original research

Development and Preliminary Validation of the Injury-Psychological Readiness to Return to Sport (I-PRRS) Scale

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Context: Only a few scales measure confidence within sport; however, these scales are insufficient to measure confidence after athletic injuries. Therefore, better measures are needed to determine the psychological readiness of injured athletes to return to sport participation.

Objective: To develop a scale that measures the psychological readiness of injured athletes to return to sport participation and to provide preliminary evidence of reliability and validity for the scale.

Design: The Delphi method was used to develop the Injury-Psychological Readiness to Return to Sport scale (I-PRRS). Two 1-way analyses of variance with repeated measures and 6 Pearson product moment correlations were computed to help validate the scale.

Setting: Athletic training clinics at 3 National Collegiate Athletic Association (NCAA) schools.

Patients or Other Participants: Four certified athletic trainers (ATs) and professors of Commission on Accreditation of Athletic Training Education-accredited athletic training programs and 3 NCAA Division III coaches made up a panel of experts that participated in the Delphi portion of the study to develop the I-PRRS. In the second part of the study, 22 injured athletes, who missed a minimum of 1 week of practice, from 3 NCAA schools in Divisions II and III were surveyed along with their respective ATs. The injured athletes and ATs participated in the validation of the I-PRRS.

Main Outcome Measure(s): The injured athlete completed the Profile of Mood States (POMS) short form and the I-PRRS shortly after injury, before returning to the first practice, before returning to competition, and immediately after competition. The respective AT completed the I-PRRS before and after competition. The I-PRRS is a 6-item scale that measures the psychological readiness of injured athletes to return to sport, and the POMS short form is a 30-item scale that measures mood states. I added the negative moods of the POMS and subtracted the positive moods of the POMS to calculate a Total Mood Disturbance (TMD) score.

Results: The I-PRRS scores were negatively correlated with the TMD scores of the POMS short form at all 4 time intervals, showing concurrent validity. The I-PRRS scores were lowest after injury, increased before practice, increased again before competition, and had no change after competition. The I-PRRS as completed by the athlete and respective AT was positively correlated both before and after practice, demonstrating external validity.

Conclusions: Preliminary evidence for reliability and validity of the I-PRRS was demonstrated. The I-PRRS can be a beneficial tool for ATs to assess an athlete's psychological readiness to return to sport participation after injury.

Key Words: athletic injuries, psychology, confidence

Key Points

- Using the Delphi method with experts, I established content validity of the Injury-Psychological Readiness to Return to Sport scale.
- The significant relationship between the Injury-Psychological Readiness to Return to Sport scale and Total Mood Disturbance scores demonstrated preliminary concurrent validity.
- The Injury-Psychological Readiness to Return to Sport scale scores of the athletic trainers related to athletes' scores, demonstrating external validity of the scale.
- The Injury-Psychological Readiness to Return to Sport scale can help athletic trainers assess when injured athletes are ready to return to sport participation.

A thletic injuries are an unfortunate part of sport participation. When an athlete is injured, he or she experiences not only physical loss but also psychological loss.[1–3] Between 5% and 19% of injured athletes report psychological distress levels similar to individuals receiving treatment for mental health problems.[4,5] Heil[6] indicated that the self-efficacy and confidence beliefs of injured athletes can decrease before returning to participation. Because athletes may have anxieties concerning return to play and possible reinjury,[5] they not only need to be physically prepared to return to sport after injury but also psychologically ready.

Returning injured athletes to sport before they are psychologically ready can lead to fear, anxiety, reinjury, injury to different body parts, depression, and a decrease in performance.[7,8] Presently, only a few scales measure confidence within sport.[9] Two such scales are the Trait Sport Confidence Inventory (TSCI) and the State Sport Confidence Inventory (SSCI).[10] Feltz[11] suggested that confidence in sport-specific situations would be better assessed using measures particular to the situation rather than using the TSCI and SSCI, which are general trait assessments. Therefore, a sport-specific situation, such as an athlete returning from athletic injury, should have its

own unique assessment for confidence. The formats of the TSCI and SSCI require athletes to rate their confidence compared with the most confident athlete they know, choosing anyone from a teammate to a professional. This can cause scores on the TSCI and SSCI to vary from high to low, depending on whom the athletes selected.[9] Better measures are needed to assess injured athletes' confidence and psychological readiness to return to sport participation.[12] Therefore, a sport psychometric test to specifically assess the self-efficacy of injured athletes to return to play is necessary. The main purpose of this study was to develop a scale to specifically assess the psychological readiness of injured athletes to return to sport participation. My second purpose was to provide preliminary evidence of reliability and validity of the scale.

METHODS

Participants

For the first part of the investigation, I selected a panel of 7 experts who had knowledge of and experience with athletic injuries and sport psychology. Four were certified athletic trainers (ATs) and professors from 2 athletic training programs in New England that were accredited by the Commission on Accreditation of Athletic Training Education. One of the professors held a doctorate in sport psychology. The other 3 panelists were varsity coaches at the National Collegiate Athletic Association (NCAA) Division III level. Of these 3 coaches, 1 taught sport psychology at the college level, 1 was a former injured athlete, and 1 was both a former injured athlete and a master's degree student in sport psychology.

The participants for the second part of the investigation were 22 collegiate varsity athletes (18 men, 4 women; age, 19.7 ± 1.4 years [range, 18–22 years]) from 3 schools in New England. Inclusion criteria required athletes to have sustained an athletic injury causing them to miss at least 1 week of practice. Participants competed in NCAA Division II or III football (n = 9), basketball (n = 3), wrestling (n = 1), ice hockey (n = 2), men's lacrosse (n = 3), women's lacrosse (n = 2), or field hockey (n = 2) during their traditional seasons. Participants gave informed consent, and the study was approved by the Institutional Review Board of Springfield College.

Scale Development

The first part of the investigation involved developing a scale to assess psychological readiness to return to sport after injury. I used the Delphi survey method in the development of the Injury-Psychological Readiness to Return to Sport scale (I-PRRS) to provide evidence for the content validity of the scale.[13] The Delphi survey method uses expert opinion to help form a survey by responding to questionnaires. The first step of the Delphi method involves selecting a group of experts or people informed on the topic. The experts give their opinions on what should be considered for the survey. The survey is revised and returned to the experts to reconsider their responses based on all of their original answers. The survey is revised again and returned to the experts for additional feedback. The Delphi method continues in this manner until a consensus is reached through statistical analysis. By

Table 1. Summary of Item-Content Relevance Ratings of the Panel of Experts of the Injury-Psychological Readiness to Return to Sport Scale

Item	Mean ± SD	V Coefficient
1. Overall confidence to play	4.86 ± 0.38	0.96[a]
2. Confidence to play without pain	4.14 ± 0.69	0.79[a]
3. Confidence to give 100% effort	4.57 ± 0.79	0.89[a]
4. Confidence in injured body part to handle the demands of the situation	5.00 ± 0.00	1.00[a]
5. Confidence to play against the level of competition	3.86 ± 0.69	0.71
6. Confidence in skill level/ability	4.57 ± 0.53	0.89[a]
7. Confidence in desire to participate	3.86 ± 1.21	0.61
8. Confidence to be successful	3.57 ± 0.98	0.71
9. Confidence to play on playing conditions	3.29 ± 0.76	0.57
10. Confidence to not concentrate on the injury	4.14 ± 0.90	0.79[a]

[a] $P < .05$.

reaching an expert consensus, the Delphi method offers a legitimate and practical means for developing surveys or confronting important issues.[13]

The expert panel was instructed to provide suggestions and questions that could be used on a scale to measure the construct of psychological readiness to return to full participation in sport. The panel submitted 22 items. All responses were returned to the panel for reconsideration on suggestion appropriateness and representation of the construct to help establish content validity.[14] From a consensus of the feedback, I reduced items to 10, eliminating items that were too sport or environment specific or were not appropriate for all returning athletes. An example of an excluded item regarded the confidence of the athlete to regain his or her starting position. Because regaining a starting position may not be relevant for all injured athletes, several experts suggested that it should not be included. Another excluded item addressed the confidence of athletes to play with their teammates. Again, several experts suggested eliminating it because athletes in individual sports would not find this question relevant. Three rounds were conducted using the Delphi method.

The revised 10 items were returned to the expert panel for evaluation of relevance for the construct of psychological readiness to return to full participation in sport. The panel rated each item on a scale from 1 to 5, with 1 representing *no match* and 5 representing *excellent match*. Item content relevance was assessed according to procedures of Dunn et al.[15] The panel ratings were analyzed using a content validity (V) coefficient, which represents the degree to which the panel of experts decided on the match of each item in the proposed construct.[16] The V coefficients for each item were calculated and compared with a 1-tail probability table presented by Aiken.[16] The 10 items with their mean rating and V coefficient are presented in Table 1. Items with $V \geq 0.75$ ($P < .05$; expert raters = 7, choices = 5) were accepted for the scale. The I-PRRS was revised; 6 items were selected based on their significant V coefficients, and the 4 nonsignificant items were eliminated. By following the procedures of Dunn et al,[15] item-content relevance was established and stringent guidelines for the items were retained.

Measurement Instruments

Injury-Psychological Readiness to Return to Sport Scale. The I-PRRS was used to assess an athlete's psychological readiness to return to full sport participation after athletic injury and measured athlete confidence at a particular time. The response scale for each item ranged from 0 to 100 with intervals of 10. The 100-point scale is the standard method for measuring efficacy beliefs.[17] A score of 0 implied that the athlete had little to no confidence, a score of 50 implied moderate confidence, and a score of 100 implied that the athlete had utmost confidence for that item. To calculate a total score for psychological readiness, the scores from the 6 items were summed and divided by 10. The maximum score was 60. A score of 60 implied that an athlete had the utmost confidence to return to sport at that time; 40, the athlete had only moderate confidence; and 20, the athlete had low overall confidence. The I-PRRS can be administered within a couple of minutes and is very easy to use.

Profile of Mood States Short Form. The Profile of Mood States (POMS) short form[18] was used to assess athlete total mood disturbance before returning to sport participation after athletic injury. The 30-item POMS short form assesses 6 mood states: Tension-Anxiety, Depression-Dejection, Anger-Hostility, Vigor-Activity, Fatigue-Inertia, and Confusion-Bewilderment. A Total Mood Disturbance (TMD) score was obtained by adding the negative mood factors of Tension-Anxiety, Depression-Dejection, Anger-Hostility, Fatigue-Inertia, and Confusion-Bewilderment and by subtracting the score of the positive mood factor, Vigor-Activity. The TMD score ranges from -20 to 100.[18] A high score meant that the person had many negative moods with low vigor, whereas a low score meant that the person had few negative moods and high vigor. The POMS has been used primarily for quantitative measurement of emotional responses to athletic injury.[4,7,19]

Procedures

A letter of explanation was sent to 3 directors of athletics in NCAA Division II and Division III schools requesting permission to conduct the investigation at their respective institutions. After permission was granted, I sent an explanatory letter to the ATs at these schools and requested their participation in the study. Once the ATs agreed to participate, they reported injury occurrences when they thought the athlete would miss practice for at least 1 week. The study details were explained to the injured athletes, and if they agreed to participate, they gave informed consent. The ATs administered the scales to the injured athletes. Each participating athlete completed a demographic questionnaire about his or her age, sex, sport played, amount of competition missed as a result of the injury, and history of injury. The athlete then completed the POMS short form and the I-PRRS within 1 day after injury.

When athletes were cleared by their ATs to return to full practice after missing at least 1 week, they completed the POMS short form and the I-PRRS a second time. These scales were completed within 1 day before returning to practice. After athletes were cleared by their ATs to return to competition, they completed the scales a third time within 1 day before competition. The ATs also completed the I-PRRS within 1 day before competition, rating the psychological readiness of their athletes to return to

Table 2. Scores on the Injury-Psychological Readiness to Return to Sport Scale for Each Time Interval

Time	Mean ± SD	α
After injury	31.68 ± 15.67	.93
Before practice	45.32 ± 9.61	.92
Before competition	54.32 ± 3.76	.78
After competition	53.86 ± 3.45	.80

competition. Within 1 day after that first competition, the athletes completed both scales a fourth time. The ATs also completed the I-PRRS a second time to indicate the psychological readiness of their athletes within 1 day after competition. In total, athletes completed both scales 4 times, and ATs completed the I-PRRS twice.

Statistical Analyses

Data were collected from the demographic questionnaire, the repeated I-PRRS measures, and the repeated POMS short form for the 4 time intervals. An α reliability coefficient was computed for each of the 4 time intervals to provide evidence for internal consistency reliability of the items on the scale. Alpha reliability measures item consistency for multiple-item questionnaires.[20] Statistics were calculated using the SPSS (version 14.0; SPSS Inc, Chicago, IL).

Four correlations between I-PRRS scores and TMD scores were computed using Pearson product moment correlation coefficients. These correlations were calculated to provide evidence of concurrent validity to the new measure. Correlations between I-PRRS scores completed by the athlete and the AT both before and after competition were computed using the Pearson product moment correlation coefficient to provide evidence of external validity for the scale.

Repeated-measures analysis of variance (ANOVA) determined differences across the 4 time intervals for I-PRRS scores and TMD scores. The α level was set at .05.

RESULTS

Participants reported 1.1 ± 1.1 previous injuries and 2.2 ± 1.6 weeks (range, 1–6 weeks) of practice missed and 2.0 ± 1.3 (range, 1–7 weeks) competitions missed due to the injury that qualified them for study participation. Descriptive statistics for I-PRRS score for each time interval are presented in Table 2. Repeated-measures ANOVA with polynomial contrast revealed a quadratic trend ($F_{1,21} = 68.26$, $P < .001$), indicating changes in I-PRRS scores between intervals. An increase occurred immediately after injury to before practice and from before practice to before competition. No difference was found between before competition and after competition.

Observed means and SDs for TMD scores across the 4 time intervals are presented in Table 3. Repeated-measures ANOVA with polynomial contrast revealed a quadratic trend ($F_{1,21} = 27.98$, $P < .001$), indicating changes in TMD scores between intervals across the 4 time intervals. Polynomial contrasts determined if differences existed between each time interval and the previous time interval. A decrease occurred immediately after injury to before practice and from before practice to before competition. No difference was found between before competition and after competition.

Table 3. Total Mood Disturbance from the Profile of Mood States Short Form for Each Time Interval

Time	Mean ± SD
After injury	30.36 ± 19.51
Before practice	14.55 ± 14.77
Before competition	5.45 ± 12.75
After competition	7.36 ± 10.43

Pearson product moment correlation analyses determined the relationship between I-PRRS and TMD scores. Negative correlations were found after injury ($r = -0.62$, $P = .002$), before practice ($r = -0.78$, $P < .001$), before competition ($r = -0.59$, $P = .004$), and after competition ($r = -0.57$, $P = .005$). At each time interval, TMD scores decreased as I-PRRS scores increased.

Pearson product moment correlation analyses were also computed to determine the relationship between the I-PRRS as scored by the athlete and the respective AT. Positive correlations were found before competition ($r = 0.82$, $P < .001$) and after competition ($r = 0.83$, $P < .001$). As the athlete's scores increased, scores from the respective AT increased.

DISCUSSION

The purpose of this study was to develop a scale to assess the psychological readiness of injured athletes to return to sport and provide preliminary evidence of scale reliability and validity. Preliminary evidence of reliability was provided because all 4 α reliability coefficients were greater than 0.70. According to Nunnally,[21] α reliability coefficients of 0.70 or more are considered good measures of internal consistency.

To provide preliminary evidence of external validity for the scale, I-PRRS scores as completed by the AT were correlated with I-PRRS scores completed by his or her respective athletes both before and after competition. Brewer[22] stated that the perceptions of injury status by the injured patient and the respective health care provider are usually positively correlated. The ATs completed the I-PRRS to help determine if athletes were rating themselves honestly. Athletes could have rated themselves high on the scale because of a perception to do so regardless of how they truly felt. A problem with self-report inventories and affective scales is that respondents may not be truthful and their answers may contain bias.[13] Ratings of athlete confidence levels by ATs should have removed this bias. Positive relationships both before and after competition demonstrated that athletes and their respective ATs rated athlete psychological readiness similarly, providing evidence of external validity for the I-PRRS for this specific sample.

The TMD and I-PRRS scores were correlated to provide evidence of concurrent validity to the new measure. The TMD scores were chosen to be correlated with I-PRRS scores because depressed mood states are associated with low self-efficacy[23–26] and the POMS is one of the primary scales used to measure emotional responses to injury.[19] Negative relationships were found at each time interval. As athlete TMD scores decreased over each time interval, I-PRRS scores increased, suggesting that mood states and psychological readiness may be related.

Trends in psychological readiness over time intervals were similar to those reported by Evans et al.[27] They found that injured athletes had low confidence immediately after injury and that confidence slowly increased during the rehabilitation. In my study, the trend in psychological readiness scores was quadratic; scores were lowest immediately after injury for all athletes, regardless of the extent of the injury. Psychological readiness scores then increased as athletes became more prepared to play again but did not change from before competition to after competition, with the athletes rating themselves similarly before and after competition. The athletes' similar scores before and after competition related positively with AT scores before and after competition, demonstrating that the athletes rated themselves somewhat honestly. Therefore, ATs can be confident that athlete scores are mostly accurate assessments.

My results do not agree with those of Quinn and Fallon.[7] They used the SSCI[10] to measure the confidence of injured athletes during rehabilitation. The injured athletes in their study used the SSCI to rate their confidence to be successful again in their sports. Unlike my finding that psychological readiness was lowest after injury and increased during rehabilitation, they found that confidence was high immediately after injury, decreased during the first two-thirds of rehabilitation, and increased before athletes returned to sport participation.[7] They expected that confidence would be lowest rather than highest immediately after injury and speculated that high athlete confidence immediately after injury may have resulted from the common expectation of quickly returning to sport. Therefore, immediately after injury, athletes may have rated their confidence to eventually return to sport rather than their confidence at that particular moment. During recoveries that took longer than originally estimated, confidence decreased until athletes recovered physically. The authors did demonstrate that injured athletes need time to regain their confidence to participate.[7]

Implications

Injury rehabilitation is both physical and psychological.[28] If an athlete does not feel psychologically ready to play, the athlete may not play well or could be reinjured.[8,27] Because injured athletes regain their confidence to play again at different times during their rehabilitation,[7] the I-PRRS is needed to help determine when this occurs. The scale can easily be used throughout the rehabilitation process and, by monitoring athletes' psychological readiness to return to sport participation, ATs can determine a more appropriate time psychologically for injured athletes to return to competition. Psychological readiness can be observed because I-PRRS scores should increase as athletes progress during rehabilitation. Additionally, scores before competition should be similar to scores after competition. Therefore, if an athlete's score before competition is not high (eg, lower than 50), waiting a little longer before returning the athlete to participation may be best. Athletes whose I-PRRS scores do not increase or plateau during rehabilitation could also be identified and assisted with psychological interventions, such as coping skills and goal setting, which have been found to increase the confidence of injured athletes.[29,30] Techniques geared toward coping self-efficacy have also been recommended for injured athletes lacking confidence when facing challenges.[31]

Limitations

A concern with the results of this investigation relates to the nature of participant injuries. The length of time missed may influence the psychological readiness of athletes throughout rehabilitation. In addition, I did not attempt to distinguish between athletes who had previously experienced similar injuries. Having experienced the injury at another time may have influenced athlete psychological readiness. The I-PRRS does need further validation. Future researchers should examine if the psychological readiness of athletes is influenced by length of time missed or previous injury. Athletes at the Division I level, as well as professional athletes, should also be investigated. Furthermore, additional participants are needed to compute weighted Ω reliability for internal consistency reliability.[32]

CONCLUSIONS

I have provided preliminary evidence for the reliability and validity of the I-PRRS. By using the Delphi method with numerous experts, I established content validity. Preliminary evidence of concurrent validity was demonstrated by the relationships found between the scale and TMD scores. External validity was also shown because athlete I-PRRS scores related to those of the ATs.

The I-PRRS can be a beneficial tool to help assess psychological readiness to return to sport among athletes similar to the sample studied. It can help ATs decide on appropriate timing for injured athletes to return to sport participation.

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