

# A systematic review of the psychological factors associated with returning to sport following injury

Clare L Ardern,<sup>1</sup> Nicholas F Taylor,<sup>1,2</sup> Julian A Feller,<sup>1,3</sup> Kate E Webster<sup>1</sup>

► Additional appendices are published online only. To view these files please visit the journal online (<http://dx.doi.org/10.1136/bjsports-2012-091203>)

<sup>1</sup>Musculoskeletal Research Centre, La Trobe University, Bundoora, Victoria, Australia

<sup>2</sup>Department of Physiotherapy, La Trobe University, Bundoora, Victoria, Australia

<sup>3</sup>Epworth Healthcare, Richmond, Victoria, Australia

## Correspondence to

Clare Ardern, Musculoskeletal Research Centre, La Trobe University, Bundoora, VIC 3086, Australia;  
[c.ardern@latrobe.edu.au](mailto:c.ardern@latrobe.edu.au)

Received 22 March 2012

Accepted 18 September 2012

## ABSTRACT

**Background** Psychological factors have been shown to be associated with the recovery and rehabilitation period following sports injury, but less is known about the psychological response associated with returning to sport after injury. The aim of this review was to identify psychological factors associated with returning to sport following sports injury evaluated with the self-determination theory framework.

**Study design** Systematic review.

**Method** Electronic databases were searched from the earliest possible entry to March 2012. Quantitative studies were reviewed that included athletes who had sustained an athletic injury, reported the return to sport rate and measured at least one psychological variable. The risk of bias in each study was appraised with a quality checklist.

**Results** Eleven studies that evaluated 983 athletes and 15 psychological factors were included for review. The three central elements of self-determination theory—autonomy, competence and relatedness were found to be related to returning to sport following injury. Positive psychological responses including motivation, confidence and low fear were associated with a greater likelihood of returning to the preinjury level of participation and returning to sport more quickly. Fear was a prominent emotional response at the time of returning to sport despite the fact that overall emotions became more positive as recovery and rehabilitation progressed.

**Conclusions** There is preliminary evidence that positive psychological responses are associated with a higher rate of returning to sport following athletic injury, and should be taken into account by clinicians during rehabilitation.

## INTRODUCTION

Athletic injury has been associated with negative psychological responses. These include tension, low self-esteem and emotions such as depression and anxiety<sup>1</sup> immediately following injury and during rehabilitation. Additionally, an athlete's ability to cope with stress while injured has also been shown to influence recovery and progression through a rehabilitation programme.<sup>2</sup> Negative psychological responses have also been reported to occur at the time the athlete receives clearance to return to sports participation.<sup>3</sup>

Psychological responses change as the athlete progresses through the rehabilitation phase.<sup>3</sup> Morrey *et al*<sup>3</sup> showed a U-shaped emotional response pattern where negative responses predominated immediately following injury, subsided as rehabilitation progressed, then became prominent again at the time the athlete received medical clearance to return to sport. Maladaptive psychological responses may be detrimental to the athlete's ability to return to

their previous level of sports participation and may also affect the quality of sports performance, and increase the risk of reinjury.<sup>4–8</sup> Given the change in psychological responses throughout rehabilitation and the fact that returning to sport is the main criterion by which a successful outcome is judged, investigation of the effect of psychological responses on whether athletes successfully return to sport is important.

Podlog and Eklund<sup>9</sup> identified motivation as a key factor likely to influence the transition back to sport following injury. Their extensive narrative review examined psychological factors within the framework of self-determination theory.<sup>10</sup> Their review highlighted the paucity of empirical research examining the return to sport phase following athletic injury and the psychological factors influencing this transition, particularly when compared with the extant literature examining the psychological factors manifesting in earlier phases of recovery.<sup>9</sup> Self-determination theory emphasises three innate psychological needs—autonomy, competence and relatedness which when fulfilled, enhance self-motivation and healthy psychological development.<sup>10</sup> Autonomy pertains to psychological factors (eg, motivation) that promote in the athlete a perception that their behaviour is self-authored or personally endorsed.<sup>9</sup> Competence pertains to the cognitive and emotional responses (eg, fear and confidence) that contribute to an athlete's perception of their proficiency or effectiveness in sports participation. Relatedness pertains to an athlete's perception of connectedness or belonging in a social context. With respect to returning to sport, the self-determination theory provides a framework within which to identify and organise the psychological factors that influence successful return to sport. When the autonomy, competence and relatedness needs are fulfilled it is proposed that the chance of successfully returning to sport is maximised.

The current review aimed to build upon the important work of Podlog and Eklund<sup>9</sup> by employing systematic review methods to review the psychological factors associated with returning to sport following sports injury. Self-determination theory was applied to this review to assist the synthesis of psychological factors. Returning to sport was defined for the purpose of the current review as a distinct phase of the recovery process—the time between receiving medical clearance to return to sport and actually returning to play.

## METHOD

### Search strategy

Relevant articles were identified via a search of the following electronic databases: MEDLINE,

PsychInfo, SPORTDiscus, Embase, CINAHL, AMED, The Cochrane Library and PEDro. All databases were searched from the earliest possible entry (January 1948 for Medline) to March 2012 (see supplementary Appendix SA for the search strategy as applied to the Medline database). Search terms were mapped to relevant MeSH terms or subject headings where possible. Search terms were entered into each database under three concepts: (1) athlete, injury and athletic injuries; (2) biopsychosocial, psychosocial, psychological techniques, health knowledge, illness beliefs, recovery expectation, attitude to health, locus of control, anxiety, depression, self-efficacy, fear, kinesiphobia, confidence, motivation, fear of re-injury, fear for re-injury, coping behaviour and sport psychology and (3) return to sport, sport re-entry, return to play, sport competition and athletic participation.

Keywords in each concept were grouped with the OR operator. The results from each concept were then combined with the AND operator to produce the search strategy. The reference lists of relevant papers were manually searched and forward citation tracking was undertaken via the electronic database Web of Science.

### Selection criteria

The selection criteria are presented in table 1. Participants must have sustained an injury during participation in sport. Studies were required to have reported return to sport data so it was possible to distinguish between participants who specifically returned to sport and those who returned to physical activity, as the psychological response may differ. Only studies reporting quantitative data were sought as this review aimed to provide empirical evidence regarding the psychological responses associated with returning to sport. When applying the selection criteria, the title and abstract of each study were first reviewed. Where it was unclear from the title and abstract whether a study was appropriate for inclusion, the full text of the article was obtained for review. Two reviewers applied the selection criteria independently. Consensus was used to resolve any disagreements between reviewers. A third reviewer was consulted if consensus was not achieved.

### Assessment of risk of bias

The risk of bias in all studies included in this review was assessed using a checklist adapted from Williamson *et al*<sup>11</sup>. The checklist comprised three sections: study characteristics (items 1–9), outcome measures (items 10–13) and prognostic factors studied and results (items 14–17; see supplementary Appendix SB for a

full description of items and instructions for scoring) that are scored as satisfactory or unsatisfactory. Studies with a low risk of bias scored  $\geq 75\%$  for all sections, moderate risk-of-bias studies scored at least 50% for all sections and studies with a high risk of bias scored below 50% for any one section.<sup>11</sup> Two reviewers completed the assessment of risk of bias independently. Discrepancies were resolved by discussion or consensus with a third reviewer when agreement could not be reached. Studies were not excluded on the basis of risk of bias.

### Data extraction and synthesis

Reporting for the current systematic review followed the Preferred Reporting Items for Systematic reviews and Meta-analyses (PRISMA) guidelines.<sup>12</sup> Data were obtained using a data extraction form developed specifically for this review. Data were sought for the following variables: participant number, age and sex; injury type; time from injury to follow-up; return to sport rate (%) and psychological factors evaluated. The primary outcome of interest was the association between the psychological variable(s) reported and return to sport. Descriptive statistics were calculated for demographic data including age, time from injury to follow-up and return to sport rate. Effect sizes (Cohen's *d*) and risk ratios (where appropriate) were calculated for comparison of results between returned-to-sport and not-returned-to-sport groups. Due to the heterogeneity of the included studies a meta-analysis was not performed and data were synthesised descriptively using self-determination theory as a framework.

## RESULTS

### Literature identification

The electronic database search yielded a total of 1815 references, and a further eight references were identified via citation tracking. Following deletion of duplicates and deletion of studies based on title and abstract, 45 full-text articles were obtained for further review. In total 34 of the 45 full text articles obtained were excluded (see supplementary Appendix SC for full references and reasons for exclusion), leaving 11 articles included for full review (figure 1). Additional information was sought from authors about whether all participants were participating in sport before injury,<sup>13</sup> and whether all participants returned to regular sports participation postoperatively.<sup>14–18</sup>

### Assessment of risk of bias

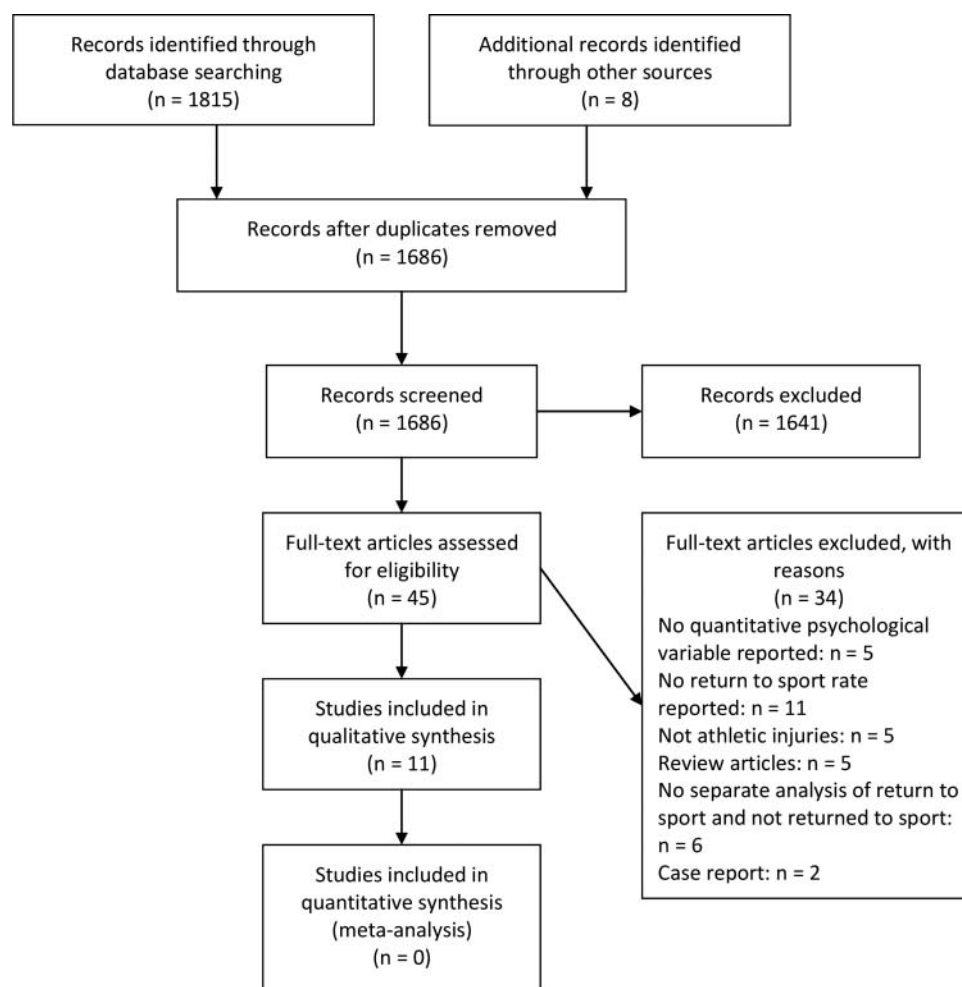
The results of the assessment of risk of bias are presented in table 2. Overall, the number of items satisfied by each study ranged from 4 to 13 (out of a possible 17). Ten of the 11 studies,<sup>14–16 18–24</sup> were rated as having a high risk of bias. One study was rated as having a moderate risk of bias.<sup>25</sup> One study undertook blinding of participants or assessors.<sup>25</sup> There were three studies where the psychological factors investigated were fully described,<sup>15 21 25</sup> and three studies where it was possible to ascertain that the loss to follow-up was less than 20%.<sup>21 22 25</sup> There was also only one study where the treatment participants received was fully described.<sup>22</sup>

### Demographic characteristics

The 11 studies reviewed reported on a total of 983 injured athletes (of which 654 (67%) were men) with a mean age of 24.4 years (range=12–54 years; table 3). The athletes ranged from international level to recreational level. Three studies reported outcomes following anterior cruciate ligament (ACL) reconstruction surgery.<sup>20 22 24</sup> Seven studies did not describe

**Table 1** Selection criteria

Inclusion criteria	Exclusion criteria
All participants evaluated following an injury sustained while participating in sport (or it is clearly stated that participants were athletes immediately prior to injury)	Review studies
All participants completed a period of rehabilitation following their injury (this could be a formal rehabilitation programme supervised by a rehabilitation specialist or informal such as a period of self-enforced rest)	Non-English language reports
Return to sport rate reported (number or percentage of participants returning to sport reported) or data allowing calculation of number of people returning to sports participation following rehabilitation reported	Unpublished abstracts
Quantitative data reported for at least one psychological variable, separate analysis of psychological variable(s) for participants who have and have not returned to sport	Case reports



**Figure 1** Process of literature identification.

the specific types or frequencies of injuries sustained by their participants. The 11 studies reported a pooled rate of return to the athletes' preinjury level of sports participation of 82% (range=40–100%).

### Measures

There were 18 different outcome measures used to assess 15 different psychological factors related to returning to sport (for full description see supplementary Appendices SD and SE). Four studies reported on the development of new scales to evaluate

return to sport psychological outcomes.<sup>16 19 20 24</sup> All but two studies<sup>18 20</sup> reported evidence of the psychometric properties of the outcome measures used, with adequate-to-excellent internal consistency being reported for all outcome measures.

### Psychological factors

#### Autonomy

Three autonomy factors were identified in the included studies: motivation,<sup>16 20</sup> self-esteem<sup>25</sup> and autonomy needs satisfaction.<sup>15</sup>

**Table 2** Assessment of risk of bias

Study	Sampling									Measurement				Analysis				Total criteria satisfied
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
Crossman <i>et al</i> <sup>18</sup>	×	×	√	×	√	×	×	√	×	×	×	√	×	×	√	×	×	5
de Heredia <i>et al</i> <sup>14</sup>	√	×	√	√	×	×	√	×	×	×	×	√	×	×	×	×	×	5
Glazer <sup>19</sup>	√	×	√	√	×	×	√	×	×	×	×	×	×	×	×	×	×	4
Gobbi and Francisco <sup>20</sup>	√	√	√	√	√	√	√	√	×	×	×	×	×	√	×	×	×	9
Johnson <sup>21</sup>	√	×	√	√	√	√	×	√	×	×	×	√	√	×	√	√	√	11
Langford <i>et al</i> <sup>22</sup>	√	√	√	√	√	√	√	√	√	×	×	×	×	√	√	×	√	13
Podlog and Eklund <sup>16</sup>	×	×	√	√	×	×	×	×	×	√	×	√	√	√	×	√	×	7
Podlog <i>et al</i> <sup>15</sup>	×	×	√	√	×	×	×	×	×	√	×	×	√	√	×	√	√	7
Smith <i>et al</i> <sup>23</sup>	×	×	√	√	×	×	√	√	×	×	×	√	√	√	×	√	√	9
Smith <i>et al</i> <sup>25</sup>	√	×	√	√	√	×	√	√	×	×	√	√	√	√	√	√	√	13
Webster <i>et al</i> <sup>24</sup>	√	√	√	√	√	√	×	×	×	×	×	×	√	√	×	×	√	9

Note: √ Criterion satisfied; × criterion not satisfied.

**Table 3** Demographic characteristics

Study	Criteria for definition of injury	Population	Description of injury type(s)	Subject number	Sex (M:F)	Age (year); mean (SD)	Time to final follow-up (months)	Return to sport rate (%)
Crossman <i>et al</i> <sup>18</sup>	Injuries medically diagnosed as moderate severity resulting in 1–8 weeks missed playing time	Canadian football or hockey players from high school, club or semi-professional level	Primarily joint sprains and muscle strains	30	30 : 0	20.1	Not reported	100
de Heredia <i>et al</i> <sup>14</sup>	Recent injury (occurring up to 1 day prior to presentation for medical assessment), medically diagnosed as moderately serious or serious	Spanish senior amateur soccer players presenting to a single sports medicine clinic	Not reported	20	Not reported	Range=18–35	Not reported	100
Glazer <sup>19</sup>	Sustained athletic injury resulting in at least 1 week missed practice	College varsity athletes (NCAA Div II or III)	Not reported	22	18 : 4	19.7 (1.4) (range=18–22)	Not reported	100
Gobbi and Francisco <sup>20</sup>	ACL injury diagnosed by surgeon, athletes underwent ACL reconstruction surgery	Non-professional athletes playing competitive regional or national level sport ; or playing recreational sport at least 3 times per week	ACL injury	100	67 : 33	28 (range=17–50)	24	65
Johnson <sup>21</sup>	Unable to train for or compete in previous sport for minimum 5 weeks due to injury	Swedish national or international competitive athletes treated at one of two sport injury centres in southern Sweden	Knee or foot/ankle injuries	12	5 : 7	24.2	36	42
Langford <i>et al</i> <sup>22</sup>	ACL injury diagnosed by surgeon, athletes underwent ACL reconstruction surgery	Athletes competing in competitive sport weekly prior to injury	ACL injury	87	55 : 32	27.5 (5.7) (range=18–40)	12	51
Podlog and Eklund <sup>16</sup>	Minimum 2 months of participation lost due to injury	Athletes competing at international, national, Canadian Inter-university sport, state, provincial and professional levels	Not reported	180	117 : 63	25 (5.2) (range=18–44)	33	100
Podlog <i>et al</i> <sup>15</sup>	Minimum 2 months of participation lost due to injury	Athletes competing at professional, international, national or intercollegiate levels in Australia, Canada and the USA	Not reported	204	138 : 66	21.75 (2.9) (range=18–36)	27	100
Smith <i>et al</i> <sup>23</sup>	Injury sustained as a consequence of participating in exercise, sports, or a game. Activity restricted beyond 1 day after injury (American Medical Association definition)	Athletes presenting to the Section of Sports Medicine at the Mayo Clinic for treatment	Primarily sprains, strains, fractures and cartilage injuries to the knee, leg, shoulder and foot	72	49 : 23	Mode=16 (range=12–54)	6	100
Smith <i>et al</i> <sup>25</sup>	Injury occurred as a consequence of participating in sports, exercise, or a game. Activity restricted beyond 1 day after injury (American Medical Association definition)	Athletes competing at high school varsity/junior varsity team, US Hockey League junior team, Division I college team or National Hockey League minor league team	Muscle strains, joint sprains, fractures, dislocations, contusions	36	31 : 5	Not reported	Not reported	100
Webster <i>et al</i> <sup>24</sup>	ACL injury diagnosed by surgeon, athletes underwent ACL reconstruction surgery	Athletes participating in sport (any) weekly prior to injury	ACL injury	220	124 : 96	29.2 (9.7) (range=16–54)	12 (range=8–22)	40

ACL, anterior cruciate ligament; M:F, male:female.

Athletes who returned to sport following ACL reconstruction surgery had significantly greater preoperative motivation than athletes who did not return to sport (table 4).<sup>20</sup> Following a return to sport, athletes with more positive perceptions of their return to sport (measured with the Return to Sport after Injury Questionnaire (RSSIQ)) were shown to have greater intrinsic motivation ( $\beta=0.365$ ,  $p=0.001$ ), and those with more negative perceptions of their return to sport were shown to have greater extrinsic motivation ( $\beta=0.258$ ,  $p=0.013$ ).<sup>16</sup> Athletes' self-esteem (measured using the Rosenberg Self-Esteem Inventory) did not change from preinjury levels.<sup>25</sup>

In a group of athletes who had returned to sport, those who had more positive perceptions of their return to sport outcomes (measured with the RSSIQ) reported a greater sense of autonomy needs satisfaction as indicated by a significant positive correlation

between well-being and the autonomy subscale of the Needs Satisfaction Scale ( $r$  statistic range=0.19–0.28;  $p<0.05$ ).<sup>15</sup>

### Competence

The following competence factors were identified in the included studies: confidence,<sup>19 22 24</sup> emotions,<sup>18 22–24</sup> mood,<sup>14 19 21 23 25</sup> perception of negative influence of injury on current life situation,<sup>21</sup> psychological readiness to return to sport,<sup>19</sup> risk appraisal,<sup>22 24</sup> subjective estimation of injury severity<sup>14</sup> and competence needs satisfaction.<sup>15</sup>

Athletes who had returned to sport scored significantly higher on the Anterior Cruciate Ligament-Return to Sport after Injury scale (ACL-RSI) when compared with athletes who had not returned to sport following ACL reconstruction surgery (table 4), demonstrating a significantly more positive



**Table 4** Comparison of psychological factors between athletes who have and have not returned to sport

Study	Psychological factor	Returned-to-sport group	Not-returned-to-sport group	Between-group comparison statistic	Return to sport rate (%)
Gobbi and Francisco <sup>20</sup>	Motivation; mean (SD)	16.04 (1.81)	10.54 (3.99)*	$d=1.78$	65
Johnson <sup>21</sup>	Perception of negative influence of injury on present life situation (Y:N)	0 : 5	5 : 2*	Risk ratio (95% CI)=3.5 (1.1 to 11.3)	42
Langford <i>et al</i> <sup>22</sup>	Confidence, emotions, risk appraisal; mean (SD)	72.05 (16.25)	58.61 (18.34)*	$d=1.15$	51
Webster <i>et al</i> <sup>24</sup>	Confidence, emotions, risk appraisal; mean (SD)	70.7 (18.6)	46.5 (23.2)*	$d=0.55$	40
Langford <i>et al</i> <sup>22</sup>	Emotions; mean (SD)	4.73 (23.73)	18.02 (25.05)	$d=0.78$	51

\*Significant difference between returned to sport group and not returned to sport group,  $p<0.05$ .

Total Anterior Cruciate Ligament-Return to Sport after Injury score presented to represent confidence, emotions and risk appraisal factors in Langford *et al*<sup>22</sup> and Webster *et al*<sup>24</sup>

psychological response (greater confidence, positive emotions and positive risk appraisal).<sup>22–24</sup> The ACL-RSI ( $F_{2,170}=16.47$ ,  $p<0.001$ ) and Injury Psychological Readiness to Return to Sport scale (I-PRRS) scores ( $F_{1,21}=68.26$ ,  $p<0.001$ ) became more positive over time indicating confidence, emotions, risk appraisal and psychological readiness to return to sport became more positive throughout the recovery phase.<sup>19–22</sup>

Reports of the positive emotions of joy and excitement significantly increased (Cochrane's  $Q=28.56$  and  $30.06$ , respectively,  $p<0.05$ ) and reports of negative emotions anger and disgust simultaneously decreased ( $Q=29.42$  and  $15.42$ , respectively,  $p<0.05$ ) as athletes progressed through rehabilitation and returned to sport.<sup>18</sup> Reports of fear significantly increased when athletes returned to competition ( $Q=8.0$ ,  $p<0.05$ ) compared with during rehabilitation. At the time of returning to competition, fear was reported by approximately 40% of athletes, compared with approximately 13% during rehabilitation.<sup>18</sup> Athletes who had less fear of relapse of injury (measured using the fear subscale of the Subjective Injury Estimation Questionnaire) returned to sport more quickly after receiving medical clearance ( $r=0.64$ ;  $p<0.05$ ).<sup>14</sup> Emotional Responses of Athletes to Injury Questionnaire (ERA IQ) scores also became more positive over time ( $F_{1,21}=5.79$ ,  $p=0.005$ ).<sup>22</sup> There was no difference in ERA IQ score between athletes who had and had not returned to sport following ACL reconstruction surgery (table 4).<sup>22</sup>

In a group of athletes who all returned to sport, injury severity was found to predict postinjury depression (measured using the POMS) ( $F_{1,34}=8.48$ ;  $R^2=0.3$ ;  $p=0.0063$ ).<sup>25</sup> Mood became significantly more positive with increasing time from injury ( $\chi^2=12.17$ ,  $p=0.002$ ;<sup>14</sup>  $F_{1,21}=27.98$ ,  $p<0.001$ ;<sup>19</sup> at 4 weeks postinjury:  $F=3.53$ ,  $p=0.019$ ; at 6 weeks postinjury:  $F=4.74$ ,  $p=0.04$ ),<sup>23</sup> and was significantly negatively correlated with I-PRRS scores indicating that mood became more positive as psychological readiness to return to sport increased ( $r$  statistic range:  $-0.78$  to  $-0.57$ ,  $p<0.01$ ).<sup>19</sup> Once the athlete received medical clearance to return to sport, the degree of mood tension (measured using the Profile of Mood States (POMS)) was significantly related to the time taken to return to sport ( $r=0.52$ ;  $p<0.05$ ).<sup>14</sup> Lower hedonic tone (the ability to experience pleasure or satisfaction) was the only mood state that was found to contribute to the prediction of not returning to sport (OR=29.73). The six-variable multiple logistic regression model ( $\chi^2=20.1$ ,  $df=6$ ,  $p=0.003$ , correctly predicted cases=96.1%)<sup>21</sup> suggested that female sex, not setting rehabilitation goals, negative outlook regarding injury and negative attitude toward rehabilitation (as assessed by the treating therapist) along with hedonic tone were predictive of an athlete who was not likely to return to sport.<sup>21</sup>

Athletes' estimation (measured with the Subjective Injury Estimation Questionnaire) of the severity of their injury

( $r=0.60$ ,  $p<0.05$ ) and perceived interference with short-term expectations for recovery ( $r=0.63$ ,  $p<0.05$ ) were significantly associated with the time required to return to sport.<sup>14</sup>

Athletes who did not return to sport following completion of active rehabilitation perceived a more negative influence of their injury on their life situation. Risk ratio analysis demonstrated athletes who did not return to sport viewed their life situation over three times more negatively when compared with athletes who returned to sport (table 4).<sup>21</sup>

In a group of athletes who had returned to sport, those who had more positive perceptions of their return to sport outcomes (measured with the RSSIQ) reported a greater sense of competence needs satisfaction (indicated by a significant positive correlation between well-being and the competence subscale of the Needs Satisfaction Scale;  $r$  statistic range=0.20–0.25;  $p<0.01$ ).<sup>15</sup>

#### Relatedness

A single relatedness factor was identified.<sup>15</sup> In a group of athletes who had returned to sport, those who had more positive perceptions of their return to sport outcomes (measured with the RSSIQ) reported a greater sense of relatedness needs satisfaction (indicated by significant correlations between well-being and the relatedness subscale of the Needs Satisfaction Scale;  $r$  statistic range= $-0.15$  to  $-0.17$  (negative affect),  $0.20$ – $0.21$  (self-esteem and vitality);  $p<0.05$ ).<sup>15</sup>

#### Additional factors

Coping mechanisms (measured with the General Coping Questionnaire) and personality factors such as anxiety, social desirability, impulsiveness and monotony avoidance (measured with the Karolinska Scales of Personality) were not found to relate to returning to sport following injury.<sup>21</sup>

#### DISCUSSION

The empirical evidence presented in this systematic review supports the previous qualitative and theoretical proposals that psychological factors are important influences on an athlete returning to sport. Overall, this review found preliminary evidence that positive psychological responses were associated with a higher return to sport rate after injury, a faster return and a greater likelihood of returning to the preinjury participation level. The results of this review suggest that psychological factors should be important considerations for treating clinicians during rehabilitation and return to sport. However, the high risk of bias identified in all but one of the included studies highlights the need for further exploration of the relationship between psychological factors and returning to sport.<sup>9</sup>

The current review included eight<sup>14–15–19–22–24–25</sup> studies that were not reviewed by Podlog and Eklund.<sup>9</sup> The results of these

studies are in agreement with the findings of Podlog and Eklund<sup>9</sup> that psychological factors associated with satisfying autonomy, competence and relatedness needs are important influences on successful return to sport.<sup>9</sup> The findings of the current review are also consistent with previous qualitative literature that has investigated the psychological factors that athletes attribute to being associated with successfully returning to sport,<sup>26 27</sup> and with quantitative literature that has investigated the factors associated with recovery and rehabilitation from injury.<sup>28–30</sup> As athletes progress through the rehabilitation phase towards a return to sport, they describe a lessening of the negative emotions associated with sustaining the initial injury (such as depression, anger and anxiety), and a shift towards a predominance of positive emotions (such as confidence and readiness to return to sport), provided the period of rehabilitation has progressed as anticipated.

Fear remains a prominent emotion at the time athletes are actually returning to sport. This is consistent with qualitative literature.<sup>9 26</sup> Fear is also a common reason given by athletes for not returning to sport.<sup>15 31</sup> The prominence of fear has important clinical implications and suggests that the time of transition to back to full sports participation should be monitored closely to ensure the athlete feels adequately supported in their return to sport. Building the athlete's confidence in the injured body part particularly with the use of goal setting strategies regarding returning to sport may assist the return to sport transition.<sup>32</sup> Importantly, athletes who perceive themselves as having made a successful return reportedly describe an associated dissipation of this fear upon testing the injured body part by returning to play.<sup>26</sup> This is consistent with another finding of this review, that positive psychological responses are associated with positive perceptions of the return to sport outcome.<sup>15 16 19</sup>

Self-determination theory provides a framework, which specifically focuses on returning to sport, and accounts for individual differences in psychological responses, to assist the clinician to identify and subsequently address maladaptive psychological responses that may place the athlete at risk of not returning to sport. Factors for clinicians to consider, informed by self-determination theory include whether the athlete perceives they are in control of their return to sport, how they feel about returning to sport and whether they perceive support from coaches, team-mates and other significant individuals as they are returning to sport. Reducing athletes' perceptions of external pressure to return to sport, by involving them in the identification of a realistic date for a potential return to sport, may promote a sense of autonomy. The use of goal setting and visual imagery throughout the active rehabilitation period to build confidence and self-esteem may promote a sense of competence. Improvements in confidence may also be achieved via strong social support which at the same time may assist in easing athlete fears about overstressing the recovered body part, setting realistic performance expectations and recognising improvements.<sup>33 34</sup> A negative outlook regarding injury and a negative attitude toward rehabilitation were found to be predictive of not returning to sport.<sup>21</sup> Clinicians may consider screening athletes during the rehabilitation phase to identify those with potentially maladaptive psychological responses to injury and implement strategies to address these issues. Screening could include psychological factors that were identified consistently in this review as being associated with returning to sport. For example, measures of motivation (autonomy), confidence and fear (competence) should be considered. An example of an appropriate psychological screening tool for

patients returning to sport after ACL reconstruction is the ACL-RSI.<sup>22 24</sup>

The psychological responses of patients following ACL injury have been quantitatively evaluated in a number of studies.<sup>13 17 20 22 24 30 35–37</sup> This potentially allows for a homogeneous population in terms of the type of injury to be studied where the injury is serious, significant and results in an extended absence from physical activity. However, some of these studies have not specifically studied homogeneous populations of athletes, or reported specifically on return to sport (return to participation in physical activity was reported), and were therefore not included in the current review.<sup>13 17 30 36 37</sup> Nevertheless, the results of these excluded studies were consistent with the findings of the current review, in that more positive psychological responses were associated with a successful return to participation. Of particular note is the study conducted by Tripp *et al*<sup>17</sup> where it was found that fear of reinjury was a unique predictor of return to sport in recreational athletes following ACL reconstruction. However, as the total proportion of athletes who returned to sport was not reported, this study was not included in the current review.

The athletes studied in the current review ranged from professional to recreational level athletes. To our knowledge, there are no studies directly comparing the psychological responses to injury of groups of athletes participating in differing levels of competition. However, it has been shown that athletes who are more involved in sport prior to their injury have higher confusion and perceive their recovery to be less at the end of their rehabilitation suggesting that emotional disturbance may be higher in athletes who invest more time in sport.<sup>38</sup> Professional or elite-level athletes who derive financial benefit from their participation in sport may perceive additional pressure to return to sport. In previous studies athletes have reported feeling pressure to maintain their spot on the team, not let team-mates or coaches down by not playing,<sup>33</sup> and concerns about being able to perform at their preinjury level upon return from injury.<sup>2</sup> This perceived pressure may lead to an athlete returning to sport prematurely, before they are psychologically ready to do so, which has been shown to subsequently increase the likelihood of reinjury.<sup>33</sup> It is also important to consider that athletes who do not return to their preinjury level may require additional support to cope with the associated lifestyle adjustment.<sup>39 40</sup>

Injury severity may also be a confounding factor when examining return to sport. Athletes with more severe injuries may exhibit more prolonged and severe negative psychological responses,<sup>18 26 41 42</sup> which may carry over to the return to sport phase. This knowledge may assist clinicians to prioritise the interventions provided for specific athletes to maximise clinical and return to sport outcomes.

One of the strengths of this current review is that it applied strict inclusion criteria to enable evidence to be generated that was applicable specifically to athletes. In addition, the PRISMA guidelines for reporting in systematic reviews<sup>12</sup> were also followed. There is a growing body of literature examining the relationships between psychological factors and returning to sport following injury. However, the fact that only 11 published studies met the inclusion criteria for this review, suggests that ongoing research is required. It is important that future research employs prospective designs with clearly defined athletic populations, and uses valid population-specific outcome measures with established psychometric properties to further investigate the psychological factors associated with returning to sport after injury. The current review only included one prognostic

### What this study adds

- ▶ This review synthesises evidence about psychological factors associated with returning to sport following injury. Most previous work has focused on the factors associated with injury occurrence and the active rehabilitation phase.
- ▶ This review has shown preliminary evidence that an athlete's psychological response to injury despite becoming more positive with time, is likely to be an important influence on their likelihood of returning to sport.
- ▶ The psychological response of athletes is an important consideration for the treating clinician rehabilitation to maximise athletes' ability to successfully return to sport.

study, which demonstrated evidence of a predictive relationship between positive psychological responses and returning to sport.<sup>23</sup> Prospective studies allow the identification of potentially prognostic psychological factors and their association with returning to sport.<sup>43</sup> This may facilitate more accurate prediction of return to sport outcome on the basis of psychological responses, and allow athletes at risk of not returning to sport to be identified early based on their psychological responses.<sup>44</sup>

### CONCLUSION

Empirical evidence suggests that psychological factors are likely to be important determinants of successful return to sport following injury. Positive psychological responses appear to promote a greater likelihood of the athlete returning to their preinjury level of participation and returning to sport more quickly. Fear was identified as a prominent emotional response at the time of transition back to sport, and clinicians should be prepared to address this and other autonomy and competence-related psychological factors early in the rehabilitation phase with confidence-building strategies such as goal setting. Clinicians may consider routine screening of injured athletes during the rehabilitation phase with validated and condition-specific measures to identify those at risk of developing maladaptive psychological responses.

**Contributors** CA, NT and KW contributed to the conception and design of the review. CA applied the search strategy, extracted and analysed the data and wrote the manuscript and is responsible for the overall content as guarantor. CA and KW applied inclusion criteria. NT, JF and KW critically revised the manuscript for important intellectual content.

**Competing interest** None.

**Provenance and peer review** Not commissioned; externally peer reviewed.

### REFERENCES

1. **Smith AM.** Psychological impact of injuries in athletes. *Sports Med* 1996;**22**:391–405.
2. **Crossman J.** Psychological rehabilitation from sports injuries. *Sports Med* 1997;**23**:333–9.
3. **Morrey MA,** Stuart MJ, Smith AM, *et al.* A longitudinal examination of athletes' emotional and cognitive responses to anterior cruciate ligament injury. *Clin J Sport Med* 1999;**9**:63–9.
4. **Hanson SJ,** McCullagh P, Tonymon P. The relationship of personality characteristics, life stress, and coping resources to athletic injury. *J Sport Exerc Psychol* 1992;**14**:262–72.
5. **Kontos AP,** Feltz DL, Malina RM. The development of the Risk of Injury in Sports Scale (RISSc). *J Sport Exerc Psychol* 2000;**22**:S10.
6. **Reuter J,** Short SE. The relationships among three components of perceived risk of injury, previous injuries and gender in non-contact/limited contact sport athletes. *Athl Insight* 2005;**7**:20–42.
7. **Short SE,** Reuter J, Brandt J, *et al.* The relationships among three components of perceived risk of injury, previous injuries and gender in contact sport athletes. *Athl Insight* 2004;**6**:38–46.
8. **Williams JM.** *Applied sport psychology: personal growth to peak performance.* 5th edn. North Ryde, New South Wales, Australia: McGraw-Hill, 2006.
9. **Podlog L,** Eklund RC. The psychosocial aspects of a return to sport following serious injury: a review of the literature from a self-determination perspective. *Psychol Sport Exerc* 2007;**8**:535–66.
10. **Ryan R,** Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development and well-being. *Am Psychol* 2000;**55**:68–78.
11. **Williamson E,** Williams M, Gates S, *et al.* A systematic review of psychological factors and the development of late whiplash syndrome. *Pain* 2008;**135**:20–30.
12. **Moher D,** Liberati A, Tetzlaff J, *et al.* Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ* 2009;**339**:332–6.
13. **Kvist J,** Ek A, Sporrstedt K, *et al.* Fear of re-injury: a hindrance for returning to sports after anterior cruciate ligament reconstruction. *Knee Surg Sport Traumatol Arthrosc* 2005;**13**:393–7.
14. **de Heredia R,** Munoz A, Artaza J. The effect of psychological response on recovery of sport injury. *Res Sports Med* 2004;**12**:15–31.
15. **Podlog L,** Lochbaum M, Stevens T. Needs satisfaction, well-being, and perceived return-to-sport outcomes among injured athletes. *J Appl Sport Psychol* 2010;**22**:167–82.
16. **Podlog L,** Eklund RC. Return to sport after serious injury: a retrospective examination of motivation and psychological outcomes. *J Sport Rehabil* 2005;**14**:20–34.
17. **Tripp DA,** Stanish W, Ebel-Lam A, *et al.* Fear of reinjury, negative affect, and catastrophizing predicting return to sport in recreational athletes with anterior cruciate ligament injuries at 1 year postsurgery. *Rehabil Psychol* 2007;**52**:74–81.
18. **Crossman J,** Gluck L, Jamieson J. The emotional responses of injured athletes. *NZ J Sports Med* 1995;**23**:1–2.
19. **Glazer DD.** Development and preliminary validation of the Injury-Psychological Readiness to Return to Sport (I-PRRS) scale. *J Athl Train* 2009;**44**:185–9.
20. **Gobbi A,** Francisco R. Factors affecting return to sports after anterior cruciate ligament reconstruction with patellar and hamstring graft: a prospective clinical investigation. *Knee Surg Sport Traumatol Arthrosc* 2006;**14**:1021–8.
21. **Johnson U.** A three-year follow-up of long-term injured competitive athletes: influence of psychological risk factors on rehabilitation. *J Sport Rehabil* 1997;**6**:256–71.
22. **Langford JL,** Webster KE, Feller JA. A prospective longitudinal study to assess psychological changes following anterior cruciate ligament reconstruction surgery. *Br J Sport Med* 2009;**43**:377–88.
23. **Smith AM,** Scott SG, O'Fallon WM, *et al.* Emotional responses of athletes to injury. *Mayo Clin Proc* 1990;**65**:38–50.
24. **Webster KE,** Feller JA, Lambros C. Development and preliminary validation of a scale to measure the psychological impact of returning to sport following anterior cruciate ligament reconstruction surgery. *Phys Ther Sport* 2008;**9**:9–15.
25. **Smith AM,** Stuart MJ, Wiese-Bjornstal DM, *et al.* Competitive athletes: preinjury and postinjury mood state and self-esteem. *Mayo Clin Proc* 1993;**68**:939–47.
26. **Johnston LH,** Carroll D. The context of emotional responses to athletic injury: a qualitative analysis. *J Sport Rehabil* 1998;**7**:206–20.
27. **Macchi R,** Crossman J. After the fall: reflections of injured classical ballet dancers. *J Sport Behav* 1996;**19**:221–34.
28. **Dawes H,** Roach NK. Emotional responses of athletes to injury and treatment. *Physiotherapy* 1997;**83**:243–7.
29. **Quinn AM,** Fallon BJ. The changes in psychological characteristics and reactions of elite athletes from injury onset until full recovery. *J Appl Sport Psychol* 1999;**11**:210–29.
30. **Thomé P,** Währborg P, Börjesson M, *et al.* Self-efficacy, symptoms and physical activity in patients with an anterior cruciate ligament injury: a prospective study. *Scand J Med Sci Sports* 2007;**17**:238–45.
31. **Ardern CL,** Webster KE, Taylor NF, *et al.* Return to the preinjury level of competitive sport after anterior cruciate ligament reconstruction surgery: two-thirds of patients have not returned by 12 months after surgery. *Am J Sport Med* 2011;**39**:538–43.
32. **Carson F,** Polman R. Experiences of professional rugby union players returning to competition following anterior cruciate ligament reconstruction. *Phys Ther Sport* 2012;**13**:35–40.
33. **Bianco T.** Social support and recovery from sport injury: elite skiers share their experiences. *Res Q Exerc Sport* 2001;**72**:376–88.
34. **Johnston LH,** Carroll D. The provision of social support to injured athletes: a qualitative analysis. *J Sport Rehabil* 1998;**7**:267–84.
35. **Lee DY,** Karim SA, Chang HC. Return to sports after anterior cruciate ligament reconstruction—a review of patients with minimum 5-year follow up. *Ann Acad Med Singapore* 2008;**37**:273–8.
36. **Thomé P,** Währborg P, Börjesson M, *et al.* Determinants of self-efficacy in the rehabilitation of patients with anterior cruciate ligament injury. *J Rehabil Med* 2007;**39**:486–92.

## Review

37. **Thomé P**, Währborg P, Börjesson M, *et al*. Self-efficacy of knee function as a pre-operative predictor of outcome 1 year after anterior cruciate ligament reconstruction. *Knee Surg Sport Traumatol Arthrosc* 2008;**16**:118–27.
38. **Johnston LH**, Carroll D. The psychological impact of injury: effects of prior sport and exercise involvement. *Br J Sport Med* 2000;**34**:436–9.
39. **Lamont-Mills A**, Christensen SA. Athletic identity and its relationship to sport participation levels. *J Sci Med Sport* 2006;**9**:472–8.
40. **Stoitenburg AL**, Kamphoff CS, Bremer K. Transitioning out of sport: the psychosocial effects of collegiate athletes' career-ending injuries. *Athl Insight* 2011;**13**:1–11.
41. **McDonald SA**, Hardy CJ. Affective response patterns of the injured athlete: an exploratory analysis. *Sport Psychol* 1990;**4**:261–74.
42. **Quackenbush N**, Crossman J. Injured athletes: a study of emotional responses. *J Sport Behav* 1994;**17**:178–87.
43. **Scholten-Peeters G**, Verhagen AP, Bekkering GE, *et al*. Prognostic factors of whiplash-associated disorders: a systematic review of prospective cohort studies. *Pain* 2003;**104**:303–22.
44. **Altman DG**. Systematic reviews of evaluations of prognostic variables. *BMJ* 2001;**323**:224–8.





## A systematic review of the psychological factors associated with returning to sport following injury

Clare L Arden, Nicholas F Taylor, Julian A Feller, et al.

*Br J Sports Med* published online October 13, 2012

doi: 10.1136/bjsports-2012-091203

---

Updated information and services can be found at:  
<http://bjsm.bmj.com/content/early/2012/10/12/bjsports-2012-091203.full.html>

---

	<i>These include:</i>
<b>Data Supplement</b>	"Web Only Data" <a href="http://bjsm.bmj.com/content/suppl/2012/10/12/bjsports-2012-091203.DC1.html">http://bjsm.bmj.com/content/suppl/2012/10/12/bjsports-2012-091203.DC1.html</a>
<b>References</b>	This article cites 43 articles, 4 of which can be accessed free at: <a href="http://bjsm.bmj.com/content/early/2012/10/12/bjsports-2012-091203.full.html#ref-list-1">http://bjsm.bmj.com/content/early/2012/10/12/bjsports-2012-091203.full.html#ref-list-1</a>
<b>P&lt;P</b>	Published online October 13, 2012 in advance of the print journal.
<b>Email alerting service</b>	Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

---

<b>Topic Collections</b>	Articles on similar topics can be found in the following collections <a href="#">Injury</a> (659 articles) <a href="#">Trauma</a> (603 articles)
--------------------------	--

---

Advance online articles have been peer reviewed, accepted for publication, edited and typeset, but have not yet appeared in the paper journal. Advance online articles are citable and establish publication priority; they are indexed by PubMed from initial publication. Citations to Advance online articles must include the digital object identifier (DOIs) and date of initial publication.

---

To request permissions go to:  
<http://group.bmj.com/group/rights-licensing/permissions>

To order reprints go to:  
<http://journals.bmj.com/cgi/reprintform>

To subscribe to BMJ go to:  
<http://group.bmj.com/subscribe/>

## Notes

---

Advance online articles have been peer reviewed, accepted for publication, edited and typeset, but have not yet appeared in the paper journal. Advance online articles are citable and establish publication priority; they are indexed by PubMed from initial publication. Citations to Advance online articles must include the digital object identifier (DOIs) and date of initial publication.

---

To request permissions go to:

<http://group.bmj.com/group/rights-licensing/permissions>

To order reprints go to:

<http://journals.bmj.com/cgi/reprintform>

To subscribe to BMJ go to:

<http://group.bmj.com/subscribe/>