom et al., 2004, 2022; Kita et al., 2020). This is problematic because some athletes in our study still wanted support while their symptoms were not visible.

One possible solution to enhance support is to increase agents' awareness of the injury. For instance, research on individuals with invisible chronic conditions (e.g., migraines, fibromyalgia) described how in the workplace setting, individuals with invisible chronic illnesses use various strategies (e.g., educating others, analogies) to disclose their illness, which sparked design concepts to help facilitate symptom disclosure (Ganesh and Lazar, 2021). These concepts included several app-based education tools, a Pain Level Indicating System, and virtual reality experiences. One strategy that may be

applicable to the university sport context is the use of a Pain Level Indicating System. Ganesh and Lazar's (2021) proposed system involved a variable-colour LED light system attached to either the individual or their workstation that indicated the level of symptoms (i.e., red = bad; green = okay) they were experiencing.

While a LED light system for athletes may not be feasible at all times due to equipment and sport regulations, a similar notification system, such as different coloured bracelets to indicate support needs (i.e., red = need support; green = do not need support) could be used to generate a signalling cue. However, this strategy is not without barriers, as Ganesh & Lazar's (2021) results highlighted that this system may actually increase a burden of having to educate others about the light system or draw unwanted attention overall. This could also be problematic for some athletes as symptom disclosure has been related to fear surrounding negative stigma and malingering in concussed athlete populations (Bloom et al., 2022). Despite these drawbacks, these barriers have been combatted in a similar strategy that is already used in sport while players are rehabbing an injury. More specifically, during practices injured professional athletes often dawn a different jersey than their non-injured teammates, to indicate that they are actively injured and not engaging in contact. While the goal of this strategy is to silently reduce unwanted contact, a similar strategy to indicate a concussed athlete's social support needs may prompt an increase in specific support behaviours (e.g., check-ins) when the athlete needs it due to an increase in visibility of their concussion.

Another interesting finding related to athletes' RTS was how their re-integration with sport impacted the support they received. For some athletes, their support increased as they graduated from the acute recovery phase of RTS and began participating in practice again (i.e., stage three). This is unsurprising given that previous research has

articulated the adverse psychosocial influences of the acute recovery phase (i.e., cocoon therapy) due to the lack of access to social support (Bloom et al., 2022). In our study, simple exposure (i.e., being around their team and social support system) was enough to make some athletes feel supported again. Other athletes described how their support decreased as they re-immersed themselves in sport again, and they attributed this to sport-related agents perceiving them as "back to normal." While some athletes appreciated support behaviours that "maintained normalcy," such that agents did not treat athletes like they were different or broken, others wanted more support in their return. From these results, it appears that athletes require a delicate balance of social support as they re-integrate with their sport and team environment that both affirms their positive and negative psychosocial experiences of re-integrating with their sport during RTS, while also not patronizing the athlete.

What types of social support are provided by different agents during athletes' RTS strategy?

In our study, athletes identified that agents provided varying levels of emotional, esteem, informational, and tangible support. Most notably, from the PASS-Q results, athletes identified that significant others (i.e., girlfriend/boyfriend) provided the most emotional and esteem support, athletic therapists provided the most informational, and head coaches provided the most tangible. Although these four types of support are not the only ones identified in sport and exercise psychology (Golaszewski & Bartholomew, 2019), they are amongst the most addressed and tested support types within sport injury social support literature (Bianco, 2001; Mitchell et al., 2014; Rees & Hardy, 2000; Yang et al., 2010).

The PASS-Q was also used to frame our qualitative interview questions. One notable finding from our interviews was that when we asked athletes to describe how agents offered support, athletes described behaviours that fell outside of the four types of support (i.e., emotional, esteem, informational, and tangible). For instance, when prompted to describe the emotional or esteem support provided by agents, athletes in the current study often mentioned how agents spent time with them during their rehabilitation activities or reassured them of their status within the team. These behaviours are more akin to companionship and validation support (Chogahara, 1999; Golaszewski & Bartholomew, 2019), which raises questions about the validity of the PASS-Q for assessing social support in concussed athlete populations.

Golaszewski and Bartholomew (2019) would argue that the aforementioned findings are due to the lack of comprehensive assessment of functional social support types using the PASS-Q, which our results support. Our results also suggest that athletes interpreted emotional, esteem, informational, and tangible support in different ways than the PASS-Q is intended to measure them. When asked to describe the support offered to them through the lens of their PASS-Q, athletes described support behaviours and not support types. Specifically, athletes spoke about the following support behaviours: checking in, providing advice, demonstrating compassion, prioritizing and encouraging recovery, and providing reassurance. Although some PASS-Q items may relate to these behaviours (e.g., care for you, boost your sense of competence etc.), other items (e.g., give you tactical advice, do things for you at competitions/matches) may not readily apply to concussed athletes' support needs. Taken together, these results do not invalidate the PASS-Q as a measure of social support, but certainly question its utility as a lone measure for assessing social support with concussed athlete populations.

Athletes also spoke in detail about the influence of contextual factors related to concussion and sport that impacted their perceptions of support behaviours. Specifically, athletes described how certain factors influenced the effectiveness of support behaviours. For instance, athletes in our study described how frequency, timing, and style impacted how effective check-ins were. They described a delicate balance where agents needed to ensure that they did not check in too much or too little, that they checked in at proper times (i.e., not while the athlete is busy), and that they approached check-ins in a way that matches athletes needs (i.e., emotional, direct, indirect check-ins). Other factors (i.e., university sport constraints, team norms, athletes' role on team) appeared to influence how often support behaviours occurred. For example, several athletes expressed how overarching university demands on their head coach (i.e., managing a team), impacted whether they checked in or not. In another instance, some athletes described how their team cultural norms related to injury (i.e., toughness), impacted whether their teammates checked in or not.

McKay and colleagues (2021) described an explanatory input-process-output framework that may explain how the sport/team environment influences social agents' support behaviours and subsequently athletes' injury experience. Specifically, input factors such as member characteristics (i.e., recreational vs. university sport) and the team environment (i.e., team size, sport type) bidirectionally influence the process factor of team structure (i.e., team roles, team norms, team subgroups). In turn, these aspects of team structure bidirectionally influence the team processes (i.e., injury expectations, positional competition). Importantly, these process factors (i.e., team structure and team processes) do not exist in a vacuum either and can be bidirectionally influenced by various emergent states (i.e., cohesion, social identity).

When looking at our results through the input-process-output framework, it makes sense why social agents performed or failed to perform certain support behaviours. For instance, athletes in our study held certain characteristics that are related to their team environment (e.g., university rugby player), whereby their potential expectations of social support during concussion (i.e., team process) would have been influenced by their team role (e.g., key player). In turn, these processes together would have influenced athletes' perceptions of effective support from agents. For instance, this may help explain the emphasis that athletes placed on the support behaviour "maintained normalcy" during their RTS, where they appreciated when support agents treated them as though they were not invalid or broken due to their concussion, which validated their sense of identity and place within the team structure.

Importantly, athletes in our study were bound by various input factors. The University of Lethbridge is a smaller institution that has less resources (i.e., number of athletic therapists) than other larger institutions. Moreover, the university is situated within a small community and often recruits athletes who live in surrounding areas, which may have allowed for athletes to have access to certain familial supports (i.e., mother, father, sister, and/or brother), that athletes at other institutions with a broader recruiting reach may not have.

Taken together, it appears that athletes' perceptions of support behaviour efficacy are conceptualized as a function of specific sport/group-level factors, where other broad contextual factors appear to influence the strength of the perceived efficacy. Further, concussion injuries must be understood within the context of a sport social environment, and the influence of agents' social actions (i.e., social support) on RTS outcomes (i.e., psychological readiness) cannot be explored without considering the key contextual

factors of the social environment that exist outside of the athletes' and agents' individual viewpoints.

What type of support, social support agent, or combination of support benefits or prevents athletes from a successful return to sport?

While athletes in our study described that various agents, support types, and support behaviours influenced their perceptions of success in RTS, they also highlighted that how these support variants were delivered and perceived (Freeman et al., 2020; Mitchell et al., 2014), as well as how they perceived to cope with their concussion and RTS progression (Cutrona & Russell, 1990), influenced their perceptions of the effectiveness of the support. More specifically, athletes described that the way (i.e., timing, frequency, style etc.) agents provided support behaviours (e.g., check-ins) improved or diminished the efficacy of support for promoting readiness. Similarly, athletes expressed that how they perceived their RTS progress as it related to symptom resolution influenced their support needs (i.e., needed more support when symptoms were not progressing in a favourable manner) and the support's subsequent efficacy.

Another notable finding was that athletes in our study described that certain factors (i.e., presence of symptoms, self-efficacy, fear: fitness/performance, re-injury, uncontrollability of contact, long-term consequences of concussion, motivation, and psychological skills) influenced whether they felt ready to return to sport. Interestingly, athletes are typically deemed "successful" or ready in their RTS when they have met all cognitive and physical RTS strategy requirements (Patricios et al., 2023), which are typically achieved through symptom-limited behaviours/achievements. As a result, it is not surprising that the presence or absence of symptoms was one of the most important indicators of readiness for our athletes. While Caron and colleagues (2022) also showed

that concussion symptoms play a role in athletes' feelings of readiness to RTS, such that athletes and sport-medicine staff can identify the absence of symptoms as important. We extend these results by explaining how social support may mitigate athletes' adverse psychological response to symptoms. Specifically, while athletes articulated that no agent could physically help ameliorate their symptoms, athletes found it helpful when agents like the athletic therapist discussed their emotions (i.e., fear) related to symptoms. Together, these results suggest that simply ensuring athletes are symptom free through the RTS strategy is a positive first step in making sure they are ready to return to sport.

In recent years, contemporary research points to the additional factors beyond symptoms that contribute to athletes' psychological readiness when considering their successful RTS (Bloom et al., 2022; Caron et al., 2022; Lassman et al., 2022; Podlog et al., 2022; van Ierssel et al., 2022). Podlog and colleagues (2022) have recently conceptualized psychological readiness as an athlete's "mental preparedness to resume sport specific activities" (p. 7). Moreover, they stipulate that cognitive appraisals (e.g., confidence), affective (e.g., fear about re-injury) and behavioural (e.g., approach-avoidance behaviours) components can promote or hinder athletes' psychological readiness and that social support may influence athletes' psychological readiness but does not cause it. With respect to confidence, several athletes expressed how their belief in their ability to achieve performance standards upon return from their concussion and to complete the RTS strategy itself influenced their feelings of psychological readiness to return. Related to social support, athletes felt social agents could not help them meet their desired performance standards but emphasized that they could validate their feelings of self-efficacy by recognizing their achievement of progress in the RTS strategy.

Another factor related to psychological readiness in our study was fear. Notably, one aspect of fear (i.e., fear of being unfit/poor performance) involved concerns about how their lack of involvement in their sport during RTS would impact their performance upon return. Athletes described how agents like their teammates/friends mitigated performance-related fears by participating in rehabilitation activities with them as an "injury buddy," which has been shown to enhance rehabilitation in the past (Podlog et al., 2015).

Athletes also spoke about how their fear of re-injury impacted their feelings of readiness to RTS, which is a common contributor to concussed athletes' readiness (e.g., Lassman et al., 2022; Podlog et al., 2022; van Ierssel et al., 2022). Novel to this study, was that several athletes attributed their fear of re-injury to the uncontrollability of contact upon return, which suggests that one of the main characteristics of stage five in the RTS may be contributing to adverse psychological responses (i.e., fear of re-injury). Of note, decisions about the RTS strategy overall are not grounded in empirical evidence (Bloom et al., 2022), thus it is not surprising that athletes may be experiencing challenges with one of its main tenets. Fortunately, our results implicate how social agents can influence these fears. For instance, one athlete described how her athletic therapist facilitated a controlled contact setting for her stage five (i.e., return to contact). In this she emphasized how having the ability to control how the contact was delivered (i.e., tackle pads vs. crash mat) as opposed to a live practice, facilitated feelings of comfort, and increased her feelings of readiness to return.

The optimal matching model of social support (Cutrona & Russell, 1990) may help explain why control was related to fear. In our study, athletes often perceived contact as an uncontrollable stressor, and relatedly indicated the importance of emotional-based

support behaviours (e.g., reassurance) as being helpful, which aligns with the model. Specifically, fear was alleviated when one athlete experienced a controlled contact setting, because the agent directly modified the strategy to make it controllable. Given the fact that many contact and collision sports such as rugby and ice hockey have colloquial terms (i.e., "controlled tackle" or "receiving a body check") that imply graded progressions of contact during teaching phases of these sport-specific skills, further research is needed on how to make athletes feel like they have more control when engaging in graded contact progressions within stage five of the RTS strategy. In doing so, we may reduce re-injury anxiety and fear to facilitate psychological readiness to RTS.

Another notable fear was the fear of long-term health consequences from receiving concussions. Specifically, many athletes feared experiencing deficits from their SRC that would impact their quality of life. Others have also found athletes were concerned with the long-term cognitive impairment associated with concussion (Stein et al., 2015). In our study, athletes' fears were confirmed/exacerbated by their social agents who expressed the possibility of developing Chronic Traumatic Encephalopathy (CTE) as a scare tactic for encouraging concussion rehabilitation adherence to athletes. While CTE related research emphasizes that there may be a relationship between the post-mortem diagnosis of CTE and repetitive head trauma (Nowinski et al., 2022), a true cause-effect relationship has yet to be established (Herring et al., 2021). Results from our study suggest that athletes and some of their support agents may be mis-informed on the causal mechanism and prevalence of CTE in university athletes. Of importance, not all social agents promoted fear, and some (i.e., concussion specialist) helped mitigate athletes' fear of long-term consequences when they informed athletes of other mediating factors (i.e., neck pain) that were causing their intense concussion symptoms. Taken together, these

results suggest that care is needed when providing information-related support, that balances the true dangers of concussion without exacerbating athletes' fear of long-term consequences, and subsequently adversely influencing athletes' psychological readiness to RTS.

The last factor related to Podlog and colleagues' (2022) conceptualization of psychological readiness was motivation. Athletes experienced changes in their motivation due to the uncontrollable aspects of RTS (i.e., setbacks) and their psychological response to interactions with social agents. Interestingly, at times social agents adversely influenced athletes' motivation. For instance, Charlie expressed how the lack of support from agents reduced his motivation, while Brittany's father's emphasis on recovering before nationals increased her motivation to rush her RTS. Although social support is thought to be helpful for motivation (Podlog et al., 2015, 2022), our results suggest that agents must be mindful of their interactions with athletes, and that the context surrounding the athlete's concussion (i.e., near nationals) and agents' support behaviours can harm the athletes' overall RTS.

Overall, our results align with Podlog et al's (2022) conceptualization of psychological readiness, such that while athletes indicated that social support influenced factors related to their readiness, it was not the reason they felt ready to return. Our findings also add to the understanding of psychological readiness by further describing how psychological factors influence athletes' psychological readiness. Specifically, certain factors bear either positive or negative connotations, and the presence of positive factors (i.e., self-efficacy, motivation) and the absence of negative factors (i.e., fear, symptoms) promote readiness. As it relates to social support agents' support behaviours, these can also influence these factors positively or negatively, such that future research is

warranted to further explore how support agents understand the utility of their specific support strategies and behaviours as it relates to promoting athletes' overall concussion recovery and psychological readiness to RTS.

One notable finding related to psychological readiness that falls outside of Podlog and colleagues' (2022) conceptualization was athletes' acknowledgement of the use of psychological skills during concussion RTS to promote psychological readiness. Specifically, athletes discussed how both goal-setting and positive self-talk positively influenced psychological readiness factors (i.e., symptoms, motivation, self-efficacy, and fear). Moreover, the athletes spoke to the instrumental role that the social agents played in goal-setting. For instance, one athlete noted that their athletic therapist adapted the RTS exercise guidelines. Specifically, he used incremental goal setting within the athlete's symptom threshold which improved his self-efficacy and motivation and mitigated symptoms and fears of performance failure upon return. Of note, a theoretically based psychological skills training program for mental performance consultants to use during concussion RTS does exist (Seguin & Durand-Bush, 2020), yet evidence-based research related to the application of this program or best practice psychological skills training such as goal-setting in general for psychosocial concussion injury factors is scant. While the aim of the current study was not to assess the utility of psychological skills for ameliorating persistent concussion symptoms during recovery, our qualitative results demonstrate the utility of a hierarchical goal-setting program for an athlete with persistent concussion symptoms during RTS, as well the use of positive self-talk.

Chapter 6: General Discussion

The global purpose of this thesis was to explore university athletes' lived experiences and perceptions of social support during the SRC Return-to-Sport strategy. Through the in-depth exploration of nine Canadian athletes' experiences in returning to sport following a concussion, the current thesis makes several notable methodological, theoretical, and applied contributions to the field.

Methodological Contributions

The first methodological contribution was the use of concentric circles mapping to understand athletes' perceptions of social support during concussion RTS. One advantage to this method was that athletes were able to nominate their own agents at each RTS stage without boundaries. This generated an unexpected outcome, as it allowed athletes to categorize the various agents and to be very specific in the identification process. For instance, athletes distinguished between teammates at various levels (i.e., teammates/friends and teammates/roommates), which indicated that these agents were qualitatively different when it came to athletes' recovery. In the past, research has simply identified support agents by having athletes select from a list (Yang et al., 2010) or mention in interviews (Kita et al., 2020). In our study, the concentric circles mapping was also shown to be a useful methodological tool for understanding who comprises their social network (our intended purpose), but it added additional value in teasing out important contextual levels/meaning that agents held within the social network.

Another methodological contribution from this study was the use of the Perceived Available Support in Sport Questionnaire (PASS-Q; Freeman et al., 2011) within a concussed athlete population. Regarding the context of concussion and RTS, our results showed which agents provided various types of support, the amount of support each agent

provided, and when the agent provided it. Results from this scale were also used to guide interview questions related to athletes' perceptions of their success (i.e., psychological readiness) in RTS. While previous studies have provided evidence for the reliability and validity of the PASS-Q for athletes with musculoskeletal injuries (Forsdyke et al., 2022), our findings suggest that this scale may not readily apply to concussed populations. For instance, while athletes' responses on the PASS-Q indicated that certain agents provided specific types of support, when athletes were asked about the support types received, they often provided examples of behaviours that did not align with the operational definitions of PASS-Q scales. This finding would suggest that the construct validity of the PASS-Q with respect to concussed athlete populations is weak. Moreover, athletes typically described support behaviours that influenced their feelings of readiness to RTS instead of support types.

While the support behaviours described by athletes were certainly related to specific support types (i.e., agents recognizing athletes' achievement could be related to esteem support), further research is warranted to explore the utility of the PASS-Q items for understanding support during concussion recovery. For instance, the informational support item "give you advice about performing in competitive situations," may not readily apply to concussion RTS, as athletes are not in competitive situations until stage six of the strategy. Moreover, while the PASS-Q was designed within the context of "high-level" athletes, certain tangible support items such as "do things for you at competitions/matches" may not readily apply to certain agents (e.g., parents) at the university sport level, who may not even live in the same city.

Another methodological contribution of the current study was the use of a mixed methods design. While several scholars have also utilized mixed methods approaches to

explore various concussion-related constructs (e.g., under-reporting, concussion education; Ferdinand-Pennock, 2022; Scott et al., 2021), there is still a resounding dearth of mixed methods research on concussion recovery. Given that concussion rehabilitation bears several unique facets when compared to musculoskeletal injury (e.g., invisibility of injury, unpredictable prognosis; Bloom et al., 2022), mixed methods was useful in this study because it allowed us to understand the inherent aspects of social support as it relates to concussion (i.e., relevant agents), while also exploring athletes' experience with support.

The last, and most noteworthy methodological contribution of this study was the use of prospective design. Previous retrospective studies have offered broad insights for social support and its influence on concussion rehabilitation (e.g., Caron et al., 2021; Kita et al., 2020 etc.), however; these have been limited by recall bias and memory errors when generating a real-time understanding of social support. The current results allowed athletes to record data as they were experiencing social support and were moving through the RTS strategy. Moreover, tracking athletes' social support throughout RTS allowed us to identify when and how social support fluctuated. This information may be more applicable when considering potential social support interventions during RTS.

Theoretical Contributions

While the aim of this study was to understand athletes' perceptions and experiences of social support during the concussion RTS strategy, several athletes articulated the influence of various physical, behavioural, psychological, and social factors related to their recovery. Past researchers (Caron et al., 2022), have suggested using the biopsychosocial model of RTS for understanding athletes' concussion RTS (Ardern et al., 2015, 2016), given that behavioural, psychological, and social factors are

often overlooked. From a theoretical standpoint, our results support most components of the biopsychosocial model, but suggest that it does not adequately recognize the nuance of context as it pertains to social factors.

Although contextual factors (e.g., age, gender, sport level) are described in the biopsychosocial model as "non-modifiable," they are currently grouped with social factors as one entity (Ardern et al., 2015, 2016). In our study athletes articulated how various contextual factors were related, but still separate from their social support. For instance, athletes described how the stage of recovery, the quality of the relationship with their support agents, and various sport-related influences (e.g., team norms) influenced aspects of their social support (e.g., frequency of support) and relatedly their readiness to RTS. Importantly, we do not argue that the contextual factors exist in a vacuum outside of the social factors; rather, there appears to be a unique interplay between social and contextual factors on the influence of athletes' psychological response to RTS and perceptions of social support. Thus, if one were to explore concussion rehabilitation using the biopsychosocial model, our results would suggest that the focus on contextual factors must be broadened.

One strategy that has been suggested is to consider a bio-psycho-socio-ecological model when exploring social support during concussion RTS (Matney et al., 2022; Silverberg & Mikolić, 2023). In a recent review of mTBI literature, Silverberg and Mikolić (2023) emphasized that a bio-psycho-socio-ecological approach may aid in untangling the complexity of interactions between biological, psychological, and sociocultural factors that influence concussion recovery. More specifically, by recognizing various contextual factors (i.e., interpersonal relationships, access to rehabilitation venues etc.; Matney et al., 2022) and their influence on athletes' biological,

psychological, and social concussion rehabilitation outcomes we can have a more holistic understanding of what athletes may be experiencing during RTS.

Applied Contributions

From an applied perspective, our findings suggest that current efforts by support agents to provide social support to SRC injured athletes during their RTS vary in effectiveness. While many athletes expressed receiving support that was helpful at various timepoints, other athletes explained how their support waned throughout the strategy. We suggest there is a need for alternative applied efforts to increase both: (a) agents understanding of the value of social support for SRC injured athletes, and (b) agents' likelihood to provide consistent social support during RTS. These recommendations are sequential, such that in order for agents to provide effective (i.e., consistent) social support throughout RTS, they must first understand the utility of social support during athletes RTS. Notably, our findings describe the utility of social support from 16 different agents for athletes during RTS.

Another important applied contribution from this study is the emphasis on individual athlete variation in support needs. Athletes' support was dependent on personal and concussion specific (i.e., typical vs. persistent recovery) needs. Thus, we suggest that support agents work with athletes during the duration of RTS to understand their everchanging support needs. One strategy that may be advantageous, is to develop an integrated social support care plan with a multidisciplinary team of support agents. Relatedly, Van Slingerland and colleagues (2020) described the utility of a multifaceted care team (e.g., physician, psychologist, mental performance consultant etc.) for treating university athletes mental health concerns. Applying a similar model of care at various RTS stages, may be valuable for concussed athletes to identify their everchanging support

needs and for specific agents to bear the responsibility of understanding athletes' needs and establishing a support network.

Limitations and Future Directions

While this study made several contributions to theory, methodology, and practice, it is not without limitation. One limitation was the variability in the application of the RTS strategy in vivo, which in turn influenced our data. For instance, Alice (i.e., non-contact track and field athlete) only participated in the RTS strategy until stage four, as it was deemed by her athletic therapist that there was no need to proceed with the contact phase of RTS due to the non-contact nature of her sport. Similarly, Hannah and Shelby both participated in the RTS strategy in their off-season, therefore they did not participate in a true stage six (i.e., return to normal game play). While it is still possible to compare these athletes' experiences to athletes who completed the strategy in full, the contextual factors (e.g., pressure to make season opener) surrounding the athletes with shortened strategies should be interpreted with care.

Another limitation of this study was the applicability of the Perceived Available Support in Sport Questionnaire (PASS-Q; Freeman et al., 2011) to concussion injury. While this questionnaire has been used in previous research to understand social support with respect to stressors like musculoskeletal injury (e.g., Forsdyke et al., 2022; Kim et al., 2023), to the best of our knowledge, this scale has not been used previously with concussion injury. Since concussions have distinct psychosocial outcomes compared to musculoskeletal injury (i.e., social isolation; Bloom et al., 2022), it is not surprising that some athletes in our study expressed confusion with certain items that did not readily apply to the RTS strategy (Patricios et al., 2023). One way we attempted to mitigate this issue was to also interview athletes based on their PASS-Q results. This allowed for us to probe athletes' PASS-Q responses. While we believe this methodological choice was

enough to elicit results that are indicative of athletes' "true" social support perceptions during RTS, results related to the PASS-Q alone should be interpreted cautiously.

The scope of this study was also limited in terms of gender, since participants were mainly self-identified females (77.8%). While most quantitative concussion literature related to clinical care guidelines lacks female representation (D'Lauro et al., 2022); the majority of psychosocial concussion research is overrepresented by female data (e.g., André-Morin et al., 2017; Caron, Schaefer et al., 2017; 2021; Kita et al., 2020; Steins et al., 2022). Several psychosocial implications (i.e., willingness to report; Wallace et al., 2017) have been suggested as a rationale for why qualitative explorations are oversaturated with females' experiences. Moreover, it is known in the literature that qualitative research has a negative gender bias towards males (Affleck et al., 2012), which may have limited our ability to recruit more males (Macdonald et al., 2010). Despite having a small pool of male participants, some potential sex differences may have existed in our data. For example, both Charlie and Jackson (i.e., self-identified males) expressed how they perceived an increase in social support upon their re-integration in team practice during RTS because support was more accessible. Conversely, several female participants described how their support decreased as they re-integrated in sport due to factors such as the lack of salience of their injury. The females' experience of a lack of social support upon return, could be related to team cohesion-based factors such as exclusionary sport cliques (i.e., subgroup within a team) that are more common in female teams than male (Eys et al., 2015). However, we do not have sufficient data to have sex-based claims.

Another limitation of our study is the emphasis on certain sports. Over half (i.e., 55.6%) of our participants were rugby players, and thus it is important to note that our

results may need to be interpreted through a rugby-specific lens, as contextual sport differences may influence how athletes perceived social support during RTS. For instance, sport-specific differences may exist between rugby and other sports in our study (i.e., basketball and track and field), such as sport-specific norms related to reporting concussion (Salmon et al., 2022) In addition, it has been highlighted in the literature that there may be sport differences in concussion causal mechanisms (Huber et al., 2021), as well as concussion incidence (Kerr et al., 2019) that influence the likelihood of incurring a concussion, participating in the RTS strategy, and requiring subsequent support. Thus, it is important to recognize that some of our themes may have been influenced by the number of rugby athletes in our sample population.

The last limitation of this study is that participants were only from the University of Lethbridge. Thus, our results may not be generalizable to athlete populations at other universities. While we chose to only collect data at a smaller institution to limit the amount of confounding contextual factors (i.e., school-specific RTS strategies; Wiebe et al., 2022), we acknowledge that the unique contextual aspects of exploring concussion at the University of Lethbridge (i.e., on-campus concussion specialist) may not readily apply to other contexts. Moreover, since the frequency of concussion during a single sport season at one institution is low, we were only able to sample three different sports, which limits our understanding of social support during concussion RTS to rugby, track and field, and basketball. Thus, it is possible that exploring social support during RTS for other university sports that are commonly identified in concussion literature such as ice hockey, football, and wrestling (Kerr et al., 2017; Putukian et al., 2019; Zuckerman et al., 2015), could yield different results.

Conclusion

Several calls to action to explore athletes' social support during concussion rehabilitation have surfaced in the literature (e.g., Caron et al., 2021; Lassman et al., 2022; Seguin & Culver, 2021; van Ierssel et al., 2021 etc.). By using a prospective mixed methods design that combined concentric circles mapping, the PASS-Q, and interviews we were able to gain a nuanced understanding of university athletes' perceptions and experiences with social support during their concussion RTS. Our findings add to the SRC rehabilitation literature by demonstrating who provides support, how they provide support, when they provide support, and the influence of support on athletes' readiness to RTS. Further, our findings suggest that support fluctuates by agent, type, and behaviour throughout RTS. Moreover, support generally decreases as athletes move through the strategy. The current results offer the first prospective psychosocial exploration of university athletes' concussion RTS strategy and suggest that social support adds unique value to our understanding of how athletes recover from concussion and when/whether they will return to sport successfully.

References

Abgarov, A., Jeffery-Tosoni, S., Baker, J., & Fraser-Thomas, J. (2012). Understanding social support throughout the injury process among interuniversity swimmers. *Journal of Intercollegiate Sport*, *5*(2), 213-229. https://doi.org/10.1123/jis.5.2.213

Affleck, W., Glass, K. C., & Macdonald, M. E. (2012). The limitations of language: Male participants, stoicism, and the qualitative research interview. *American Journal of Men's Health, 7*(2), 155-162. https://doi.org/10.1177/1557988312464038

André-Morin, D., Caron, J. G., & Bloom, G. A. (2017). Exploring the unique challenges faced by female university athletes experiencing prolonged concussion symptoms. *Sport, Exercise and Performance Psychology, 6*(3), 289-303. https://doi.org/10.1037/spy0000106

Ardern, C. L., Glasgow, P., Schneiders, A., Witvrouw, E., Clarsen, B., Cools, A., Gojanovic, B., Griffin, S., Khan, K. M., Moksnes, H., Mutch, S. A., Phillips, N., Reurink, G., Sadler, R., Silbernagel, K. G., Thorborg, K., Wangensteen, A., Wilk, K. E., & Bizzini, M. (2016). 2016 Consensus statement on return to sport from the First World Congress in Sports Physical Therapy, Bern. *British Journal of Sports Medicine*, *50*(14), 853-864. http://dx.doi.org/10.1136/bjsports-2016-096278

Ardern, C. L., Hooper, N., O'Halloran, P., Webster, K. E., & Kvist, J. (2022). A psychological support intervention to help injured athletes "Get Back in the Game": Design and development study. *JMIR Formative Research, 6*(8). https://doi.org/10.2196/28851

Ardern, C. L., Kvist, J., & Webster, K. E. (2015). Psychological aspects of anterior cruciate ligament injuries. *Operative Techniques in Sports Medicine, 24*(1), 77-83. https://doi.org/10.1053/j.otsm.2015.09.006

Ardern, C. L., Taylor, N. F., Feller, J. A., & Webster, K. E. (2012). A systematic review of the psychological factors associated with returning to sport following injury. *British Journal of Sports Medicine, 47*(17), 1120–1126. https://doi.org/10.1136/bjsports-2012-091203

Arvinen-Barrow, M. & Pack, S. (2013). Social support in injury rehabilitation. In M. Arvinen-Barrow & N. Walker (Eds.), *The psychology of sport injury and rehabilitation* (pp. 117- 133). Routledge. https://doi.org/10.4324/9780203552407

Arvinen-Barrow, M., Clement, D., Hamson-Utley, J. J., Zakrajsek, R. A., Lee, S., Kamphoff, C., Lintunen, T., Hemmings, B., & Martin, S. B. (2015). Athletes' use of mental skills during sport injury rehabilitation. *Journal of Sport Rehabilitation*, *24*(2), 189-197. https://doi.org/10.1123/jsr.2013-0148

Banbury, A., Chamberlain, D., Nancarrow, S., Dart, J., Gray, L., & Parkinson, L. (2017). Can videoconferencing affect older people's engagement and perception of their social support in long-term conditions management: a social network analysis from the Telehealth Literacy Project. *Health & Social Care in the Community, 25*(3), 938-950. https://doi.org/10.1111/hsc.12382

Baugh, C. M., Meehan, W. P., McGuire, T. G., & Hatfield, L. A. (2020). Staffing, financial, and administrative oversight models and rates of injury in collegiate athletes. *Journal of Athletic Training*, *55*(6), 580–586. https://doi.org/10.4085/1062-6050-0517.19

Bhaskar, R. (2008). *A realist theory of science: With a new introduction*. Routledge. https://doi.org/10.4324/9780203090732

Bianco, T. (2001). Social support and recovery from sport injury: Elite skiers share their experiences. *Research Quarterly for Exercise and Sport, 72*(4), 376-388. https://doi.org/10.1080/02701367.2001.10608974

Bianco, T., & Eklund, R. C. (2001). Conceptual considerations for social support research in sport and exercise settings: The case of sport injury. *Journal of Sport and Exercise Psychology*, *23*(2), 85-107. https://doi.org/10.1123/jsep.23.2.85

Black, A. M., Sergio, L. E., & Macpherson, A. K. (2017). The epidemiology of concussions: Number and nature of concussions and time to recovery among female and male Canadian varsity athletes 2008-2011. *Clinical Journal of Sports Medicine, 27*(1), 52-56. https://doi.org/10.1097/JSM.0000000000000308

Bloom, G. A., & Caron, J. G. (2019). Introduction. In G. A. Bloom & J. G. Caron (Eds.), *Psychological aspects of sport-related concussions* (pp. 1–7). Routledge. https://doi.org/10.4324/9781351200516-1

Bloom, G. A., Horton, A. S., Patricios, P., & Johnston, K. M. (2004). Sport psychology and concussion: new impacts to explore. *British Journal of Sports Medicine*, *38*(5), 519-521. http://dx.doi.org/10.1136/bjsm.2004.011999

Bloom, G., Trbovich, A., Caron, J. G., & Kontos, A. (2022). Psychological aspects of sport-related concussion: An evidence-based position paper. *Journal of Applied Sport Psychology, 34*(3), 495-517. https://doi.org/10.1080/10413200.2020.1843200

Braun, V., & Clarke, V. (2021). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology, 18*(3), 328-352. https://doi.org/10.1080/14780887.2020.1769238

Braun, V., Clarke, V., Hayfield, N., & Terry, G. (2019). Thematic analysis. In P. Liamputtong (Ed.). *Handbook of research methods in health social sciences* (pp. 843-860). Springer. https://doi.org/10.1007/978-981-10-5251-4

Broglio, S. P., Cantu, R. C., Gioia, G. A., Guskiewicz, K. M., Kutcher, J., Palm, M., & Valovich McLeod, T. C. (2014). National Athletic Trainers' Association position statement: Management of sport concussion. *Journal of Athletic Training, 49*(2), 245-265. https://doi.org/10.4085/1062-6050-49.1.07

Burke, S. (2017). Rethinking 'validity' and 'trustworthiness' in qualitative inquiry: how might we judge the quality of qualitative research in sport and exercise sciences? In B. Smith & A. C. Sparkes (Eds.), *Routledge handbook of qualitative research in sport and exercise* (pp. 330-339). Routledge.

Caron, J. G., Benson, A. J., Steins, R., McKenzie, L., & Bruner, M. W. (2021). The social dynamics involved in recovery and return to sport following a sport-related concussion: A study of three athlete-teammate-coach triads. *Psychology of Sport & Exercise*, 52. https://doi.org/10.1016/j.psychsport.2020.101824

Caron, J. G., Bloom, G. A., & Podlog, L. W. (2017). Are athletes psychologically ready for sport following a concussion? *British Journal of Sports Medicine, 52*(1), 1-2. https://doi.org/10.1136/bjsports-2017-098319

Caron, J. G., Bloom, G. A., Johnston, K. M., & Sabiston, C. M. (2013). Effects of multiple concussions on retired national hockey league players. *Journal of Sport & Exercise Psychology, 35*(2), 168-179. https://doi.org/10.1123/jsep.35.2.168

Caron, J. G., Schaefer, L., Andre-Morin, D., & Wilkinson, S. (2017). A narrative inquiry into female athlete's experiences with protracted concussion symptoms. *Journal of Loss and Trauma, 22*(6), 501-503. https://doi.org/10.1080/15325024.2017.1335150

Caron, J.G., Cadotte, G., Collict, C., van Ierseel, J. J., & Podlog, L. (2022). Exploring the factors involved in being "ready" to return to sport following a concussion. *Clinical Journal of Sports Medicine, 33*(4), 395-404. http://dx.doi.org/10.1097/JSM.0000000000001101

Casper, S. T., Bachynski, K. E., Buckland, M. E., Comrie, D., Gandy, S., Gates, J., Goldberg, D. S., Henne, K., Hind, K., Morrison, D., Ortega, F., Pearce, A. J., Philpott-Jones, S., Sandel, E., Tatos, T., Tucker, S., & Finkel, A. M. (2021). Toward complete, candid, and unbiased international consensus statements on concussion in sport. *Journal of Law, Medicine & Ethics, 49*(3), 372-377. https://doi.org/10.1017/jme.2021.56

Cassilo, D., & Sanderson, J. (2019). From social isolation to becoming an advocate: Exploring athletes' grief discourse about lived concussion experiences in online forums. *Communication & Sport, 7*(5), 678-696. https://doi.org/10.1177/2167479518790039

Chandran, A., Nedimyer, A. K., Boltz, A. J., Robison, H. J., Collins, C. L., & Morris, S. M. (2021). Epidemiology of injuries in national collegiate athletic association women's ice hockey: 2014-2015 through 2018-2019. *Journal of Athletic Training, 56*(7), 695-702. https://doi.org/10.4085/1062-6050-546-20

Chogahara M. (1999). A multidimensional scale for assessing positive and negative social influences on physical activity in older adults. *The Journals of Gerontology.*

Series B, Psychological Sciences and Social Sciences, *54*(6), S356–S367. https://doi.org/10.1093/geronb/54b.6.s356

Chrisman, S. P., Quitiquit, C., & Rivara, F. P. (2013). Qualitative study of barriers to concussive symptom reporting in high school athletics. *Journal of Adolescent Health, 52*(3), 330-335. https://doi.org/10.1016/j.jadohealth.2012.10.271

Clement, D., & Shannon, V. R. (2011). Injured athletes' perceptions about social support. *Journal of Sport Rehabilitation, 20*(4), 457-470. https://doi.org/10.1123/jsr.20.4.457

Clement, D., Arvinen-Barrow, M., & Fetty, T. (2015). Psychosocial responses during different phases of sport-injury rehabilitation: A qualitative study. *Journal of Athletic Training, 50*(1), 95-104. https://doi.org/10.4085/1062-6050-49.3.52

Cohen, S., & Syme, S.L. (1985). *Social support and health*. New York: Academic Press.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98*(2), 310–357. https://doi.org/10.1037/0033-2909.98.2.310

Collins, M. W., Kontos, A. P., Okonkwo, D. O., Almquist, J., Bailes, J., Barisa, M., Bazarian, J., Bloom, O. J., Brody, D. L., Cantu, R., Cardenas, J., Clugston, J., Cohen, R., Echemendia, R., Elbin, R. J., Ellenbogen, R., Fonseca, J., Gioia, G., Guskiewicz, K., … Zafonte, R. (2016). Statements of agreement from the Targeted Evaluation and Active Management (TEAM) approaches to treating concussion meeting held in Pittsburgh, October 15-16, 2015. *Neurosurgery*, *79*(6), 912–929. https://doi.org/10.1227/NEU.0000000000001447

Corbillon, F., Crossman, J., & Jamieson, J. (2008). Injured athletes' perceptions of the social support provided by their coaches and teammates during rehabilitation. *Journal of Sport Behaviour, 31*(2), 93-107.

Covassin, T., Crutcher, B., Bleecker, A., Heiden, E. O., Dailey, A., & Yang, J. (2014). Postinjury anxiety and social support among collegiate athletes: A comparison between orthopaedic injuries and concussions. *Journal of Athletic Training, 49*(4), 462-468. https://doi.org/10.4085/1062-6059-49.2.03

Covassin, T., Elbin, R. J., Beidler, E., & LaFevor, M. (2017). A review of psychological issues that may be associated with a sport-related concussion in youth and collegiate athletes. *Sport, Exercise, and Performance Psychology, 6*(3), 220-229. http://dx.doi.org/10.1037/spy0000105

Covassin, T., Elbin, R. J., Stiller-Ostrowski, J. L., & Kontos, A. P. (2009). Immediate post-concussion assessment and cognitive testing (ImPACT) practices of sports medicine professionals. *Journal of Athletic Training*, *44*(6), 639-644. https://doi.org/10.4085/1062-6050-44.6.639

Covassin, T., Neidler, E., Ostrowski, J., & Wallace, J. (2015). Psychosocial aspects of rehabilitation in sports. *Clinical Journal of Sports Medicine, 34*(2), 199-212. https://doi.org/10.1016/j.csm.2014.12.004

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative and mixed methods approaches.* (3rd ed.). SAGE Publications.

Creswell, J. W., & Plano-Clark, V. L. (2018). *Designing and conducting mixed methods research*. (3rd ed.). SAGE Publications.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design*. (4th ed.). SAGE Publications.

Cutrona, C. E., & Russell, D. W. (1990). Type of social support and specific stress: Toward a theory of optimal matching. In B. R. Sarason, I. G. Sarason, & G. R. Pierce (Eds.), *Social support: An interactional view* (pp. 319–366). John Wiley & Sons.

Davis, G. A., Anderson, V., Babl, F. E., Gioia, G. A., Giza, C. C., Meehan, W., Moser, R. S., Purcell, L., Schatz, P., Schneider, K. J., Takagi, M., Yeates, K. W., & Zemek, R. (2017). What is the difference in concussion management in children as compared with adults? A systematic review. *British Journal of Sports Medicine*, *51*(12), 949-957. http://dx.doi.org/10.1136/bjsports-2016-097415

Deal, C. J., & Shields, C. A. (2015). Importance of the student therapist/athlete relationship and goal-setting in injury rehabilitation. *Qualitative Report*, *20*(11), 1859-1870. https://doi.org/10.46743/2160-3715/2015.2395

Dean, N. A. (2020). Sport-related concussions: Critical reflections, methodological musing, and new research directions. In R. Wadey (Ed.), *Sport injury psychology: Cultural, relational, methodological, and applied considerations* (pp. 49-60). Routledge.

DeCuir-Gunby, J. T., Marshall, P. L., & McCulloch, A. W. (2011). Developing and using a codebook for the analysis of interview data: An example from a professional development research project. *Field Methods*, *23*(2), 136-155. https://doi.org/10.1177/1525822X10388468

D'Lauro, C., Jones, E. R., Swope, L. M., Anderson, M. N., Broglio, S., & Schmidt, J. D. (2022). Under-representation of female athletes in research informing influential concussion consensus and position statements: an evidence review and

synthesis. *British Journal of Sports Medicine*, *56*(17), 981-987. http://dx.doi.org/10.1136/bjsports-2021-105045

Donaldson, S., Donaldson, M., & Kaluzny, K. (2017). Assessing second impact syndrome concussions in junior hockey utilizing the QEEG. *Biofeedback, 45*(20), 30-33. https://doi.org/10.5298/1081-5937-45.01.09

Echemendia, R. J., Brett, B. L., Broglio, S., Davis, G. A., Giza, C. C., Guskiewicz, K. M., Harmon, K. G., Herring, S., Howell, D. R., Master, C. L., Valovich McLeod, T. C., McCrea, M., Naidu, D., Patricios, J., Putukian, M., Walton, S. R., Schneider, K. J., Burma, J. S., & Bruce, J. M. (2023). Introducing the Sport Concussion Assessment Tool 6 (SCAT6). *British Journal of Sport Medicine, 57*(11), 619-621. http://dx.doi.org/10.1136/bjsports-2023-106849

Echemendia, R. J., Meeuwisse, W., Patricios, P., Davis, G. A., Putukian, M., Leddy, J., Makdissi, M., Sullivan, S. J., Broglio, S. P., Raftery, M., Schneider, K., Kissick, J., McCrea, M., Dvořák, J., Sills, A. K., Aubry, M., Engebretsen, L., Loosemore, M., Fuller, G., … Herring, S. (2017). The Sport Concussion Assessment Tool 5th Edition (SCAT5): Background and rationale. *British Journal of Sports Medicine, 51*(11), 848-850. https://doi.org/10.1136/bjsports-2017-097506

Eckner, J. T., Wang, J., Nelson, L. D. (2020) Effect of routine sport participation on short-term clinical neurological outcomes: A comparison of non-contact, contact, and collision sport athletes. *Sports Medicine, 50*(5), 1027–1038. https://doi.org/10.1007/s40279-019-01200-y

Eggleston, S. D. (2020). *Athletes in love: A grounded theory of collegiate athletes navigating romantic relationships and sports*. [Doctoral dissertation, Texas Tech University]. Texas Tech University. https://hdl.handle.net/2346/86655

Elbin, R. J. Fazio-Sumrok, V., Anderson, M. N., D'Amico, N. R., Said, A., Grossel, A., Schatz, P., Lipinski, D., & Womble, M. (2019). Evaluating the suitability of the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) computerized neurocognitive battery for short-term, serial assessment of neurocognitive functioning. *Journal of Clinical Neuroscience, 62*, 138-141. https://doi.org/10.1016/j.jocn.2018.11.041

Ellis, M. J., Leddy, J. & Willer, B. (2016). Multi-disciplinary management of athletes with post-concussion syndrome: An evolving pathophysiological approach. *Frontiers in Neurology, 7*(136), 1-14. https://doi.org/10.3389/fneur.2016.00136

Engström, Å., Jumisko, E., Shahim, P., Lehto, N., Blennow, K., Zetterberg, H., & Tegner, Y. (2020). Losing the identity of a hockey player: The long-term effects of concussions. *Concussion, 5*(2), https://doi.org/10.2217/cnc-2019-0014

Evans, L., Hardy, L., Mitchell, I., & Rees, T. (2008). The development of a measure of psychological responses to injury. *Journal of Sport Rehabilitation*, *17*(1), 21-37. https://doi.org/10.1123/jsr.17.1.21

Eys, M., Evans, M. B., Martin, L. J., Ohlert, J., Wolf, S. A., Van Bussel, M., & Steins, C. (2015). Cohesion and performance for female and male sport teams. *The Sport Psychologist*, *29*(2), 97-109. https://doi.org/10.1123/tsp.2014-0027

Ferdinand Pennock, K. M. (2022). *Deciding to play: Exploring why adolescent athletes under-report sport-related concussions using a mixed methods*

approach. [Doctoral dissertation, University of Toronto]. University of Toronton. https://hdl.handle.net/1807/125008

Fletcher, A. J. (2017) Applying critical realism in qualitative research: Methodology meets method, *International Journal of Social Research Methodology, 20*(2), 181-194. https://doi.org/10.1080/13645579.2016.1144401

Forsdyke, D., Madigan, D., Gledhill, A., & Smith, A. (2022). Perceived social support, reinjury anxiety, and psychological readiness to return to sport in soccer players. *Journal of Sport Rehabilitation*, *31*(6), 749-755. https://doi.org/10.1123/jsr.2021-0181

Freeman, P. (2020). Social support in sport. In G. Tenenbaum & R. C. Eklund (Eds.), *Handbook of sport psychology* (pp. 447–463). John Wiley & Sons, Inc. https://doi.org/10.1002/9781119568124.ch21

Freeman, P., & Rees, T. (2008). The effects of perceived and received support on objective performance outcome. *European Journal of Sport Science*, *8*(6), 359-368. https://doi.org/10.1080/17461390802261439

Freeman, P., Coffee, P., & Rees, T. (2011). The PASS-Q: The Perceived Available Support in Sport Questionnaire. *Journal of Sport & Exercise Psychology*, *33*(1), 54–74. https://doi.org/10.1123/jsep.33.1.54

Froehlich, D. E., Van Waes, S., & Schäfer, H. (2020). Linking quantitative and qualitative network approaches: A review of mixed methods social network analysis in education research. *Review of Research in Education, 44*(1), 244-268. https://doi.org/10.3102/0091732X20903311

Ganesh, K., & Lazar, A. (2021). The work of workplace disclosure: invisible chronic conditions and opportunities for design. *Proceedings of the ACM on Human-computer Interaction*, *5*, 1-26. https://doi.org/10.1145/3449147

Gessel, L. M., Fields, S. K., Collins, C. L., Dick, R., & Comstock, D. (2007). Concussions among United States high school and collegiate athletes. *Journal of Athletic Training, 42*(4), 495-503. Retrieved July 2021, from https://pubmed.ncbi.nlm.nih.gov/18174937/

Golaszewski, N. M., & Bartholomew, J. B. (2019). The development of the physical activity and social support scale. *Journal of Sport and Exercise Psychology*, *41*(4), 215-229. https://doi.org/10.1123/jsep.2018-0234

Gordon, K. E., & Kuhle, S. (2022). Canadians reporting sport-related concussions: Increasing and now stabilizing. *Clinical Journal of Sport Medicine, 32*(3), 313-317. https://doi.org/10.1097/JSM.0000000000000888

Gottlieb, B. H., & Bergen, A. E. (2010). Social support concepts and measures. *Journal of Psychosomatic Research*, *69*(5), 511-520. https://doi.org/10.1016/j.jpsychores.2009.10.001

Griffin, L. J., Moll, T., Williams, T., & Evans, L. (2021). Rehabilitation from sport injury: A social support perspective. In Z. Zenko & L. Jones (Eds.), *Essentials of exercise and sport psychology: An open access textbook* (pp. 734–758). Society for Transparency, Openness, and Replication in Kinesiology. https://doi.org/10.51224/B1031

Guskiewicz, K. M., & Walton, S. R. (2020). The changing landscape of sport concussion, *Kinesiology Review*, *9*(1), 79-85. Retrieved Jul 2, 2023, from https://doi.org/10.1123/kr.2019-0059

Hatteberg, S. J. (2020). Collegiate athletes' use and perceptions of institutional sources of support for role-related stressors. *Journal of Issues in Intercollegiate Athletics*, 98-123.

Henry, L., Elbin, R., Collins, M., Marchetti, G., & Kontos, A. (2016). Examining recovery trajectories after sport-related concussion with a multimodal clinical assessment approach. *Neurosurgery, 78*(2), 232–241. https://doi.org/10.1227/NEU.0000000000001041

Herring, S., Kibler, W. B., Putukian, M., Solomon, G. S., Boyajian-O'Neil, L., Dec, K. L., Franks, R. R., Indelicato, P. A., LaBella, C. R., Leddy, J. J., Matuszak, J., McDonough, E. B., O'Connor, F., & Sutton, K. M. (2021). Selected issues in sport-related concussion (SRC/mild traumatic brain injury) for the team physician: A consensus statement. *British Journal of Sports Medicine, 55*(22), 1251-1261. http://dx.doi.org/10.1136/bjsports-2021-104235

Horton, A. S. (2002). *The impact of support groups on the psychological state of athletes experiencing concussions.* [Master's thesis, McGill University]. McGill University. https://escholarship.mcgill.ca/concern/theses/7p88cj53s

Hoyle, C. (2020). *Mental health outcomes of elite athletes following sport-related concussion*. [Doctoral dissertation, University of Alberta]. Education and Research Archive. https://doi.org/10.7939/r3-ctcq-9f80

Hruschka, D. J., Schwartz, D., St. John, D. C., Picone-Decaro, E., Jenkins, R. A., & Carey, J. W. (2004). Reliability in coding open-ended data: Lessons learned from HIV behavioral research. *Field Methods*, *16*(3), 307-331. https://doi.org/10.1177/1525822X04266540

Huber, C. M., Patton, D. A., McDonald, C. C., Jain, D., Simms, K., Lallo, V. A., Margulies, S. S., Master, C. L., & Arbogast, K. B. (2021). Sport- and gender-based differences in head impact exposure and mechanism in high school sports. *Orthopaedic Journal of Sports Medicine*, *9*(3). https://doi.org/10.1177/2325967120984423

ImPACT Applications Inc. (2022). *ImPACT concussion*. ImPACT test. https://impactconcussion.com/

Johnson, L. S. M., Partridge, B., & Gilbert, F. (2015). Framing the debate: Concussion and mild traumatic brain injury. *Neuroethics, 8*(1), 1-4. https://doi.org/10.1007/s12152-015-9233-8

Judge, L. W., Bellar, D., Blom, L. C., Lee, D., Harris, B., Turk, M., McAtee, G., & Johnson, J. (2012). Perceived social support from strength and conditioning coaches among injured student athletes. *Journal of Strength and Conditioning Research, 26*(4), 1154-1161. https://doi.org/10.1519/JSC.0b013e31822e008b

Kay, M. C., & Kucera, K. L. (2018). Mixed methods designs for sports medicine research. *Clinical Journal of Sports Medicine, 37*(3), 401-412. https://doi.org/10.1016/j.csm.2018.03.005

Kenzie, E. S., Parks, E. L., Bigler, E. D., Wright, D. W., Lim, M. M., Chesnutt, J. C., Hawryluk, G. W. J., Gordon, W., & Wakeland, W. (2018). The dynamics of

concussion: Mapping pathophysiology, persistence, and recovery with causal-loop diagramming. *Frontiers in Neurology, 9*(203), 1-16. https://doi.org/10.3389/fneur.2018.00203

Kerr, Z. Y., Chandran, A., Nedimyer, A. K., Arakkal, A., Pierpoint, L. A., & Zuckerman, S. L. (2019). Concussion incidence and trends in 20 high school sports. *Pediatrics*, *144*(5). https://doi.org/10.1542/peds.2019-2180

Kerr, Z. Y., Roos, K. G., Djoko, A., Dalton, S. L., Broglio, S. P., Marshall, S. W., & Dompier, T. P. (2017). Epidemiologic measures for quantifying the incidence of concussion in national collegiate athletic association sports. *Journal of Athletic Training*, *52*(3), 167–174. https://doi.org/10.4085/1062-6050-51.6.05

Kim, J., Tamminen, K. A., Bissett, J. E., Danyluck, C., Wolf, S. A., McEwen, C., & Wagstaff, C. R. D. (2023). "I hate it when that happens too!": observed and perceived exchanges of social support between university student-athletes during discussions of stressors. *International Journal of Sport and Exercise Psychology,* 1-17. https://doi.org/10.1080/1612197X.2022.2161106

Kita, H., Mallory, K. D., Hickling, A., Wilson, K. E., Kroshus, E., & Reed, N. (2020). Social support during youth concussion recovery. *Brain Injury, 34*(6), 784-792. https://doi.org/10.1080/02699052.2020.1753243

Kontos (2019). Psychological outcomes associated with concussion. In G. A. Bloom & J. G. Caron (Eds.). *Psychological aspects of sport-related concussions* (pp. 37-51). Routledge. https://doi.org/10.4324/9781351200516-1

Kontos, A. P. (2017). Concussion in sport: Psychological perspectives. *Sport, Exercise and Performance Psychology, 6*(3), 215-219. http://dx.doi.org/10.1037/spy0000108

Kontos, A. P., Covassin, T., Elbin, R. J., & Parker, T. (2012). Depression and neurocognitive performance after concussion among male and female high school and collegiate athletes. *Archives of Physical Medicine and Rehabilitation, 93*(10), 1751-1756. https://doi.org/10.1016/j.apmr.2012.03.032

Kontos, A. P., Deitrick, J. M., & Reynolds, E. (2016). Mental health implications and consequences following sport-related concussion. *Journal of Sports Medicine, 50*(3), 139-140. http://dx.doi.org/10.1136/bjsports-2015-095564

Kontos, A. P., Elbin, R. J., Schatz, P., Covassin, T., Henry, L., Pardini, J., & Collins, M. W. (2012). A revised factor structure for the Post-Concussion Symptom Scale: Baseline and postconcussion factors. *The American Journal of Sports Medicine, 40*(10), 2375-2384. https://doi.org/10.1177/0363546512455400

Kontos, A. P., Elbin, R. J., Sufrinko, A., Marchetti, G., Holland, C. L., & Collins, M. W. (2019) Recovery following sport-related concussion: Integrated pre- and postinjury factors into multidisciplinary care. *Journal of Head Trauma Rehabilitation, 34*(6), 394-401.

Kroshus, E. (2019). Psychological aspects of concussion in university athletes. In G. A. Bloom & J. G. Caron (Eds.), *Psychological aspects of sport-related concussions* (pp. 168- 183). Routledge. https://doi.org/10.4324/9781351200516-1

Kroshus, E., Garnett, B., Hawrilenko, M., Baugh, C. M., & Calzo, J. P. (2015). Concussion under-reporting and pressure from coaches, teammates, fans, and

parents. *Social Science & Medicine*, *134*, 66-75. https://doi.org/10.1016/j.socscimed.2015.04.011

Kroshus, E., Kubzansky, L. D., Goldman, R. E., & Austin, S. B. (2015). Norms, athletic identity, and concussion symptom under-reporting among male collegiate ice hockey players: A prospective cohort study. *Annals of Behavioural Medicine, 49*(1), 95-103. https://doi.org/10.1007/s12160-014-9636-5

Längler, M., Brouwer, J., & Gruber, H. (2020). Data collection for mixed method approaches in social network analysis. In D. E. Froehlich., M. Rehm & B. C. Rienties (Eds.), *Mixed methods social network analysis: Theories and methodologies in learning and education* (pp. 25-38). Routledge.

Lassman, M. E., Rathwell, S., Black, A. M., Caron, J. G. (2022). Exploring student-athletes' perceptions of their psychological readiness to return to sport following a concussion. *Sport, Exercise, and Performance Psychology, 11*(4), 444-458. https://doi.org/10.1037/spy0000309

Ledbetter, A. M., Carr, K., & Lynn, G. (2020). When a romantic partner has a spinal cord injury: Caregiving tasks and resilience as moderators of support quality on psychosocial distress and relational closeness. *Journal of Social and Personal Relationships*, *37*(8–9), 2551–2577. https://doi.org/10.1177/0265407520929761

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry* (pp. 221-249, 289-331). Sage Publications.

Lu, F. J. H., Hsu, Y. W., Chan, Y. S., Cheen, J. R., & Kao, K. T. (2012). Assessing college student-athletes' life stress: initial measurement development and

validation. *Measurement in Physical Education and Exercise Science*, *16*(4), 254-267. https://doi.org/10.1080/1091367X.2012.693371

Macdonald, M. E., Chilibeck, G., Affleck, W., & Cadell, S. (2010). Gender imbalance in pediatric palliative care research samples. *Palliative Medicine*, *24*(4), 435–444. https://doi.org/10.1177/0269216309354396

Mainwaring, L. M., Hutchison, M., Bisschop, S. M., Comper, S., & Richards, D. W. (2010). Emotional response to sport concussion compared to ACL injury. *Brain Injury, 24*(4), 589-597. https://doi.org/10.3109/02699051003610508

Malinauskas, R. (2008). College athletes' perceptions of social support provided by their coach before injury and after it. *Journal of Sports Medicine and Physical Fitness, 48*(1), 107-112.

Matney, C., Bowman, K., Berwick, D., & National Academies of Sciences, Engineering, and Medicine. (2022). Understanding patients with traumatic brain injury. In D. Berwick, K. Bowman, & C. Matney (Eds), *Traumatic brain injury: A roadmap for accelerating progress* (pp. 47-70). National Academies Press (US).

McCrea, M., Guskiewicz, K., Randolph, C., Barr, W. B., Hammeke, T. A., Marshall, S. W., Powell, M. R., Woo Ahn, K., Wang, Y., & Kelly, J. P. (2013). Incidence, clinical course, and predictors of prolonged recovery time following sport-related concussion in high school and college athletes. *Journal of the International Neuropsychological Society, 19*(1), 22-23. https://doi.org/10.1017/S1355617712000872

McCrory, P., Meeuwisse, W., Dvorak, J., Aubry, M., Bailes, J., Broglio, S., Cantu, R. C., Cassidy, D., Echemendia, R. J., Castellani, R. J., Davis, G. A., Ellenbogen, R., Emery, C., Engebretsen, L., Feddermann-Demont, N., Giza, C. C., Guskiewicz, K. M., Herring, S., Iverson, G. L., . . . Vos, P. E. (2017). Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016. *British Journal of Sports Medicine, 51*(11), 838-847. https://doi.org/10.1136/bjsports-2017-097699

McGuckin, M. E., Law, B., McAuliffe, J., Rickwood, G., & Bruner, M. W. (2016). Social influences on return to play following concussion in female competitive youth ice hockey players. *Journal of Sport Behavior, 39*(4), 426-445.

McKay, C., Herbison, J. D., & Martin, L. J. (2021). Navigating team dynamics throughout the injury process: "Family" values in a sport environment. In C. D. McKay (Ed.) *The mental impact of sports injury* (pp. 120-137). Routledge.

McKee, A. C. (2020). The neuropathology of chronic traumatic encephalopathy: The status of the literature. *Seminars in Neurology, 40*(4), 359-369. https://doi.org/10.1055/s-0040-1713632

McKee, A. C., Stein, T. D., Nowinski, C. J., Stern, R. A., Daneshvar, D. H., Alvarez, V. E., Lee, H., Hall, G., Wojtowicz, S. M., Baugh, C. M., Riley, D. O., Kubilus, C. A., Cormier, K. A., Jacobs, M. A., Martin, B. R. Abraham, C. R., Ikezu, T., Reichard, R. R., Wolozin, B. L., … Cantu, R. C. (2013). The spectrum of disease in chronic traumatic encephalopathy. *Brain, 136*(1), 43-64. https://doi.org/10.1093/brain/aws307

Menke, D. J., & Germany, M. (2019). Reconstructing athletic identity: College athletes and sport retirement. *Journal of Loss and Trauma, 24*(1), 17-30. https://doi.org/10.1080/15325024.2018.1522475

Miller, T. W., Coates, J., Plateau, C. R., & Barker, J. B. (2023). Exploring the barriers and facilitators to mental health help-seeking behaviours in British elite track and field athletes. *Journal of Applied Sport Psychology*, 1-21. https://doi.org/10.1080/10413200.2023.2197962

Mitchell, I., Evans, L., Rees, T., & Hardy, L. (2014). Stressors, social support, and tests of the buffering hypothesis: Effects on psychological responses of injured athletes. *British Journal of Health Psychology, 19*(3), 486-508. https://doi.org/10.1111/bjhp.12046

Morgan, T. K., & Giacobbi, P. R. (2006). Toward two grounded theories of the talent development and social support process of highly successful collegiate athletes. *The Sport Psychologist*, *20*(3), 295-313. https://doi.org/10.1123/tsp.20.3.295

Morrey, M. A., Stuart, M. J., Smith, A. M., & Wiese-Bjornstal, D. M. (1999). A longitudinal examination of athletes' emotional and cognitive responses to anterior cruciate ligament injury. *Clinical Journal of Sport Medicine: Official Journal of the Canadian Academy of Sport Medicine*, *9*(2), 63-69. https://doi.org/10.1097/00042752-199904000-00004

Nowinski, C. J., Bureau, S. C., Buckland, M. E., Curtis, M. A., Daneshvar, D. H., Faull, R. L. M., Grinberg, L. T., Hill-Yardin, E. L., Murray, H. C., Pearce, A. J., Suter, C. M., White, A. J., Finkel, A. M., & Cantu, R. C. (2022). Applying the Bradford

Hill Criteria for Causation to repetitive head impacts and chronic traumatic encephalopathy. *Frontiers in Neurology*, *13*. https://doi.org/10.3389/fneur.2022.938163

O'Leary, Z. (2021). *The essential guide to doing your research project*. SAGE Publications.

Okonkwo, D. O., Tempel, Z. J., & Maroon, J. (2014). Sideline assessment tools for the evaluation of concussion in athletes: A review. *Neurosurgery*, *75*, S82-S95. https://doi.org/10.1227/neu.0000000000000493

Ontario Neurotrauma Foundation. (2018, May). *Guideline for concussion/mild traumatic brain injury & prolonged symptoms*. Brain injury guidelines. https://braininjuryguidelines.org/concussion/fileadmin/pdf/Concussion_guideline_3rd_edition_final.pdf

Patricios, J. S., Schneider, K. J., Dvorak, J., Ahmed, O. H., Blauwet, C., Cantu, R. C., Davis, G. A., Echemendia, R. J., Makdissi, M., McNarnee, M., Broglio, S., Emery, C. A., Feddermann-Demont, N., Ward Fuller, G., Giza, C. C., Guskiewicz, K. M., Hainline, B., Iverson, G. L., Kutcher, J. S., ... & Meeuwisse, W. (2023). Consensus statement on concussion in sport: The 6th International Conference on Concussion in Sport–Amsterdam, October 2022. *British Journal of Sports Medicine*, *57*(11), 695-711. http://dx.doi.org/10.1136/bjsports-2023-106898

Pfister, T., Pfister, K., Hagel, B., Ghali, W. A., & Ronksley, P. E. (2016). The incidence of concussion in youth sports: A systematic review and meta-analysis. *British Journal of Sports Medicine*, *50*(5), 292–297. https://doi.org/10.1136/bjsports-2015-094978

Podlog, L., & Eklund, R. C. (2007). The psychosocial aspects of a return to sport following serious injury: A review of the literature from a self-determination perspective. *Psychology of Sport and Exercise, 8*(4), 535-566. https://doi.org/10.1016/j.psychsport.2006.07.008

Podlog, L., Banham, S. M., Wadey, R., & Hannon, J. C. (2015). Psychological readiness to return to competitive sport following injury: A qualitative study. *The Sport Psychologist, 29*(1), 1-14. http://dx.doi.org/10.1123/tsp.2014-0063

Podlog, L., Heil, J., & Schulte, S. (2014). Psychosocial factors in sports injury rehabilitation and return to play. *Physical Medicine and Rehabilitation Clinics, 25*(4), 915-930. https://doi.org/10.1016/j.pmr.2014.06.011

Podlog, L., Wadey, R., Caron, J., Fraser, J. J., Ivarsson, A., Heil, J., Podlog, S., & Casucci, T. (2022). Psychological readiness to return to sport following injury: A state-of-the-art review. *International Review of Sport and Exercise Psychology,* 1-20. https://doi.org/10.1080/1750984X.2022.2081929

Public Health Agency of Canada. (2020, October 21). *Concussion: Sport and recreation*. Government of Canada. https://www.canada.ca/en/public-health/services/diseases/concussion-sign-symptoms/sport-recreation.html

Putukian, M., D'Alonzo, B. A., Campbell-McGovern, C. S., & Wiebe, D. J. (2019). The ivy league–big ten epidemiology of concussion study: a report on methods and first findings. *The American Journal of Sports Medicine, 47*(5), 1236-1247. https://doi.org/10.1177/0363546519830100

Rees, T. (2007). Influence of social support on athletes. In S. Jowette & D. Lavallee (Eds.), *Social psychology in s port* (pp. 223–231). Human Kinetics. https://doi.org/10.5040/9781492595878.ch-016

Rees, T., & Hardy, L. (2000). An investigation of the social support experiences of high-level sports performers. *The Sport Psychologist*, *14*(4), 327-347. https://doi.org/10.1123/tsp.14.4.327

Rees, T., Mitchell, I., Evans, L., & Hardy, L. (2010). Stressors, social support and psychological responses to sport injury in high-and low-performance standard participants. *Psychology of Sport and Exercise*, *11*(6), 505-512. https://doi.org/10.1016/j.psychsport.2010.07.002

Rhind, D., Jowett, S., & Lorimer, R. (2011). The impact of social support on student athletes' satisfaction in individual sports. *Journal for the Study of Sports and Athletes in Education*, *5*(1), 73-84. https://doi.org/10.1179/ssa.2011.5.1.73

Rice, S. G. (2008). Medical conditions affecting sports participation. *Pediatrics, 121*(4), 841-848. https://doi.org/10.1542/peds.2008-0080

Richman, J. M., Rosenfeld, L. B., & Hardy, C. J. (1993). The social support survey: A validation study of a clinical measure of the social support process. *Research on Social Work Practice*, *3*(3), 288-311. https://doi.org/10.1177/1049731593003003

Robbins, J. E., & Rosenfeld, L. B. (2001). Athletes' perceptions of social support provided by their head coach, assistant coach, and athletic trainer, pre-injury and during rehabilitation. *Journal of Sport Behavior, 24*(3), 277-297.

Ryba, T. V., Wiltshire, G., North, J., & Ronkainen, N. J. (2022). Developing mixed methods research in sport and exercise psychology: Potential contributions of a critical realist perspective. *International Journal of Sport and Exercise Psychology*, *20*(1), 147-167. https://doi.org/10.1080/1612197X.2020.1827002

Salmon, D. M., Badenhorst, M., Walters, S., Clacy, A., Chua, J., Register-Mihalik, J., ... & Whatman, C. (2022). The rugby tug-of-war: Exploring concussion-related

behavioural intentions and behaviours in youth community rugby union in New Zealand. *International Journal of Sports Science & Coaching*, *17*(4), 804-816. https://doi.org/10.1177/17479541211047661

Sarason, B. R., Sarason, I. G., & Pierce, G. R. (Eds.). (1990). *Social support: An interactional view.* John Wiley & Sons.

Sarason, I. G., Levine, H. M., Bashan, R. B., & Sarason, B. R. (1983). Assessing social support: The Social Support Questionnaire. *Journal of Personality and Social Psychology, 44*(1), 127-139. https://doi.org/10.1037/0022-3514.44.1.127

Schatz, P., Elbin, R. J., Anderson, M. N., Savage, J., & Covassin, T. (2017). Exploring sandbagging behaviors, effort, and perceived utility of the ImPACT Baseline Assessment in college athletes. *Sport, Exercise, and Performance Psychology, 6*(3), 243–251. https://doi.org/10.1037/spy0000100

Schmidt, J. D., Suggs, D. W., Rawlins, M. L. W., Bierema, L., Miller, L. S., Courson, R., & Reifsteck, F. (2020). Coach, sports medicine, and parent influence on concussion care seeking intentions and behaviors in collegiate student-athletes. *Journal of Clinical and Translational Research*, *5*(4), 215–226. https://doi.org/10.18053/jctres.05.2020s4.009

Schneider, K. J., Emery, C. A., Black, A., Yeates, K. O., Debert, C. T., Lun, V., & Meeuwisse, W. H. (2019). Adapting the dynamic, recursive model of sport injury to concussion: An individualized approach to concussion prevention, detection, assessment, and treatment. *Journal of Orthopaedic & Sports Physical Therapy*, *49*(11), 799-810. https://www.jospt.org/doi/10.2519/jospt.2019.8926

Scott, C. L., Plateau, C. R., & Haycraft, E. (2020). Teammate influences, psychological well-being, and athletes' eating and exercise psychopathology: A moderated mediation analysis. *International Journal of Eating Disorders*, *53*(4), 564-573. https://doi.org/10.1002/eat.23222

Scott, L. C., Langdon, J., Botnaru, D., & Hunt, T. N. (2021). Evaluating knowledge attainment and retention of a multimodal approach to concussion education in collegiate athletes. *Athletic Training Education Journal*, *16*(3), 198-207. https://doi.org/10.4085/1947-380X-20-119

Seguin, C. M., & Culver, D. M. (2021). The lived experience of sport-related concussion: A collaborative inquiry in elite sport. *Journal of Applied Sport Psychology, 34*(5), 916-937. https://doi.org/10.1080/10413200.2021.1998804

Seguin, C. M., & Durand-Bush, N. (2019). A psychological skills training program for concussed athletes. In G. A. Bloom & J. G. Caron (Eds.), *Psychological aspects of sport-related concussions* (pp. 83-110). Routledge. https://doi.org/10.4324/9781351200516-1

Shumaker, S. A. and Brownell, A. (1984), Toward a theory of social support: Closing conceptual gaps. *Journal of Social Issues, 40*(4), 11-36. https://doi.org/10.1111/j.1540-4560.1984.tb01105.x

Silverberg, N. D., Iverson, G. L., ACRM Brain Injury Special Interest Group Mild TBI Task Force members:, Cogan, A., Dams-O-Connor, K., Delmonico, R., Graf, M. J. P., Iaccarino, M. A., Kajankova, M., Kamins, J., McCulloch, K. L., McKinney, G., Nagele, D., Panenka, W. J., Rabinowitz, A. R., Reed, N., Wethe, J. V., Whitehair, V., ACRM Mild TBI Diagnostic Criteria Expert Consensus Group:,

Anderson, V., … Zemek, R. (2023). The American congress of rehabilitation medicine diagnostic criteria for mild traumatic brain injury. *Archives of physical medicine and rehabilitation, 104*(8), 1343–1355. https://doi.org/10.1016/j.apmr.2023.03.036

Silverberg, N. D., & Mikolić, A. (2023). Management of psychological complications following mild traumatic brain injury. *Current Neurology and Neuroscience Reports*, *23*(3), 49-58. https://doi.org/10.1007/s11910-023-01251-9

Sparkes, A. C., & Smith, B. (2014). *Qualitative research methods in sport, exercise and health: From process to product*. Routledge. https://doi.org/10.4324/9780203852187

Stehlik, T. (2010). Mind the gap: School leaver aspirations and delayed pathways to further and higher education. *Journal of Education and Work*, *23*(4), 363-376. https://doi.org/10.1080/13639080.2010.492392

Stein, T. D., Alvarez, V. E., & McKee, A. C. (2015). Concussion in chronic traumatic encephalopathy. *Current Pain and Headache Reports, 19*(47), 1-6. https://doi.org/10.1007/s11916-015-0522-z

Steins, R. M., Bloom, G., & Caron, J. G. (2022). Exploring female university athlete experiences of coping with protracted concussion symptoms. *The Sport Psychologist, 36*(1), 10-19. https://doi.org/10.1123/tsp.2021-0045

Stern, R. A., Daneshvar, D. H., Baugh, C. M., Seichepine, D. R., Montenigro, P. H., Riley, D. O., Fritts, N. G., Stamm, J. M., Robbins, C. A., McHale, L., Simkin, I., Stein, T. D., Alvarez, V. E., Goldstein, L. E., Budson, A. E., Kowall, N. W., Nowinski, C. J., Cantu, R. C., & McKee, A. C. (2013). Clinical presentation of

chronic traumatic encephalopathy. *Neurology*, *81*(13), 1122–1129. https://doi.org/10.1212/WNL.0b013e3182a55f7f

Stillman, A., Alexander, M., Mannix, R., Madigan, N., Pascual-Leone, A., & Meehan, W. P. (2017). Concussion: Evaluation and management. *Cleveland Clinical Journal of Medicine*, *84*(8), 623-630. https://doi.org/10.3949/ccjm.84a.16013

Subcommittee on Sports-Related Concussions in Canada. (2019). *Tackling the problem head-on: Sports-related concussions in Canada.* https://www.ourcommons.ca/Content/Committee/421/HESA/Reports/RP10528875/hesarp24/hesarp24-e.pdf

Sufrinko, A. M., Kontos, A. P., Apps, J. N., McCrea, M., Hickey, R. W., Collins, M. W., Thomas, D. G. (2017). The effectiveness of prescribed rest depends on initial presentation after concussion. *The Journal of Pediatrics, 185*, 167-172. https://doi.org/10.1016/j.jpeds.2017.02.072

Tamminen, K. A., & Poucher, Z. A. (2020). Research philosophies. In D. Hackfort & R. Schinke (Eds.), *The Routledge international encyclopedia of sport and exercise psychology* (pp. 535-549). Routledge.

Todd, R., Bhalerao, S., Vu, M. T., Soklaridis, S., & Cusimano, M. D. (2018). Understanding the psychiatric effects of concussion on constructed identity in hockey players: Implications for health professionals. *PloS one*, *13*(2). https://doi.org/10.1371/journal.pone.0192125

Udry, E., Gould, D., Bridges, D., & Tuffey, S. (1997). People helping people? Examining the social ties of athletes coping with burnout and injury stress. *The Journal of*

Sport and Exercise Psychology, 19(4), 368-395. https://doi.org/10.1123/jsep.19.4.368

University of Lethbridge. (2022, August 10). *22-23 student athlete handbook*. University of Lethbridge. https://gohorns.ca/documents/2022/8/10/22-23_Student_Handbook.pdf

USPORTS. (2019, April 10). *Concussion statement and guidelines.* USPORTS. https://USPORTS.ca/uploads/hq/Medical/Concussion/190410_-_Concussion_Statement.pdf

USPORTS. (2021, August 10). *Policies and procedures: 40-eligibilty.* USPORTS. https://USPORTS.ca/uploads/hq/By_Laws-Policies-Procedures/2021/Policy_40.10.1_to_40.10.6_Eligibility_Rules_%282021-2022%29_DRAFT.pdf

van Ierssel, J., O'Neil, J., Sveistrup, H., Marshall, S., & Graham, I. (2021). A qualitative study of persons with persistent postconcussion symptoms and clinicians with concussion expertise to inform the development of a concussion-specific questionnaire. *Disability and Rehabilitation, 43*(23), 3365-3376. https://doi.org/10.1080/09638288.2020.1743772

van Ierssel, J., Pennock, K. F., Sampson, M., Zemek, R., & Caron, J. G. (2022.). Which psychosocial factors are associated with return to sport following concussion? A systematic review. *Journal of Sport and Health Science*, *11*(4), 438-449. https://doi.org/10.1016/j.jshs.2022.01.001

Van Slingerland, K., Durand-Bush, N., DesClouds, P., & Göran Kenttä. (2020). Providing mental health care to an elite athlete: The perspective of the Canadian Centre for

Mental Health and Sport team. *Case Studies in Sport and Exercise Psychology, 4*(S1), S1-17. https://doi.org/10.1123/cssep.2019-0022

Van Waes, S., & Van den Bossche, P. (2019). Around and around: The concentric circles method as a powerful tool to collect mixed method network data. In D. E. Froehlich, M. Rehm, & B. C. Rienties (Eds.), *Mixed methods social network analysis* (pp. 159-174). Routledge.

Wallace, J., Covassin, T., Nogle, S., Gould, D., & Kovan, J. (2017). Knowledge of concussion and reporting behaviors in high school athletes with or without access to an athletic trainer. *Journal of Athletic Training*, *52*(3), 228-235. https://doi.org/10.4085/1062-6050-52.1.07

Walter, A. E., Kaschak, C., Sebasianelli, W., Arnett, O., & Slobounov, S. M. (2020). Concussion in collegiate athletics: A link to academic achievement. *Journal of Concussion*, *65*(6), 924-956. https://doi.org/10.1177/2059700220972584

Walton, S. R., Kerr, Z. Y., Mannix, R., Brett, B. L., Chandran, A., DeFreese, J. D., McCrea, M. A., Guskiewicz, K. M., Meehan, W. P., & Echemendia, R. J. (2022). Subjective concerns regarding the effects of sport-related concussion on long-term brain health among former NFL players: An NFL-LONG study. *Sports Medicine, 52*(5), 1189-1203. https://doi.org/10.1007/s40279-021-01589-5

Wäsche, H., Dickson, G., Woll, A., & Brandes, U. (2017). Social network analysis in sport research: An emerging paradigm. *European Journal for Sport and Society*, *14*(2), 138-165. https://doi.org/10.1080/16138171.2017.1318198

Weber Rawlins, M. L., Johnson, R. S., Schmidt, J. D., Lynall, R. C., O'Brien, K. H., & Welch Bacon, C. E. (2022). University educators' perceptions of academic

adjustments following a concussion for student-athletes and non-student-athletes. *Journal of American College Health*, 1-9. https://doi.org/10.1080/07448481.2022.2108324

West, S. W., Pankow, M. P., Gibson, E. S. Eliason, P. H., Black, A. M., & Emery, C. A. (2022). Injuries in Canadian high school boys' collision sports: Insights across football, ice hockey, lacrosse, and rugby. *Sport Sciences for Health*, 1-9. https://doi.org/10.1007/s11332-022-00999-w

Wiebe, D. J., Bretzin, A. C., & D'Alonzo, B. A. (2022). Progression through return-to-sport and return-to-academics guidelines for concussion management and recovery in collegiate student athletes: Findings from the ivy league - big ten epidemiology of concussion study. *British Journal of Sports Medicine, 56*(14), 801-811. http://dx.doi.org/10.1136/bjsports-2021-104451

Wiese-Bjornstal, D. M., White, A. C., Russell, H. C., & Smith, A. M. (2015). Psychology of sport concussions. *Kinesiology Review, 4*(2), 169–189. http://dx.doi.org/10.1123/kr.2015-0012

Williams, L. M., & Douglas, J. M. (2022). It takes two to tango: The therapeutic alliance in community brain injury rehabilitation. *Brain Impairment*, *23*(1), 24-41. https://doi.org/10.1017/BrImp.2021.26

Yang, J., Peek-Asa, C., Covassin, T., & Torner, J. C. (2015). Post-concussion symptoms of depression and anxiety in division I collegiate athletes. *Developmental Neuropsychology, 40*(1), 18-23. https://doi.org/10.1080/87565641.2014.973499

Yang, J., Peek-Asa, C., Lowe, J. B., Heiden, E., & Foster, D. T. (2010). Social support patterns of collegiate athletes before and after injury. *Journal of Athletic Training, 45*(4), 372-379. https://doi.org/10.4085/1062-6050-45.4.372

Yang, J., Schaefer, J. T., Zhang, N., Covassin, T., Ding, K., & Heiden, E. (2014). Social support from the athletic trainer and symptoms of depression and anxiety at return to play. *Journal of Athletic Training, 49*(6), 773-779. https://doi.org/10.4085/1062-6050-49.3.65

Yin, R. K. (2018). Case study research and applications: Design and methods (6th ed.). Thousand Oaks, Calif: Sage Publications.

Zemek, R., Barrowman, N., Freedman, S. B., Gravel, J., Gagnon, I., McGahern, C., Aglipay, M., Sangha, G., Boutis, K., Beer, D., Craig, W., Burns, E., Farion, K. J., Mikrogianakis, A., Barlow, K., Dubrovsky, A. S., Meeuwisse, W., Gioia, G., Meehan, W. P., … Osmond., M. H. (2016). Clinical risk score for persistent postconcussion symptoms among children with acute concussion in the ED. *JAMA*, *315*(10), 1014-1025. https://doi.org/10.1001/jama.2016.1203

Zuckerman, S. L., Kerr, Z. Y., Yengo-Kahn, A., Wasserman, E., Covassin, T., & Solomon, G. S. (2015). Epidemiology of sports-related concussion in NCAA athletes from 2009-2010 to 2014-2014: Incidence, recurrence, and mechanisms. *The American Journal of Sports Medicine, 43*(11), 2654-2662. https://doi.org/10.1177/0363546515599634

Appendix A

Athlete Recruitment Letter

To whom it may concern,

You are being invited to participate in a research study on sport-related concussions and social support during the return to sport strategy at the University of Lethbridge. This is a research study that aims to understand the role of social support during the concussion return to sport strategy. Through your participation, we hope to better understand the perceptions of supports available and used by university athletes during their concussion return to sport strategy. Data for this study will be collected for the purposes of Carley Jewell's Master's Thesis at the University of Lethbridge under the supervision of Dr. Scott Rathwell.

For this study, you will be asked to participate in completing: six mapping exercises at each return to sport stage, several Perceived Available Support in Sport Questionnaires (PASS-Q), and 2 in-person interviews during the return to sport strategy. Mapping exercises and the PASS-Q will be conducted in English and will occur in-person at a location convenient for the participant (i.e., athletic therapist office etc.). Each mapping exercise will take approximately 10-15 minutes. Each PASS-Q will take approximately 5 minutes. Interviews will be conducted in English. Each interview will take approximately 60-90 minutes. One interview will take place between stages four and five of the return to sport strategy, and the other will be conducted after stage 6, at the completion of the strategy. This second interview will take approximately 30-60 minutes.

The current study will inform researchers of how social support may influence a university athletes' return to sport from sport-related concussion injury. Particularly, university athletes are mandated to complete the return to sport strategy to return to their respective sports after suffering a concussion. The results of this study will be used to inform practitioners and policy makers of the utility of social support during the return to sport strategy, which may provide rationale to amend the existing concussion return to sport strategy to allocate adequate social support resources during rehabilitation. This research may also allow athletes to champion for the provision of social support during their concussion return to sport strategy.

If you are interested in participating in this study, contact primary researcher, Carley Jewell, via email at carley.jewell@uleth.ca to inform her of your interest. Afterwards, you will be sent a Letter of Consent that will need to be signed and returned to Carley Jewell prior to participating. Once this form has been signed and returned, you will be emailed a demographic questionnaire that asks for various personal and sport-related information. Following this, the primary researcher will email you to arrange times and dates to complete the mapping exercise and interviews that is most convenient for you during the return to sport strategy.

If you have any questions about the study, please feel free to email the primary researcher at carley.jewell@uleth.ca.

Thank you for your consideration,

Carley Jewell
Master's student, B.Sc. Psychology
Department of Kinesiology & Physical Education
Faculty of Arts & Science
University of Lethbridge
4401 University Drive
Lethbridge, Alberta, Canada T1K 3M4
(204) 330-7789
carley.jewell@uleth.ca

Appendix B

Participant Consent Form

Title of Study: ***Social Support and Return to Sport in Concussed University Athletes: An Explanatory- Sequential Mixed Methods Study***

Contact Information
Principal Investigator: Carley Jewell, MSc Student, Kinesiology & Physical Education
Mailing Address: 4401 University Drive, Lethbridge AB, T1K 3M4
Email: carley.jewell@uleth.ca

Supervisor: Dr. Scott Rathwell, Associate professor, Kinesiology & Physical Education
Mailing Address: 4401 University Drive, Lethbridge AB, T1K 3M4
Phone: 403-329-5188
Email: scott.rathwell@uleth.ca

You are being invited to take part in a research study. Before you take part, a member of the study team is available to explain the project and you are free to ask any questions about anything you do not understand. You will be given a copy of this form for your records.

Why am I being asked to take part in this research study?
You are being asked to be in this study because you have recently experienced a sport-related concussion and will be participating in the Return to Sport (RTS) strategy. The purpose of this research is to understand university athletes' perspectives of social support provided to them during the concussion RTS strategy.

The results of this study will be used in support of my Master's thesis required for the completion of the Masters of Science degree specializing in Kinesiology. The findings of this study may be presented in journals read by experts in the field of exercise and sport psychology. Additionally, the findings will be presented at the primary researcher's thesis defense to members of the university community. Before you decide, you are encouraged to ask questions if anything needs to be clarified. You will be given a copy of this form for your records.

What is the reason for doing the study?
The goal of this study is to understand the role of social support during the concussion Return to Sport strategy. The role of social support during concussion rehabilitation is debated. This research wants to better understand the role that social support plays in influencing athletes return to sport from concussion injury so it can help us understand how to provide social support to concussion injured university athletes. Your participation will help us better understand the perceptions of supports available and utilized by university athletes during their concussion Return to Sport strategy.

What will I be asked to do?
You are being invited to take part in two ways. First, we would like you to complete a social network analysis tool called concentric circles mapping at each stage of the Return to Sport (RTS) strategy and the Perceived Available Support in Sport Questionnaires (PASS-Q). This will be an individual activity where you will complete a visual diagram that describes the individuals currently offering you support and their relative importance in you reaching your rehabilitation goals, and a questionnaire that indicates the type of support these individuals offer.

Together, each mapping and questionnaire exercise will take approximately 10-15 minutes and will take place in-person at the University of Lethbridge (U of L) campus. You can select where we meet, and all COVID-19 protocols set by U of L will be adhered to. The primary researcher (Carley Jewell) will be present for all six mapping and questionnaire exercises, and the overall time commitment for this portion will be approximately 60-70 minutes.

The second part of the study invites you to take part in two one-on-one interviews. Interviews will take place at two timepoints. The first between stages four and five of the RTS strategy, and the second at the completion of the strategy (i.e., stage 6). You will have the option of participating in interviews online via Zoom or in-person at a convenient location at the U of L for you. Each interview will last between 30-60 minutes. You will discuss your general experience with concussion, your sport history, and your experience with social support during your current concussion RTS strategy. Interviews will be audio-recorded and transcribed by our research team. If you would like a copy of the transcript emailed to you to check for accuracy, you can indicate so at the end of the meeting and you will be given the opportunity to make changes, revisions, or deletions to your comments.

Overall, the total time commitment for this study (i.e., including six concentric circles mapping exercises, questionnaires and two interviews) is approximately 90-120 minutes. If you wish, you may participate in only the concentric circles mapping and questionnaire exercises and not the interviews. However, you may not be able to participate in the interviews without completing the concentric circles mapping and questionnaire exercises, as the interviews are designed to further elaborate on the concentric circles maps and questionnaires.

The concentric circles mapping results, questionnaire responses, and interview transcripts will be kept confidential with only the primary researcher (Carley Jewell) having access to the data. All printed transcripts will be stored in a locked filing cabinet that only the primary researcher (Carley Jewell) has access to.

What are the risks and discomforts?
You are unlikely to experience risks or discomforts by taking part in this research. One potential risk is the disturbance to recovery. This study will take place simultaneously with rehabilitation strategies; however, all research acts will refrain from interfering with explicit rehabilitation processes. There is potential that the cognitive load of interviews may cause new or worsening concussion related symptoms. If this is the case, interview

sessions will conclude and can be rescheduled if necessary. It is not possible to know all the risks that may happen in a study, but we have taken all reasonable safeguards to minimize any known risks to you.
COVID-19 Related Risks: Because concentric circles mapping and some interviews may take place in person, we will adhere to all current Alberta Health Services public health and U of L guidelines related to COVID-19. Please feel free to discuss protocols with us prior to taking part in the project.

What are the benefits to me?
There may not be any direct benefit to you for participating in this research. However, some participants find it helpful to discuss and identify their social support systems during the concussion Return to Sport strategy.

By participating in this study, you will help us understand ways that concussed athletes are supported during the Return to Sport strategy, and the results may help yourself and other individuals who will participate in the Return to Sport strategy in the future to receive adequate and effective social support.

Do I have to take part in the study?
Being in this study is your choice. If you wish to withdraw from the study, any information collected from you will be destroyed upon your request. If you decide to be in the study, you can change your mind and stop being in the study at any time until March 30, 2023. After that point we cannot remove you from the study because data will be analyzed in full, and data will have been included in the written Master's thesis that this study is being conducted to fulfill.

There will be no negative consequences if you wish to withdraw from the study. To withdraw from the study please contact the principal investigator (Carley Jewell: carley.jewell@uleth.ca)
Even if you remain in the research study, you may choose to withdraw some or all your responses by contacting Carley Jewell (carley.jewell@uleth.ca). Throughout the study duration, you will have access to your concentric circles maps and will be able to remove, change, or withdraw anything that you would like. Individual interview transcripts will be sent to you via email, and you will have two weeks to review the contents and remove, change, or withdraw anything that you like. We will be unable to remove your answers after March 30, 2023, because by that time data analysis will be complete. For both the concentric circles maps and interviews you reserve the right to decline answering any questions should you wish to do so.
Prior to your first interview, the primary researcher will go over the consent form with you again to remind you of your rights as a participant.

Will my information be kept private?
During this study we will do everything we can to make sure that all information you provide is kept private. No information relating to this study that includes your name will be released outside of the researcher's office or published by the researchers unless you give us your express permission. Sometimes, by law, we may have to release your

information with your name so we cannot guarantee absolute privacy. However, we will make every legal effort to make sure that your information is kept private.

When your interview is transcribed, we will assign a pseudonym (fake name) to protect your identity. If you would like to choose your own fake-name, please say so in the interview. If you would like us to use your real name, please indicate this on the signed consent form on the last page of this document.

During analysis, you will be assigned a code that will be used during the transcription in place of your name. Any mention of your name in the interview will be replaced with this code. A file containing your name and your assigned pseudonym and code will be saved on a password locked computer that only the primary researcher has access to. This computer will be stored in a locked office in the Psychology for Active Living and Sport (PALS) lab at the University of Lethbridge. When not in use, any paper copies of the typed interviews will be stored in a locked filing cabinet in the same locked office, that only the primary researcher has access to.

What will happen to the information or data that I provide?
The information you provide will form part of Carley Jewell's Master's thesis in Kinesiology at the University of Lethbridge. It may also be used as part of public or academic presentations, in news or academic publications, as well as for examples during teaching. At no point will you be identified in this work.

After the study is done, we will store your data for a minimum of 5 years. Any physical papers and transcripts will be stored in locked cabinets in the Psychology for Active Living and Sport (PALS) lab at the University of Lethbridge. These papers will be securely shredded after Carley Jewell's thesis is complete. Electronic data will be stored on a secure University of Lethbridge OneDrive. The data will be stored for at least 5 years but may be kept longer for future research. Your name will never be associated with any electronic data. Your data may be linked to other data for research purposes only to increase the usefulness of the data. Any researcher who wants to use this data in the future must have the new project reviewed by an ethics board.

The information from this study will be seen only by members of the research group. On occasion, this data will need to be checked for accuracy. For this reason, your data, including your name, may also be looked at by people from the Research Ethics Board or by the University of Alberta auditors.

What if I have questions?
If you have any questions about the research now or later, please contact Carley Jewell (carley.jewell@uleth.ca) or her supervisor Dr. Scott Rathwell (scott.rathwell@uleth.ca).

This study is funded by the Social Sciences and Humanities Research Council of Canada (SSHRC). The Institution and Principal Investigator are getting money from the study sponsor to cover the costs of doing this study. You are entitled to request any details concerning this compensation from the Principal Investigator.

If you have any questions regarding your rights as a research participant, you may contact the University of Alberta Research Ethics Office at reoffice@ualberta.ca and quote Ethics ID Pro00122528. This office is independent of the study investigators.

How do I indicate my agreement to be in this study?
By signing below, you understand:

- That you have read the above information and have had anything that you do not understand explained to you to your satisfaction.
- That you will be taking part in a research study.
- That you may freely leave the research study at any time.
- That you do not waive your legal rights by being in the study
- That the legal and professional obligations of the investigators and involved institutions are not changed by your taking part in this study.
- That you agree to the data being stored as part of a data repository

SIGNATURE OF STUDY PARTICIPANT

_____
Name of Participant

I give permission for my real name to be used:

☐ Yes
☐ No

Pseudonym: _____

_____ _____
Signature of Participant Date

SIGNATURE OF PERSON OBTAINING CONSENT

_____ _____
Name of Person Obtaining Consent Contact Number

A copy of this information and consent form has been given to you to keep for your records and reference.

Appendix C

Concentric Circles Map Instructions and Package

You are about to participate in a research study exploring university athletes' perceptions of social support during the Return-to-Sport (RTS) strategy. Please read the following instructions carefully. The instructions inform you of everything you need to know to participate in this study. If you do not understand something, please ask the PI (*Carley Jewell*) directly.

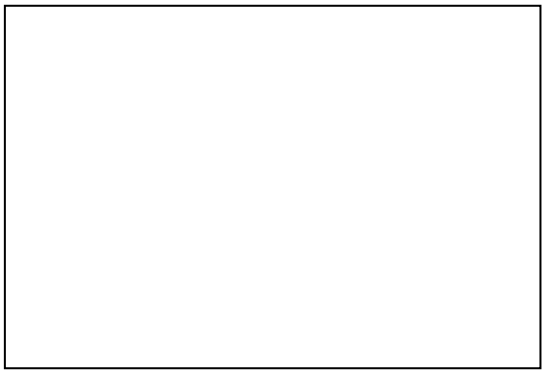
The first part of the study lasts for the **entirety** of the **RTS strategy**. At each RTS strategy stage you will be asked to complete **one** concentric circles map. Each map is labelled for the stage you are at. To complete the map, you will answer the following question:

Who is *currently* most important to you in supporting your concussion?

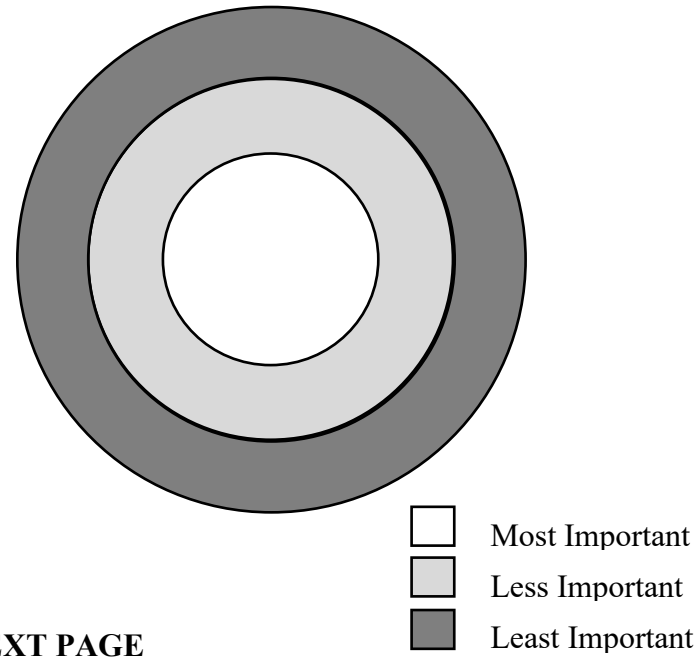
To answer this question, you will do two things:

1) Nominate ***as many*** individuals as possible in your life with their appropriate position title (i.e., coach) in the box on the right who are important to managing your concussion **at this RTS stage**. Please **do not** use their name to describe them.
2) After nominating individuals, please rank them by placing them **in the circle** that **best** describes their level of importance to you as indicated by the shown legend (i.e., most important, less important, least important). Please **do not** place individuals in more than one importance level.

Stage 'X'



Please use this rectangle to help nominate individuals who are *currently* important to you in supporting your concussion.

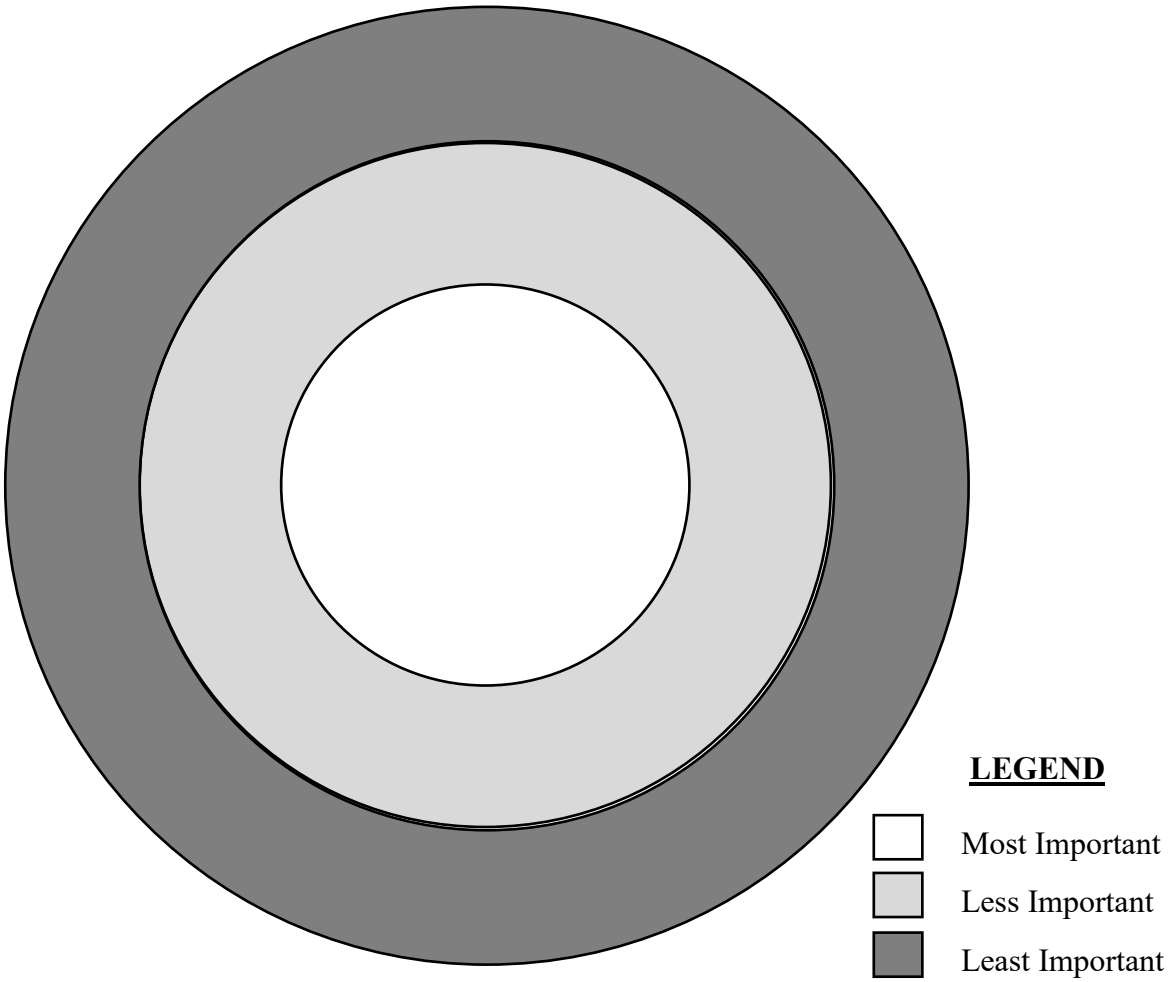


NEXT PAGE

STAGE 1

Who is *currently* most important to you in supporting your concussion recovery?

1. Please use this rectangle to help nominate the individual(s) who are ***currently*** important to you in supporting your concussion recovery. Please **do not** use names of the individual(s), use their title (i.e., coach).

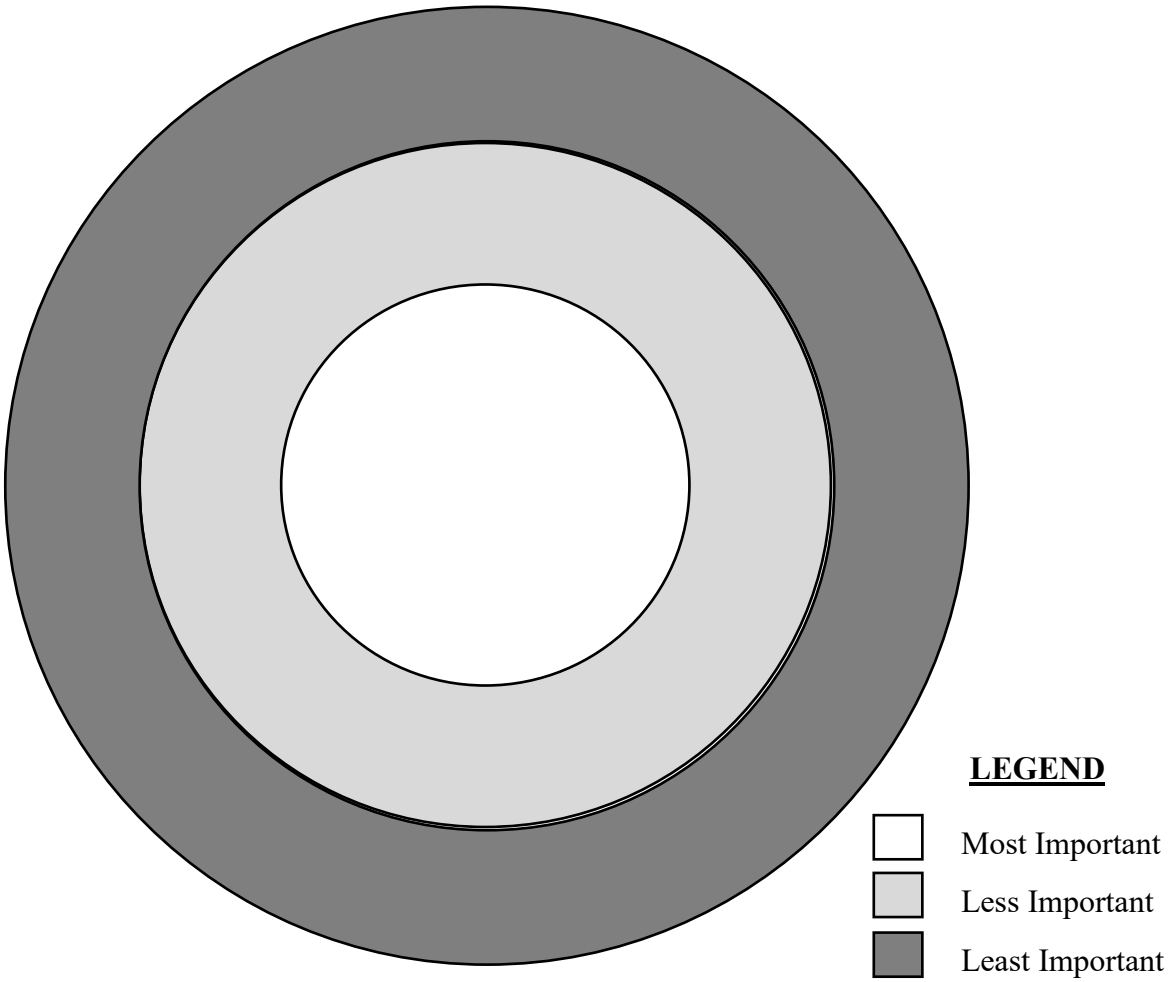


2. Please rank the above individuals by placing them **in the circle** that **best** describes their level of importance to you with respect to support during your concussion recovery as indicated by the shown legend (i.e., most important, less important, least important). Please **do not** place individuals in more than one importance level.

STAGE 2

Who is *currently* most important to you in supporting your concussion recovery?

2. Please use this rectangle to help nominate the individual(s) who are ***currently*** important to you in supporting your concussion recovery. Please **do not** use names of the individual(s), use their title (i.e., coach).

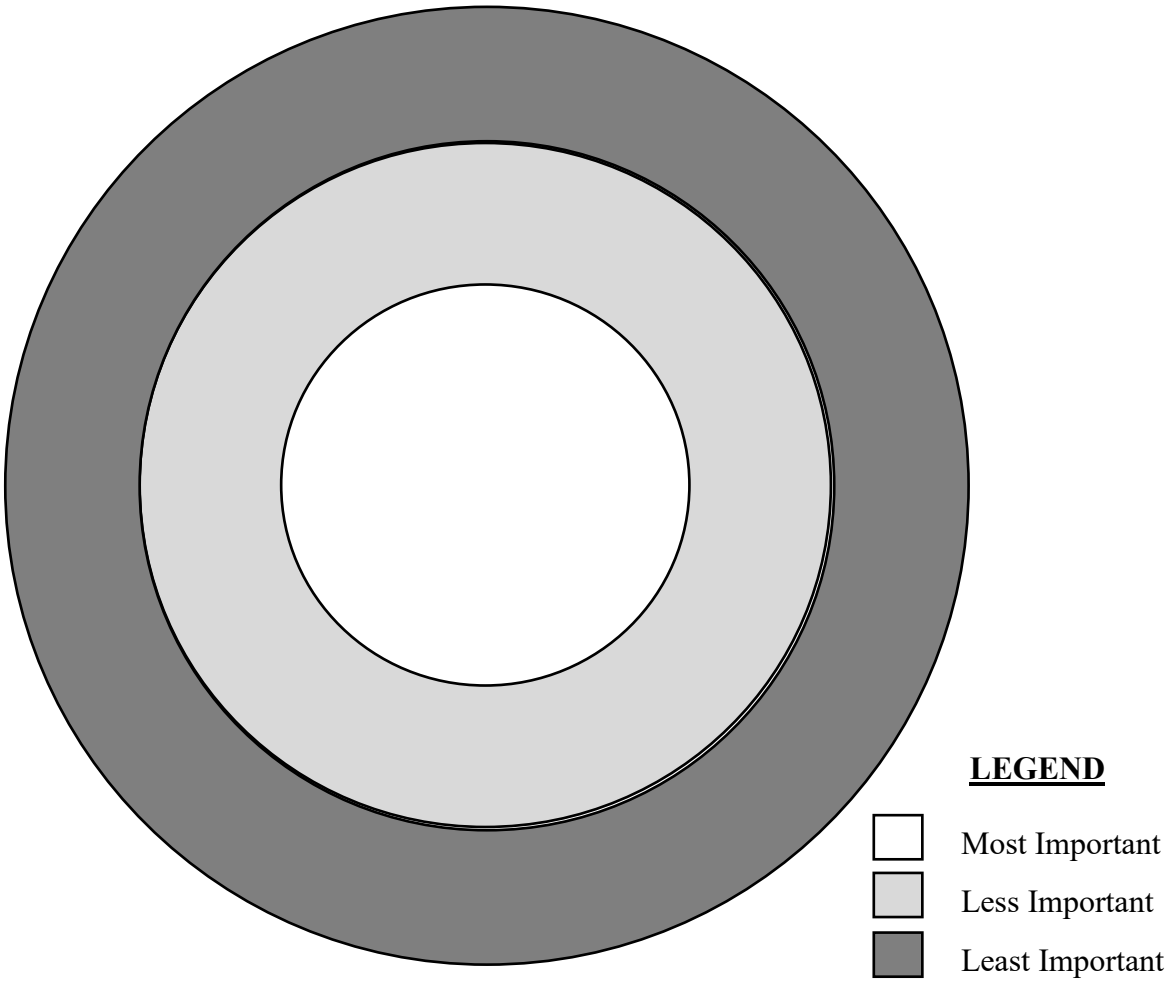


2. Please rank the above individuals by placing them **in the circle** that **best** describes their level of importance to you with respect to support during your concussion recovery as indicated by the shown legend (i.e., most important, less important, least important). Please **do not** place individuals in more than one importance level.

STAGE 3

Who is *currently* most important to you in supporting your concussion recovery?

3. Please use this rectangle to help nominate the individual(s) who are ***currently*** important to you in supporting your concussion recovery. Please **do not** use names of the individual(s), use their title (i.e., coach).

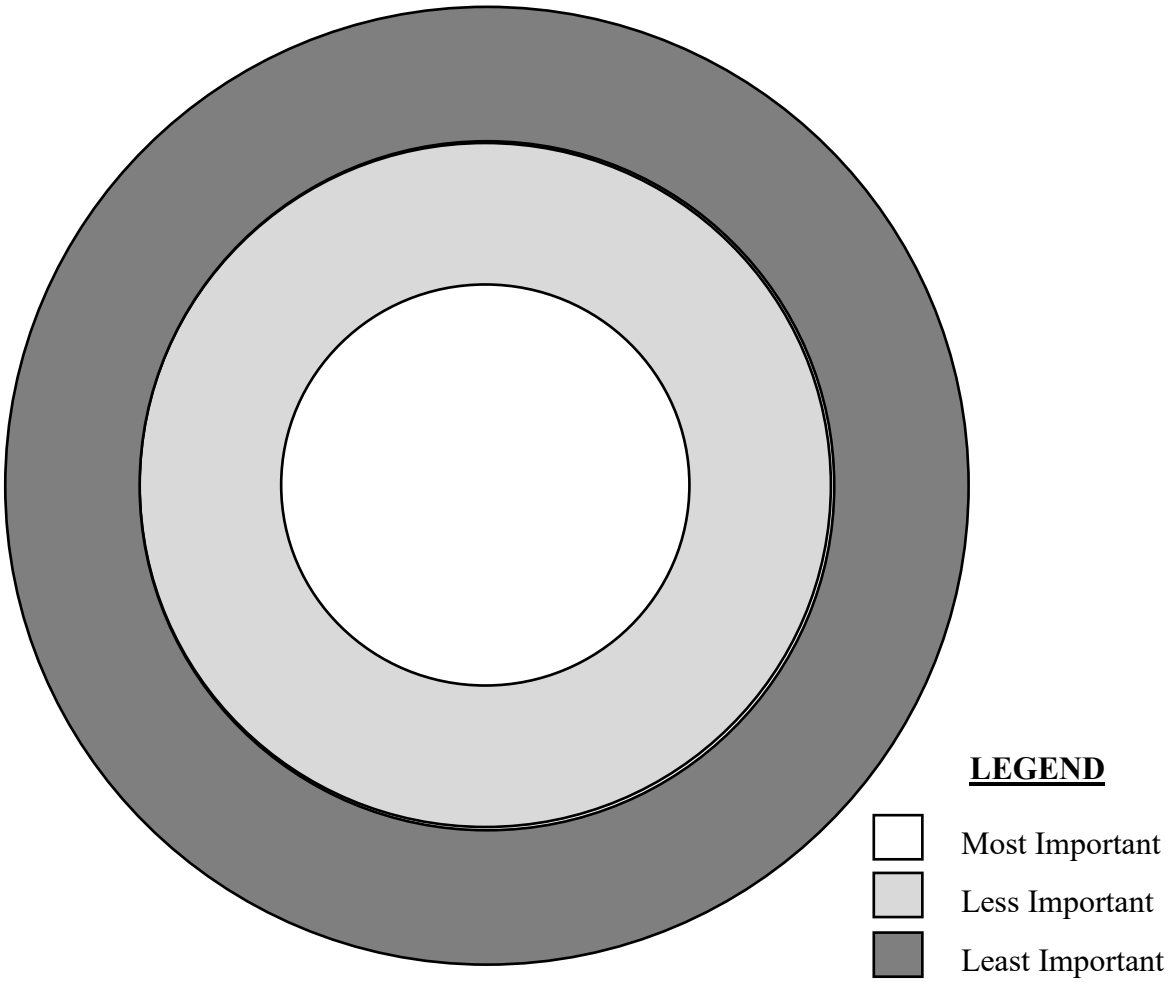


2. Please rank the above individuals by placing them **in the circle** that **best** describes their level of importance to you with respect to support during your concussion recovery as indicated by the shown legend (i.e., most important, less important, least important). Please **do not** place individuals in more than one importance level.

STAGE 4

Who is *currently* most important to you in supporting your concussion recovery?

4. Please use this rectangle to help nominate the individual(s) who are ***currently*** important to you in supporting your concussion recovery. Please **do not** use names of the individual(s), use their title (i.e., coach).

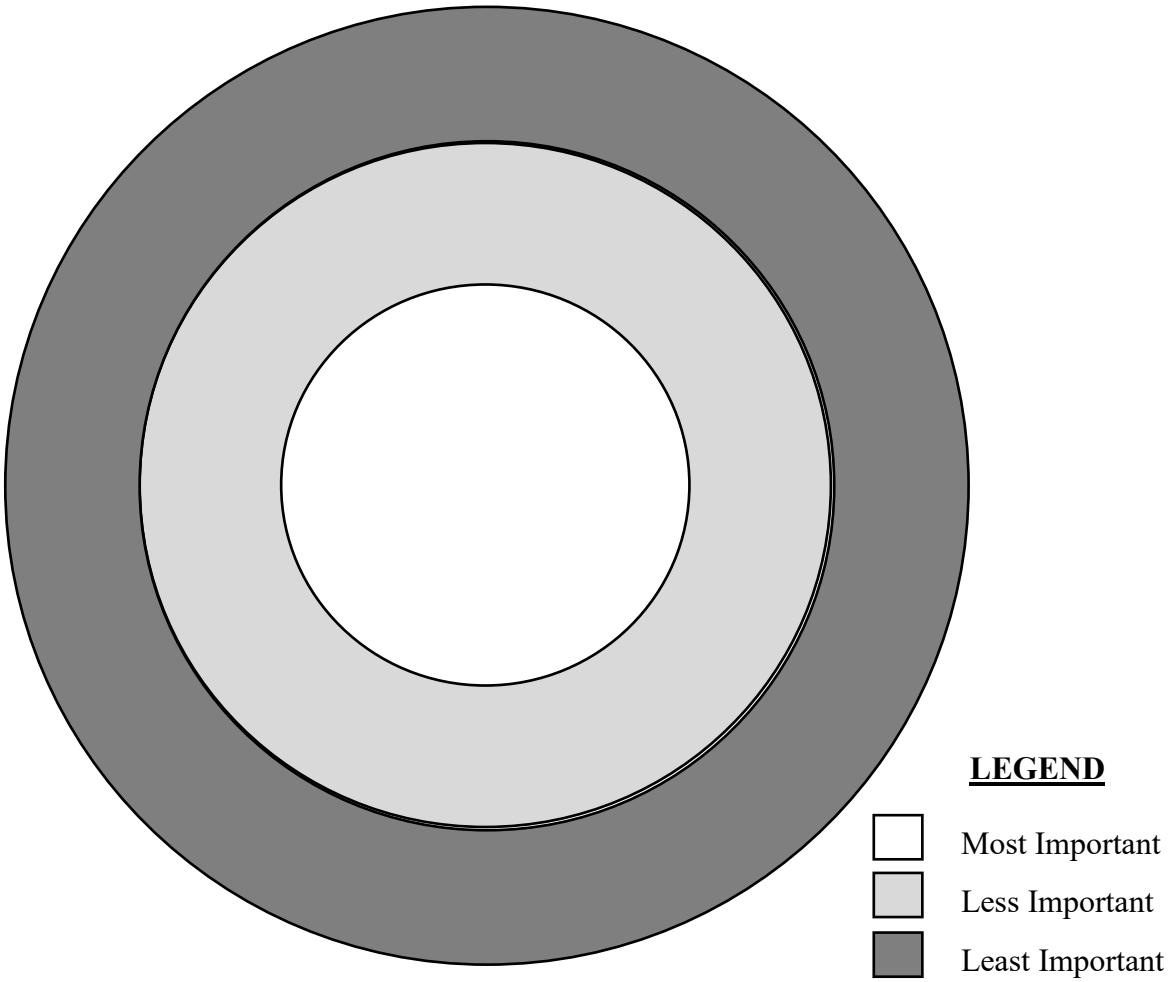


2. Please rank the above individuals by placing them **in the circle** that **best** describes their level of importance to you with respect to support during your concussion recovery as indicated by the shown legend (i.e., most important, less important, least important). Please **do not** place individuals in more than one importance level.

STAGE 5

Who is *currently* most important to you in supporting your concussion recovery?

5. Please use this rectangle to help nominate the individual(s) who are ***currently*** important to you in supporting your concussion recovery. Please **do not** use names of the individual(s), use their title (i.e., coach).

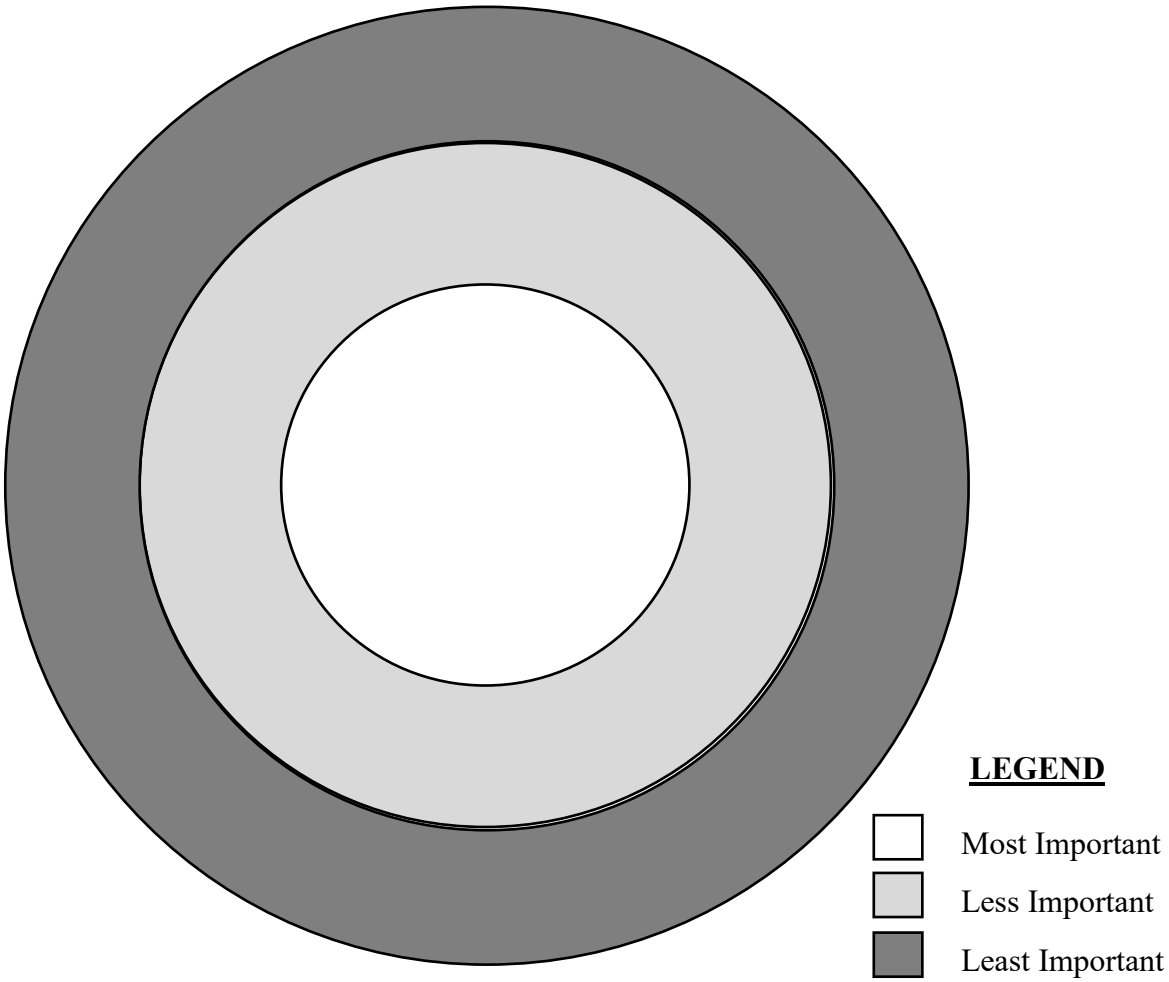


2. Please rank the above individuals by placing them **in the circle** that **best** describes their level of importance to you with respect to support during your concussion recovery as indicated by the shown legend (i.e., most important, less important, least important). Please **do not** place individuals in more than one importance level.

STAGE 6

Who is *currently* most important to you in supporting your concussion recovery?

6. Please use this rectangle to help nominate the individual(s) who are ***currently*** important to you in supporting your concussion recovery. Please **do not** use names of the individual(s), use their title (i.e., coach).



2. Please rank the above individuals by placing them **in the circle** that **best** describes their level of importance to you with respect to support during your concussion recovery as indicated by the shown legend (i.e., most important, less important, least important). Please **do not** place individuals in more than one importance level.

Appendix D

The Perceived Available Support in Sport Questionnaire (PASS-Q)

The following questions are designed to reflect **how you feel (list support person here) supports you during your concussion recovery**.

Please **CIRCLE** a number from 0 (not at all) to 4 (always) to indicate the extent your (**list support person here**) would perform each statement as it pertains to your concussion rehabilitation.

	Not at all	Rarely	Sometimes	Often	Always
Emotional support					
1. Provide you with comfort and security	0	1	2	3	4
2. Always be there for you	0	1	2	3	4
3. Care for you	0	1	2	3	4
4. Show concern for you	0	1	2	3	4
Esteem support					
5. Reinforce the positives	0	1	2	3	4
6. Enhance your self-esteem	0	1	2	3	4
7. Instill you with the confidence to deal with pressure	0	1	2	3	4
8. Boost your sense of competence	0	1	2	3	4
Informational support					
9. Give you constructive criticism	0	1	2	3	4
10. Give you tactical advice	0	1	2	3	4
11. Give you advice about performing in competitive situations	0	1	2	3	4
12. Give you advice when you're performing poorly	0	1	2	3	4
Tangible support					
13. Help with travel to training and matches	0	1	2	3	4
14. Help with tasks to leave you free to concentrate	0	1	2	3	4

15. Do things for you at competitions/matches	0	1	2	3	4
16. Help you organize and plan your competitions/matches	0	1	2	3	4

Appendix E

Conclusion Letter

Your time and efforts in participating in this study are greatly appreciated. Your responses and discussion of your experience with social support during your progression through the concussion return to sport strategy will provide researchers, support providers, and other athletes with a great understanding as to how to best support athletes during their concussion rehabilitation.

If you have any questions, comments, or concerns pertaining to this study, please feel free to contact myself (Carley Jewell) or Dr. Scott Rathwell by email with the contact information provided below.

Please contact myself (Carley Jewell) if you would like any of the following:

- A copy of the publications of the study you participated in
- An email regarding participation in future research opportunities

If there is any need to contact us in the future, we can be reached at:
Carley Jewell
Email: carley.jewell@uleth.ca
Scott Rathwell
Email: scott.rathwell@uleth.ca

Appendix F

Interview 1 Guide

1. How old are you currently?
2. What year of eligibility for your sport are you in?
    a. What year of university are you in?
    b. What type of degree are you taking?
3. What gender do you identify with?
4. Have you been diagnosed with or are being treated for any anxiety or depression-related disorders?
5. What sports or events do you currently compete in?
6. Is this your first sport-related concussion?
    a. If not, when was you last sport-related concussion?
    b. How many sport-related concussions have you had?
7. Have you had any challenges with the concentric circles mapping exercises thus far?
    a. If so, what are they?
    b. If so, how do you think it could be improved?
8. Have you had any challenges with the PASS-Q questionnaire exercises thus far?
    a. If so, what are they?
    b. If so, how do you think it could be improved?

Prompt: Ok, now I am going to start to ask you some questions about specific support providers that you have listed in your concentric maps. I noticed you have indicated that **[insert position title/name]** was important at **(several or specific stage(s)).**

Agent	S1	S2	S3	S4

9. Can you describe your relationship with **[insert agent]?**
    a. Is it typically supportive?
    b. Would you say your relationship with **[insert agent]** is typically helpful/harmful?
    c. Can you describe what type of support **[insert agent]** typically offered you in your recovery?

10. During the **[name of RTS stage (i.e., symptom limited activity]** stage **(stage number)** of your return-to-sport, why was this support person placed where they were in your concentric map (**most important, less important, or least important**)?

    - Why not more important?
    - Why not less important?
    - Why change in level of support if there is a change? / Why were they only a support provider at one stage?

11. In the PASS-Q questionnaire you filled out, you indicated this **[agent]** often provided **[insert type of support (emotional, esteem, informational, tangible from PASS-Q]** support?

    Was this helpful for your concussion rehabilitation?
    a. How did they offer this support?
        i. Can you provide examples of what this looked like at (**at each stage listed if stage varies**)

    1. Did this type of support help you with your **physical recovery** (i.e., symptoms) from your concussion?
        - How?
        - At what stage(s)?
        - Can you provide any examples?

    2. Did this type of support help you with your **psychological recovery** (i.e., mood fluctuation, depression, anxiety) from your concussion?
        - How?
        - At what stage(s)?
        - Can you provide any examples?

    3. Did this type of support help you with your **emotional recovery** (i.e., irritability, overwhelmed, shock, guilt) from your concussion?
        - How?
        - At what stage(s)?
        - Can you provide any examples?

    4. Did this type of support help you with your **social recovery** (i.e., isolation etc.) from your concussion?
        - How?
        - At what stage(s)?
        - Can you provide any examples?

    b. Was anything this **[agent]** did harmful to your concussion rehabilitation at stage **[insert stage]**?
        i. If so, could they have done anything differently?

    c. Was there any type of support you wanted from this individual, but didn't receive?

REPEAT ABOVE FOR ALL TYPES OF SUPPORT LISTED IN PASS-Q

    d. Did **[insert agent]** provide any support to you that was not covered/listed on the PASS-Q questionnaire or that we haven't discussed?

***Once all stages where the first support provider is listed are discussed, move to the next support person listed in the concentric maps.**

Wrap-up

12. Was there a time/specific stage when you felt you had the most social support?
    - Would you have wanted less at this time?

13. Was there at time/specific stage when you felt you had the least social support?
    - Would you have wanted more at this time?

14. Is there anything else about your concentric maps that you would like to add that we haven't already discussed?

15. Is there anything else about your concussion rehabilitation and/or social support providers that you'd like to add?

Appendix G

Interview 2 Guide

Okay so for this interview I'm just going to ask a few clarification questions from the last interview and then most of the rest of the interview will focus on the last two stages of the return to play strategy.

INSERT PARTICIPANT SPECIFIC CLARIFICATION QUESTIONS FROM INTERVIEW 1

Prompt: Okay, so now for the rest of this interview we are going to focus on the last two stages of the return to play strategy. Just like last time we spoke, I am going to ask you some questions about specific support providers that you have listed in your concentric maps.

I noticed you have indicated that **[insert agent]** was important at **(several or specific stage(s)).**

Agent	S5	S6

16. During **STAGE 5** of your return-to-sport (full-contact practice), why was this support person placed where they were in your concentric map (**most important, less important, or least important**)?

    - Why not more important?
    - Why not less important?
    - Why change in level of support if there is a change? / Why were they only a support provider at one stage?

17. In the PASS-Q questionnaire you filled out, you indicated this **[agent]** often provided **[insert type of support (emotional, esteem, informational, tangible from PASS-Q]** support? Was this helpful for your concussion rehabilitation?
    a. How did they offer this support?
        i. Can you provide examples (check for each stage listed)
    5. Did this type of support help you with your **physical recovery** from your concussion?
        - How?
        - At what stage(s)?

    6. Did this type of support help you with your **psychological recovery** from your concussion?
        - How?
        - At what stage(s)?

    7. Did this type of support help you with your **emotional recovery** from your concussion?

- How?
- At what stage(s)?

8. Did this type of support help you with your **social recovery** from your concussion?
    - How?
    - At what stage(s)?

b. Was anything **this [agent]** did harmful to your concussion rehabilitation at **STAGE 5**?
    i. If so, could they have done anything differently?

REPEAT FOR ALL TYPES OF SUPPORT LISTED IN PASS-Q

c. Did **this agent** provide any support to you that was not covered/listed on the PASS-Q questionnaire or that we haven't discussed?

***Once all stages where the first support provider is listed are discussed, move to the next support person listed in the concentric maps.**

REPEAT FOR STAGE 6

Okay so now we are going to talk more generally about transitioning back to full contact practice and back to competitive sport.

1. So, when talking about moving between stage 4, non-contact and stage 5, full contact, who cleared you to move to full-contact practice?
2. What did that clearance look like? Any tests, questions, what did they do?
3. Did you feel supported during this? Specific types of support?
4. Were there any challenges during this transition?

RETURN TO SPORT TRANSITION

1. Since you have successfully returned to sport, do you feel that you were ready to return? How so? What made you feel this way?

2. Do you feel that a specific support provider, at any stage, made you feel most ready to return?
    a. If so, can you describe how you knew the [**support provider**] helped you feel ready to return?
        a. If so, what types of support did they use? (emotional, esteem, informational, tangible)

2. Can you describe how the [**type of support**] from this support provider helped how ready you felt to return to sport?

3. Can you describe how the [**timing of support/stage of rehabilitation**] from this support provider helped how ready you felt to return to sport?

    a. If so, did the stage of rehabilitation that they offered support (i.e., stage 1) influence how helpful this **support provider** was?

3. Is there anyone else who significantly helped you feel ready to return to sport after your concussion?

4. Do you feel that a specific support provider, at any stage, made you feel least ready to return?

5. If so, can you describe how you knew the [**support provider**] harmed you feeling ready to return?
    a. If so, what types of support did they use? What types of support did they not use? How could this have been better?

6. Can you describe how the [**type of support**] from this support provider harmed how ready you felt to return to sport?

7. Can you describe how the [**timing of support/stage of rehabilitation**] from this support provider harmed how ready you felt to return to sport?

8. Is there anything else you would like to add about your concussion rehabilitation and/or social support providers?

9. Is there anything else about your concentric maps that you would like to add that we haven't already discussed?