**Abstract**

Psychological readiness to return to sport (RTS) after injury is a critical and timely area of research that has received significant research attention of late. Although research on psychological readiness to RTS has bourgeoned in recent years, there remains a lack of conceptual clarity on what psychological readiness is. As such, our aims in this state-of the art review (Grant & Booth, 2009) are threefold. First, we articulate key conceptual issues and questions regarding the nature of psychological readiness and offer a preliminary nomothetic definition of the construct. Based on the definition, we advance several hypotheses for testing in future research. Second, we discuss research examining correlates of psychological readiness and third, we look at empirical work focused on outcomes of psychological readiness. Our review draws upon literature spanning various disciplines and cultures/languages.

***Key words*: Psychology, Rehabilitation, Sport Medicine, Synthesis**

**Introduction**

Musculoskeletal injury is common among athletes (Arthur-Banning et al., 2018; Hootman et al., 2007). Once injured, the ultimate aim of many athletes is to return to sport (RTS; Podlog et al., 2015). As athletes achieve physical healing and functional rehabilitation progressions, the question of when the athlete is ready to RTS becomes increasingly relevant – both to the athlete and key stakeholders (e.g., teammates, coaches, administrators, medical team, and parents; Podlog et al., 2015). Traditionally, decisions regarding athletes’ readiness to RTS have been based exclusively on assessment of physical function (Podlog et al., 2015). The assumption underlying physical test batteries assessing readiness to return to sport is that individuals who pass them are recovered from injury and ready to perform without increased risk of reinjury relative to the injury treated. Increasing evidence, however, suggests problems with that assumption (Ardern, Taylor, et al., 2014; Cheney et al., 2020; de Mille & Osmak, 2017; Webster & Hewett, 2019). In their meta-analytic examination of physical return-to-sport (RTS) tests after ACL surgery, Webster and Hewett (2019) found that only one out of 18 studies showed that passing RTS test batteries led to greater RTS rates. Counterintuitively, passing a RTS test battery increased the risk for a subsequent contralateral ACL injury (RR = 3.35 [95% CI 1.52-7.37]). These findings suggest that commonly employed tests (e.g., agility, strength, muscle mass/size) designed to assess athletes’ readiness to RTS and avoid re-injury may be inadequate.

Towards a more multidisciplinary perspective, it has been suggested that psychology (i.e., thoughts, feelings, behaviours) can also play an important role in better understanding the nature of athletes’ readiness to RTS and in developing inventories to evaluate it (Ardern, Österberg, et al., 2014; Glazer, 2009; Podlog et al., 2015; Thomeé et al., 2007). Heeding this recommendation, sport science scholars have developed measures purported to assess ‘psychological readiness’ and examined correlates and outcomes of it (Conti et al., 2019; Glazer, 2009; Gómez-Piqueras et al., 2014; Thomeé et al., 2007; Webster et al., 2008). Research on psychological readiness has emanated from different countries, utilized various research philosophies, and included a multitude of sports and injury types (Gerometta et al., 2018; Hirohata et al., 2020; Sigonney et al., 2020; Slagers, Akker-Scheek, et al., 2019; Thiebat et al., 2022). Ironically, despite the proliferation of research on the topic, uncertainty remains as to what psychological readiness is, and a nomothetic definition of the construct remains elusive (e.g., Glazer, 2009; Podlog et al., 2015; Webster et al., 2008). Given the emerging nature of the psychological readiness construct, our aims in this state-of the art review are threefold. First, we describe key conceptual issues and outstanding questions regarding the nature of psychological readiness and offer a preliminary nomothetic definition of the construct. Based on the definition, we advance several hypotheses for testing in future research. Second, we discuss research examining correlates of psychological readiness and, third, we review empirical work focused on outcomes of psychological readiness.

**Method**

Consistent with the typology of reviews offered by Grant and Booth (2009), we felt that a state-of-the-art review was appropriate to address our aims for several reasons. First, despite a significant increase in interest in the topic of psychological readiness, there remains conceptual ambiguity. According to Grant and Booth (2009), state of the art reviews “… may offer new perspectives on an issue” (p. 95). As such, an initial aim was to review the literature to construct and propose a nomothetic definition of the concept of psychological readiness. Second, given the proliferation of research on psychological readiness within the past 10 years, it seemed prudent to take stock of the current knowledge regarding the nature of psychological readiness as well as readiness correlates and outcomes. Third, key features of a state-of the-art review – namely, a “narrative” synthesis of information with the option of tabular accompaniment, and articulation of priorities for future investigation – were consistent with our aims in the current review (Grant & Booth, 2009; Greenhalgh et al., 2018).

According to Grant and Booth (2009) there are no standardized methodologies for conducting state-of-the-art reviews or any formal mechanisms for quality assessment. In conducting our literature search, our aim was not to be exhaustive or to employ methodologies such as a systematic or scoping review. Following the initial conceptualization of the review, members of the research team conducted a preliminary search in four databases using the EBSCO*host* platform (SPORTDiscus with Full Text, Medline, APAPsycInfo). As part of the preliminary search, we also examined Google Scholar, PubMed, and Scopus. We used combinations of the following search terms: ‘psychological readiness’; ‘return to sport; ‘injury’; ‘musculoskeletal’; ‘concussion’; ‘mild traumatic brain injury’; ‘assessment’; ‘inventory’; ‘psychosocial’; ‘fear of re-injury’. Search terms were grouped using the Boolean operator ‘OR’ and terms listed above were combined using ‘AND’ for all database searches. Inclusion of relevant literature was also maximized by the fact that our team of authors was comprised of an international group of subject matter experts on the psychological aspects of sport injury. To increase the likelihood of obtaining relevant articles, no date limits or filters were used in the database searches. The initial search was conducted from January until June of 2021. Discussions with members or the research team led to the suggestion that it would be beneficial to include research librarians to optimize our search for articles relevant to our three *a priori* aims and to identify any recent articles not obtained in the initial search. Hence, a second follow-up search was conducted by two research librarians from the lead author’s institution (Meert et al., 2016). The search was conducted in Medline from Ovid to ensure that articles germane to our aims were retrieved. A combination of keywords and controlled subject headings was used (see Appendix).

The first author screened titles and abstracts for eligibility criteria. The inclusion criteria were any original study or literature review with the *a priori* aim of examining psychological readiness after injury, where psychological readiness was either the independent or dependent variable or where qualitative examination of the concept was undertaken. Conference abstracts, dissertations, book chapters, and articles that outlined a study protocol but did not report empirical data, were excluded. For any articles whose eligibility was unclear, the first author and seventh author reviewed the full-text article and consensus on eligibility reached through discussion between the two authors. Following our database search, a manual search of the reference lists of all relevant articles was completed.

Studies were grouped into themes deductively based on their fit with our three *a priori* aims of examining conceptual issues and questions regarding the psychological readiness construct with the goal of developing a nomothetic definition and hypotheses for research testing (Aim 1); examining correlates of psychological readiness (Aim 2); and empirical work focused on outcomes of psychological readiness (Aim 3). Any disagreements about the independent categorization of studies into specific themes were resolved through discussion between the first and seventh author. All authors agreed on the final categorizations. For conciseness and ease of reading, we combine results of our literature search and discussion of the findings.

**Results and Discussion**

**What is Psychological Readiness to Return to Sport?**

Although researchers have developed various measures to assess psychological readiness, it is evident that a lack of conceptual clarity exists regarding the nature of psychological readiness to RTS. While some scholars have suggested that psychological readiness is unidimensional (Glazer, 2009), others have suggested a multidimensional conceptualization (Gómez-Piqueras et al., 2014, 2020). In terms of the former, Glazer (2009) developed the I-PRRS scale, to assess the extent to which athletes feel confident in their ability to perform well upon return to sport. Using the Delphi survey method, Glazer solicited expert opinions from a panel of 7 individuals (4 certified athletic trainers who were also academic faculty and 3 coaches from NCAA Division III schools) who were instructed to “provide suggestions and questions that could be used on a scale to measure the construct of psychological readiness (p. 186).” The panel submitted 22 items which were subsequently reduced to 10 items, eliminating items that were sport or environment specific or not appropriate for all returning athletes. Example items include: “My overall confidence to play is;”, My confidence to play without pain is”, and “My confidence to not concentrate on the injury is”.

Moving beyond Glazer’s unidimensional operationalization of psychological readiness, Webster and colleagues (2008) established the 12-item multidimensional, injury-specific ACL-Return to Sport after Injury (ACL-RSI) Scale to assess athletes:’(1) emotions (“Are you nervous about playing your sport?”); (2) confidence in performance (“Are you confident that your knee will not give way by playing your sport?”); and (3) risk appraisal (“Do you think you are likely to re-injure your knee by participating in your sport?;) when returning to sport after ACL reconstructive surgery. A short, 6-item version (Webster & Feller, 2018), and various injury specific versions exist for use with shoulder (SI-RSI; Gerometta et al., 2018), hip arthroscopy (Hip-RSI;(Jones, Webster, et al., 2020; Wörner et al., 2021), and ankle instability patients (ALR-RSI; Sigonney et al., 2020).

A third, sport-specific readiness scale, the Psychological Readiness of Injured Athlete to Return to Sport (PRIA-RS) questionnaire, was developed to assess soccer player’s psychological readiness to return to sport after injury (Gómez-Piqueras et al., 2014, 2020). The 10-item inventory purported to assess returning athletes’ “confidence, the individual perception, the insecurity and the fear of re-injury reported by the athlete at the end of the recovery process (Gómez-Piqueras et al., 2020, p. 2).” Sample items include: “How do you evaluate the progression you have experienced during the rehabilitation/sport functional recovery period since your injury?”; “How is your mood”; “What is your physical state in view of a potential return to the team?”; and “Are you feeling nervous about returning to regular training with the team?”. Table 1 summarizes various psychological readiness measurement tools as well as their constituent subscales.

[insert Table 1 here]

 Multidimensional conceptualizations of psychological readiness have been supported in two qualitative studies involving interviews with athletes from the UK and Australia (Kunnen et al., 2020; Podlog et al., 2015). Based on individual and focus group interviews with seven English athletes from various sports, Podlog et al. (2015), found that psychological readiness was comprised of three components including: (a) confidence in returning to sport; (b) realistic expectations of one’s sporting capabilities; and (c) motivation to regain previous performance standards. Kunnen et al. (2020) found that confidence and a love of the game were key elements of psychological readiness that enabled a RTS following ACL reconstruction among 21 Australian soccer players. Moreover, both Kunnen et al. (2020) and Podlog et al. (2015) reported that the confidence component of readiness was multidimensional in that it consisted of a belief in the efficacy of one’s rehabilitation program, confidence and trust in rehabilitation professionals, a belief that one’s formerly injured body part was fully healed, and efficacy in one’s performance capabilities. While it seems likely that the latter two dimensions are most relevant to psychological readiness, further empirical work is needed to verify this contention. Moreover, additional research is needed to determine whether there is a higher-order confidence factor.

Given the aforementioned findings, it is evident that there remains conceptual ambiguity surrounding what psychological readiness is. A number of key questions require further investigation to better understand the nature of psychological readiness. First, it is unclear if readiness is unidimensional, and if it is, whether the one dimension reflecting psychological readiness is confidence? That is, it is unclear whether psychological readiness and confidence are synonymous? If so, there would *not appear* to be a need to assess “psychological readiness” as researchers and practitioners could simply assess the single construct of interest, for example, “confidence to return”. Conversely, further evidence pointing towards a multidimensional nature of psychological readiness would suggest that unidimensional measures such as the IPPRS are inadequate for valid assessment of psychological readiness and should therefore be discarded moving forward. While all of the aforementioned studies ̶ both quantitative measures and qualitative investigations ̶ reported confidence as a dimension of psychological readiness, idiosyncratic dimensions also emerged across studies. If psychological readiness is multidimensional, further research is needed to determine how many of the proposed components of the construct are required for athletes to be deemed “psychologically ready”? Along these lines, if further investigation revealed that psychological readiness is more than the sum of its parts, it might be more parsimonious to eliminate reference to different components and simply combine subscale (sub dimension) scores into an overall readiness score. Indeed, Webster et al. (2008) suggest use of a single score in which the 12-items from the ACL-RSI are summed and averaged. Based on these uncertainties, it is evident that although researchers may have included the terms “psychological readiness” in the title of their inventories, the extent to which such measures actually capture the essence of what it means to be psychologically ready to RTS is unclear. Further testing of the content validity of current psychological readiness measures is needed.

Second, it is evident that researchers have failed to clarify whether psychological readiness is about the relative absence of negative states (e.g., re-injury anxiety) or about experiencing the presence of positive states of mind. Questions remain whether athletes are psychologically ready to resume competitive activities when they possess certain “adaptive” psychological states – for example confidence – or whether psychological readiness is about the relative absence of negatively valanced states such as re-injury anxiety? Alternatively, there may be value in shifting away from “positive and “negative” binary notions of readiness towards an appreciation of the co-existence of positive and negative elements of readiness and the manner in which they dialectically interact over time. Such an approach is consistent with Hanin’s (2000) Individual Zone of Optimal Functioning. Hanin identified positive and negative emotions as independent dimensions rather than opposite poles on the same dimension; existing in a dynamic balance with success linked to a favorable idiosyncratic positive to negative affective balance.

Third, and finally, it is unclear when best to assess psychological readiness and how information from any existing scale should be used. As physical readiness to RTS is typically assessed just prior to a potential RTS, when athletes are on the cusp of a return to competitive activities, it would seem logical to assess psychological readiness to RTS within the same time frame. In some studies, however, psychological readiness to RTS was assessed prior to surgery (e.g., McPherson et al., 2019a; Ohji et al., 2021; Sadeqi et al., 2018), an assessment time point that seems at odds with the very nature of what *readiness* entails (i.e., preparedness to engage in an imminent task or behavior). Given that one would not likely assess athletes’ *physical* readiness to RTS prior to surgery (since by definition athletes are physically incapable of returning), it seems odd that scholars would examine the parallel notion of *psychological* readiness prior to surgery. That said, the optimal timing of assessment of psychological readiness to RTS remains an open question for further empirical examination. With respect to how information gleaned from any readiness measures should be used, it is unclear what steps practitioners should take assuming athletes report a given score on a particular readiness inventory. For instance, in the event an athlete has a low score on a readiness measure (e.g., 20-30 for the I-PPRS or below 42 for the ACL-RSI), research is needed to determine whether the best course of action is to delay the RTS until the player feels more confident or to expose them to some form of training/competition to ‘boost’ confidence to handle sport-related demands (McCall et al., 2017).

To address questions regarding the nature of psychological readiness, when it is assessed and how the information should be used, it is useful to have a definition as a starting point for guiding future investigations and for hypothesis testing. With that in mind, we propose the following nomothetic definition:

Psychological readiness to RTS after injury reflects an individual’s state of mental preparedness to resume sport-specific activities and is likely comprised of three dimensions, including cognitive appraisals (confidence, expectations, motivations, risk appraisals, internal or external pressures), affective (anxiety or fears about re-injury or movement, moods) and behavioral components (approach-avoidance behaviors to demonstrate physical function/neuromuscular control, and engage in sport-specific tasks).

Noticeably absent from our definition is a physical, social, or contextual component. While we contend that physical, social and contextual factors (e.g., history of injuries, social support, sub-cultural norms and values, interactions with injury stakeholders, titration of return-to-sport activity at conclusion of physical rehabilitation, access to rehabilitation facilities) may for instance, *impact* psychological readiness, such factors are not in and of themselves, *part of* psychological readiness, which we propose is an intra-individual state of mind. Furthermore, while we have offered a nomothetic definition of psychological readiness, we do not intend to suggest that consensus must be achieved on a single definition of psychological readiness or that the components of readiness identified in our definition transcend all sporting contexts and cultures. For instance, confidence may be a westernized construct that may or may not be a salient dimension of psychological readiness depending upon the setting in question. As such, a multiplicity of definitions may exist contingent upon the researcher’s *a priori* interests and study purposes (e.g., examination of specific injury types, sports or social/cultural contexts). We therefore suggest that researchers determine whether they are interested in undertaking nomothetic, or idiographic research (e.g., injury or sport/culture specific research) and that they clearly define psychological readiness.

In line with our proposed nomothetic definition, we offer several postulates to help move work in this area forward. First, we hypothesize thatdifferent components of psychological readiness will fluctuate over the course of rehabilitation. Specifically, cognitive appraisals of confidence, expectations and motivations will increase as athletes experience greater functional capacities, while risk appraisals and negative affectivity will decrease. Similarly, approach behaviors should increase with greater functional capacity, while avoidance behaviors decrease as injury symptomology improves. While we believe psychological readiness is an intra-individual state of mind, we also contend that various biopsychosocial factors likely facilitate or undermine its development (Brewer et al., 2002). For instance, resolution of body system impairments (e.g., increased neuromuscular control), improvements in physical functioning (e.g., improvement in the ability to run), resumption of social participation (e.g., graded resumption of practice with the team), and improvements in objective biological and physical functioning (e.g., increased neuromuscular control) will facilitate psychological readiness. Conversely, an inability to regain physical functioning and absences from team participation may diminish perceptions of psychological readiness over time. Moreover, psychological characteristics of the individual (e.g., personality traits, athletic identity, pain tolerance, history of stressors) may positively or negatively influence readiness to RTS. Furthermore, socio-environmental factors (patient-practitioner interactions, social support, access to rehabilitation facilities, the high-performance context) may increase or decrease perceptions of psychological readiness. As indicated, further research is needed to test the aforementioned research questions and hypotheses and to refine, amend or confirm the validity (in all its forms) of our nomothetic definition. Finally, in developing measures of psychological readiness, researchers and practitioners should avoid exclusive reliance on self-report inventories given their susceptibility to deception. For instance, athletes might report higher levels of readiness then they actually perceive in order to expedite their return to sport. Conversely, others may report heightened symptoms than is the case (e.g., malinger) in order to avoid a RTS, and by definition may not therefore be psychologically ready to resume sport participation. To this end, measures that are not transparent with respect to their intended purpose are needed to complement self-report indicators of psychological readiness.

**Correlates of Psychological Readiness to RTS**

Ten studies examined correlates of psychological readiness to RTS after injury. Although their study was qualitative in nature and did not examine “correlates” of readiness *per se*, Podlog and colleagues (2015) found a number of precursors that athletes believed contributed to the three readiness dimensions: confidence in returning to sport, realistic expectations of one’s sporting capabilities, and motivation to regain previous performance standards. Having trust in the knowledge and expertise of rehabilitation providers, social support that satisfied one’s recovery needs, and the achievement of physical standards, all contributed to increased confidence beliefs in ones’ RTS. Similarly, patience, accepting one’s post-injury limitations and effective goal setting were perceived as related to realistic expectations. Further, effective goal-setting, the boredom of injury, feeling wanted by significant others, and social support, were also reported precursors of motivation to regain previous performance standards. Given the retrospective qualitative design, it is unclear if these factors actually preceded readiness – a limitation that could be addressed with longitudinal, repeated measure designs. Finally, it is worth noting that Podlog et al. (2015) did not include participants who failed to return to sport. Such responses would facilitate understanding of factors that constitute a lack of psychological readiness to RTS after injury. Further research in this area is warranted to uncover barriers that likely undermine perceptions of psychological readiness. Such knowledge could facilitate interventions for athletes seeking a RTS but who may be susceptible to experiencing low levels of readiness.

Several recent studies have also begun to illuminate relationships between demographic factors, functional abilities, and psychological readiness (Aizawa et al., 2020; Della Villa et al., 2021; Faleide, Magnussen, Bogen, et al., 2021; Kuenze et al., 2021; Meierbachtol et al., 2018; Nagelli et al., 2019; Presley et al., 2021; Rogowski et al., 2020; Webster et al., 2018).

For instance, research with a large cohort of 635 athletes undergoing ACLR revealed that a variety of demographic factors and perceptions of functional ability contributed to athlete’s psychological readiness to return to sport (RTS) after ACLR (Webster et al., 2018). Univariate analysis for the entire group showed that all of the following had a positive association with psychological readiness: male sex (β = 5.8; 95% CI, 2-10), younger age (β = −0.2; 95% CI, –0.4 to 0.01), a shorter interval between injury and surgery (β = −0.1; 95% CI, −0.1 to −0.02), a higher frequency of preinjury sport participation (β = 5.4; 95% CI, 2-9), greater limb symmetry (β = 0.5; 95% CI, 0.3-0.6), and higher subjective knee scores (β = 1.3; 95% CI, 1.1-1.4). In the multivariate model, subjective knee scores and age contributed significantly to the prediction of psychological readiness (*r*2 = 0.37, *p* < .0001), indicating that perceived physical readiness may be a possible precursor of psychological readiness. Male patients who participated frequently in sport before ACL injury had higher psychological readiness in comparison to those with less frequent pre-ACL sport participation. Conversely, no sex differences in psychological readiness were found by Kuenze et al. (2021) in their cross-sectional analysis of 45 men and 45 women age-matched ACL injured athletes. In their investigation, Della Villa (2021) found a statistically significant linear relationship between quadriceps strength symmetry and the I-PRRS score in patients who experienced a noncontact **injury** (n = 55; *p* = 0.01; *r2* = 0.24). No such relationship was found for those who experienced a contact **injury** (n = 23; *p*= 0.97; *r2* = 0.01). Along these lines, Presley et al. (2021) examined the association between mode-of-injury (‘in-sport’ versus ‘out-of-sport’) and psychological readiness for RTS after ACL reconstruction. They found that athletes sustaining ‘in-sport’ ACL injuries demonstrated poorer psychological readiness when compared to athletes injured outside their primary sport (55.3 ±12.9 versus 60.8 ±11.6, t = 2.747, *p* < .001) when in preparation for RTS following ACL reconstruction.

Aizawa et al. (2020) examined a range of factors associated with psychological readiness (ACL-RSI) following ACL reconstruction among 30 patients. Predictor variables included a range of demographic (age, sex, body mass index), functional abilities (knee strength, single leg hop [SLH] distances, leg anterior reach distance, perceived running ability), and fear of movement (Kinisiophobia). Results from the multivariate regression analysis revealed that higher subjective running ability, β = 0.657 (95% CI, 0.359 to 0.955), a lower kinesiophobia score, β = –1.265 (95% CI, –1.983 to –0.546), and greater limb symmetry in lateral SLH distance, β = 0.421 (95% CI, 0.063 to 0.778) were associated with higher levels of psychological readiness. These findings were supported by Meierbachtol et al. (2018) who found that a 5-week group training program involving functional movements (single leg hop testing, triple, crossover triple, and timed hops) among 58 individuals undergoing ACL reconstruction, improved psychological readiness (ACL-RSI score pretraining = 60.1 ±19.3; ACL-RSI posttraining = 77.0 ±14.7, effects size *d* = 1.04). Nagelli et al. (2019) found that among 18 ACL injured athletes, greater frontal plane knee range of motion and lower frontal plane hip range of motion within the involved limb explained nearly 40% of the variability in ACL-RSI scores. Finally, Faleide, Magnussen, Bogen, et al. (2021) found statistically significant associations between the ACL-RSI score and two tests of knee laxity – the Lachman test (rho = -0.18; *p* = .046) and KT-1000 arthrometer measurement (rho = -0.18; *p* = .040) – suggesting that patients with less knee laxity after ACLR felt more psychologically ready to RTS.

Unfortunately, with the exception of Faleide, Magnussen, Bogen, et al. (2021), the cross-sectional designs among studies reviewed in this section, precludes definitive conclusions on whether these demographic variables, strength/limb symmetry, or perceptions/objective functional ability preceded psychological readiness. Further longitudinal research examining predictors of readiness is needed. Additionally, there remains a lack of clarity on how or why certain factors facilitate versus diminish psychological readiness, that is, the work described in this section is atheoretical. To better understand which factors might influence psychological readiness, researchers and practitioners can draw on theories from various fields of research – including sport psychology (or the parent discipline). For example, adoption of existing injury models such as Wiese-Bjornstal’s et al. (1998) integrated model of response to injury, the biopsychosocial model (Brewer et al., 2002) or Self-Determination Theory (Podlog & Eklund, 2007), may all be useful explanatory frameworks for developing and testing research hypotheses regarding predictors of psychological readiness. Alternatively, the development of new theories and conceptual models that elucidate relationships of interest may be warranted. Such efforts can help shift the research from its current descriptive state towards more explanatory approaches that promote a deeper understanding of why certain factors predict psychological readiness, assuming the latter exists.

**Outcomes of Psychological Readiness to Return to Sport**

In recent years, studies (n = 26) focused on outcomes associated with psychological readiness have proliferated. The central question underlining this growing body of work is: does psychological readiness influence salient downstream outcomes such as athletes’ mental health, physical function, the likelihood of RTS, or one’s risk of re-injury? Researchers have suggested that individuals who are ready to RTS will have a greater likelihood of actually returning and will experience more positive outcomes upon their return (Podlog et al., 2015). Conversely, athletes with lower levels of readiness are expected to experience deleterious outcomes.

Cross-sectional and longitudinal studies have supported hypothesized relationships in so far as greater psychological readiness is predictive of mental health (Conti et al., 2019; Glazer, 2009), physical function (Erickson et al., 2022; Peebles et al., 2021; Thomeé et al., 2007; Zarzycki et al., 2018), the likelihood of returning to pre-injury competitive levels (Albano et al., 2020; Ardern, Österberg, et al., 2014; Beischer et al., 2019; Faleide, Magnussen, Strand, et al., 2021; Fältström et al., 2016; Kitaguchi et al., 2020; Slagers, Dams, et al., 2021; Webster et al., 2008, 2019; Webster & Feller, 2020; Wörner et al., 2021) and reinjury (McPherson et al., 2019a, 2019b). Of relevance to our discussion of readiness outcomes, researchers conducting cross-sectional work have positioned psychological readiness as an independent variable predictive of various dependent outcomes (e.g., physical function and the likelihood of return to sports participation; Albano et al., 2020; Slagers, van Veen, et al., 2021; Zarzycki et al., 2018). As such, despite the cross-sectional nature of some of the studies covered in this section, from a conceptual and applied perspective it seems appropriate to discuss these studies within the context of ‘outcomes’ of psychological readiness. With regard to mental health profiles, Glazer (2009) and Conti et al. (2019) demonstrated that higher perceptions of readiness were inversely related with negative mood states over the course of rehabilitation. Along similar lines, Jones, Kemp, Crossley, Hart, and Ackerman’s (2020) qualitative study with 17 Australian adults aged 18-50 years who underwent hip arthroscopy, revealed that suboptimal psychological readiness to return to sport was implicated with participants’ negative emotions. In particular, a mismatch between expected and actual progress and a perceived inability to meet expected milestones, was connected with feelings of sadness and depression.

In terms of relationships between psychological readiness and functional status, Erickson et al. (2022) found that ACL-RSI scores measured at 3-months post- ACL reconstruction positively correlated with International Knee Documentation Committee (IKDC; *r* = 0.565, *p* = 0.001), Knee Injury and Osteoarthritis Outcome Score (KOOS) sport/recreational activities (KOOSSport; *r* = 0.548, *p* = 0.002) and quality of life (KOOSQoL; *r* = 0.431, *p* = 0.017), and quadriceps strength (*r* = 0.528, *p* = 0.003) measured at 6-months post ACL reconstruction. Similarly, Hart et al. (2020) found that lower psychological readiness scores on the ACL-RSI were associated with poorer patient-reported function, assessed via the Knee Injury and Osteoarthritis Outcome Score (KOOS function in sport and recreation subscale) (β = .28; 95% CI, .14 to 0.41) and the International Knee Documentation Committee (IKDC) Subjective Knee Evaluation Form (β = .30; 95% CI, .21 to 0.38), as well as performance-based function (β = .14; 95% CI, .03 to 0.25). Further, Slaggers, Dams, et al. (2021), found that psychological readiness measured at 6 (β = -0.88; 95% CI, −1.48 to −0.28) and 12 months (β = -1.52; 95% CI, −2.01 to −1.02) after achilles tendon rupture had significant associations with sports participation and performance at 12 months.

Extending these findings, Zarzycki et al., (2018) sought to determine the relationship between psychological readiness to RTS following ACL reconstruction and kinematic and kinetic measures of knee symmetry during gait. In this controlled laboratory, cross-sectional study, 79 athletes (39 women) underwent gait analysis following impairment resolution after ACLR (i.e., full range of motion, minimal or no effusion, quadriceps strength index of 80% or greater). Significant negative correlations were observed between the ACL-RSI and 2 kinematic variables: knee flexion angle at initial contact (*r* = −0.281, *p* = .012) and peak knee flexion (*r* = −0.248, *p* = .027). In general, lower scores on the ACL-RSI were associated with greater interlimb asymmetry. Given the cross-sectional nature of the investigation as well as the timing of the administrations of the readiness questionnaire (i.e., prior to ACL reconstruction and 4-months post ACL reconstruction), findings by Zarzycki et al., (2018) suggest that physical readiness indicators may drive ACL-RSI scores. Finally, Peebles et al. (2021) found that among 38 patients recovering from primary unilateral ACL reconstruction, ACL-RSI scores were positively associated with peak knee extension moment limb symmetry index (LSI; *r*2 = 0.105, *p* = 0.047).

Both original studies and literature reviews have also found that higher levels of psychological readiness are associated with a greater likelihood of return to previous sport activities and/or competitive levels (Ardern, 2015; Ardern et al., 2013; Ardern, Österberg, et al., 2014; Beischer et al., 2019; Faleide, Magnussen, Bogen, et al., 2021; Gerometta et al., 2018; Hart et al., 2020; Kitaguchi et al., 2020; Langford et al., 2009; Sadeqi et al., 2018; Webster et al., 2008, 2019; Webster & Feller, 2020; Wörner et al., 2021). Gerometta et al. (2018) found that the mean SI-RSI scores were significantly higher in 62 patients who returned to rugby following an episode of shoulder instability. Similarly, Ardern, Österberg, and colleagues (2014) found that psychological readiness to return to sport and recreational activity (measured with the ACL-RSI scale), was most strongly associated with returning to the preinjury levels among 164 Swedish athletes of various competitive levels.

Langford et al. (2009) revealed that participants who had returned to competitive sport at 12 months, scored significantly higher on the ACL-RSI scale (reflecting a more positive psychological response about sport participation) at both 6 and 12 months than participants who had not returned to competitive sport. Similarly, in their prospective study, Sadeqi et al. (2018) found that at 2-year follow-up, 74.9% of patients had returned to running and 58.4% to their same preinjury sport. The ACL-RSI score was significantly higher at 6 months, 1-, and 2-years post-surgery in patients who had returned to sport and in those who returned to the same level of play or higher (*p* < .00001). The optimal ACL-RSI score threshold to return to the same sport at 2-year follow-up was ≥65. Finally, Webster et al. (2008) found that participants who had given up sport scored significantly lower on the ACL-RSI scale (mean = 46 , range 0-92, reflecting diminished readiness) than those who had returned to return to sport (mean = 70, range 11-99, *p* = .001). Collectively, these findings suggest that psychological readiness differentiates athletes who do, and do not, resume competitive activities following serious, long-term injury. Importantly, eight of the aforementioned studies examining relationships between psychological readiness and return (versus non-return) to previous sport activities/competitive levels, appeared to control for physical readiness, indicating that psychological readiness is capturing unique variance in the prediction of RTS above and beyond physical readiness. Of further note, the decision among several researchers (e.g., Langford et al., 2009; Sadeqi et al., 2018; Slaggers et al. (2021) to measure psychological readiness to RTS once athletes had already returned, would – on the surface – appear too late to measure the “readiness” construct of interest. In other words, measuring psychological readiness at the same time point as athletes are already competing, would appear tantamount to asking athletes if they are ready to resume an activity (sport participation) they are already doing. As indicated, further research is needed to examine optimal time points for assessing psychological readiness to RTS.

With regard to the outcome of re-injury, two studies have prospectively demonstrated that lower levels of psychological readiness are predictive of re-injury or secondary injury upon RTS (McPherson et al., 2019a, 2019b). McPherson et al. (2019a) investigated whether psychological readiness – as measured by ACL- RSI – predicted further injury, specifically, the incidence of second ACL injury. Among 329 patients who returned to sport after ACLR, 52 (16%) sustained a second ACL injury. No statistically significant difference in psychological readiness was observed at the preoperative time point, but patients who sustained a second injury trended toward lower psychological readiness at 12 months compared with non-injured patients (60.9 vs 67.2 points; *p* = .11; McPherson et al., 2019a). Additionally, younger (20 years) patients with injury had significantly lower psychological readiness to RTS than young non-injured patients (60.8 vs 71.5 points; *p* = .02), but no difference was found in older patients (60.9 vs 64.6 points; *p* = .58). In younger patients, receiver operating characteristic curve analysis revealed a cutoff score of 76.7 points with 90% sensitivity to identify younger patients who sustained a second ACL injury. The researchers concluded that younger patients with lower psychological readiness are at higher risk for a second ACL injury after RTS.

The aforementioned findings were extended in a follow up study by McPherson, Feller, Hewett and Webster (2019b) in which patients ≤20 years old at the time of surgery who had a primary ACL reconstruction completed a short version of the ACL-RSI before their ACL reconstruction and again at 12 months after surgery. The primary outcome of interest was the relationship between the change in psychological readiness and second ACL injuries. Findings showed that among 115 young patients who returned to sport after ACL reconstruction, 21 (18%) experienced a second ACL injury. Injured patients did not show improvement in their ACL-RSI score between the preoperative assessment and 12-month time point (58.5 vs 60.8 points, *p* = .60) and had a significantly smaller change when compared with non-injured patients (9.2 vs 24.9 points, *p* = .01). When compared with the non-injured group, the secondary injured group reported they were more nervous about playing sport, less confident in playing sport without concern for the knee, more frustrated with having to consider the knee with respect to sport, and more fearful of reinjuring the knee by playing sport (*p*≤ .05). The authors concluded that the secondary injured patients exhibited less improvement in psychological readiness at a group level and reported different psychological characteristics with regard to return to sport at 12 months after ACL reconstruction as monitored by the ACL-RSI scale. Collectively, these findings suggest that psychological readiness – operationalized in different ways – appears to be an important construct of clinical relevance in the assessment of athletes’ RTS after injury.

Our review of the research on psychological readiness outcomes also highlights the cross-sectional nature of much of the work. It is therefore difficult to disentangle time-order effects, that is, to determine whether particular variables are antecedents or outcomes of psychological readiness. this issue in order to. Toward this end, researchers could employ various quantitative and qualitative methodologies to imbed themselves in the environment in question, to gain a more nuanced understanding of what psychological readiness is, what predicts it, and what its outcomes are. In particular, longitudinal, repeated measures, and observational research studies that control for potential explanations (e.g., propensity score matching) are needed to address temporal research questions and to answer questions about causality/prediction (Antonakis et al., 2010). Such research is critical in further establishing criterion-related validity, particularly predictive validity. Additionally, ethnographic approaches, case histories, phenomenological investigations or repeated interviews would all be useful in uncovering athlete experiences of psychological readiness as they unfold in real-time.

Questions also remain regarding the mechanisms by which psychological readiness may impact various RTS outcomes of interest. For example, it may be that psychological readiness impacts functional movement patterns because, the former frees attentional resources that allow for more efficient movement patterns. This supposition is supported by the findings of Taylor et al. (2020), who found that psychological factors were a robust and significant predictor for performance on the Y-balance test and the Functional Movement Screen in military tactical athletes (Taylor et al., 2020). It may also be that lower levels of readiness create physiological stress that inhibits effective skill execution, reduce timing, and negatively impact muscle coordination. Based on available evidence, we hypothesize that the positive impact of psychological readiness on rehabilitation and sport specific outcomes will be mediated via physiological and behavioral mechanisms. Specifically, higher readiness will positively impact physiological parameters (e.g., cortisol, testosterone) and physiological healing (e.g., tissue healing) which in turn, will promote enhanced rehabilitation and sport-specific outcomes. Additionally, we predict that increased readiness will positively influence behavioral engagement in rehabilitation (e.g., increased rehabilitation adherence) which will thereby promote enhanced rehabilitation/RTS outcomes. Finally, we posit that higher levels of psychological readiness will facilitate enhanced rehabilitation (e.g., strength, functional movements, neuromuscular control) and sport-specific outcomes (skill execution, objective/subjective performance indices, re-injury). Further interdisciplinary research into the specific reasons *why* psychological readiness may be associated with variability in RTS outcomes, such as functional movement patterns, is a fruitful avenue for future research.

Once researchers and clinicians have a clearer understanding of what readiness is and which measure(s) are best suited to examine outcomes of it, it is important to determine meaningful readiness cut-off scores that can predict differential RTS outcomes. Doing so can help guide clinical decisions as to whether athletes should or should not RTS. Further research is needed before clear cut-off scores can be recommended for use in clinical settings. Finally, assuming psychological readiness is a construct “worthy” of assessment, we would argue that psychological readiness should be evaluated in conjunction with other indicators of readiness, such as functional strength, neuromuscular function, and execution of sport-specific movements. Such inventories may be used to inform and guide discussions with athletes about the potential deleterious implications of low levels of psychological readiness (e.g., diminished likelihood of return to previous sport activities or performance-based function, elevated risk of re-injury, greater interlimb asymmetry), and help mitigate the likelihood of a premature RTS.

**Limitations of the Review**

The current review has highlighted important gaps in current conceptualizations of psychological readiness to RTS after injury and advanced the literature in this area by articulating a nomothetic definition of the construct. Despite these advances, several limitations to our review are evident. First given that we conducted a ‘state-of-the-art’ review, our goal was not to be comprehensive in searching for every article on the topic of psychological readiness. That said, we believe our search methodologies were rigorous. Second, we did not provide description of studies examining the psychometric properties of existing psychological readiness measures or those of associated measures that could be relevant in assessing athlete’s readiness to resume sporting activities. Although examination of such studies would provide further insights into the validity and reliability of existing instruments, our primary focus was to articulate conceptual issues and critical questions limiting our understanding of what psychological readiness is. Further reviews examining the psychometric properties of extant readiness measures are warranted. Third and finally, the nomothetic (i.e., general) definition of psychological readiness offered in the initial section of this review may not transcend all sporting contexts and cultures. That is, our definition may fail to capture contextually sensitive information regarding the nuances and specificities of psychological readiness across various settings. Further research, for example, among tactical athletes (military service members, police, firefighters) may elicit greater understanding of such contextual differences.

**Conclusion**

Three aims guided our focus in the current review. First, we sought to examine the nature of psychological readiness and to offer a preliminary nomothetic definition for guiding future research. Second, we highlighted empirical work examining predictors of psychological readiness, and third, we described research focused on readiness outcomes. Regarding our first aim, we found a unidimensional characterization of readiness focused on confidence to RTS (Glazer, 2009) and several multidimensional conceptualizations (e.g., confidence, risk appraisals, emotions, motivation, expectations, Gómez-Piqueras et al., 2014, 2020; Kunnen et al. 2020; Podlog et al. 2015; Webster et al., 2008). In an effort to address the conceptual ambiguity associated with the notion of psychological readiness, we offered a nomothetic definition and testable hypotheses aimed at spurring further research on the topic. As highlighted, additional work is needed to better understand the nature of psychological readiness and to substantiate its existence. Regarding aims two and three, we found much of the work on predictors (aim two) and outcomes (aim three) to be atheoretical and cross-sectional. As such, we advocate further theoretically grounded longitudinal studies on this topic of recent interest. Research on psychological readiness holds the potential to further enhance decision making efforts aimed at maximizing the safety and success of athletes RTS following injury.

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