Examining Psychological Factors During Injury Rehabilitation

Yannis Theodorakis, Anastasia Beneca, Parascevi Malliou, and Marios Goudas

The aim of this study was to examine the effectiveness of goal setting on performance and on a number of psychological variables such as self-efficacy, pretesting anxiety, and self-satisfaction during an injury rehabilitation program. An experimental group \((n = 20)\) and a control group \((n = 17)\) of injured physical education students were studied. Both groups underwent a 4-week quadriceps strengthening program on an isokinetic dynamometer, with the experimental group setting specific personal goals in each training session. The experimental group improved in performance significantly more than the control group. Although both groups exhibited an increase in self-efficacy and a decrease in pretesting anxiety, only the experimental group had an increase in self-satisfaction with performance. Results confirm that incorporating goal setting in the rehabilitation process enhances rehabilitation results.

Sport injuries often have significant negative effects not only on the injured athlete’s career but on the success of athletic programs as well. There is little question that considerable attention from multiple disciplines is being devoted to injury rehabilitation. Researchers and practitioners seem to have reached a consensus regarding the use of psychological techniques within the rehabilitation process (6, 11–13). It is argued that psychological interventions may motivate athletes to overcome the potential psychological barriers set by injury and thus speed up the rehabilitation process. One psychological technique that has been proposed toward this aim is goal setting.

Goal setting refers to what the individual is trying to accomplish. Theorists (9) have proposed that goal setting enhances performance via three different mechanisms: by providing direction to the individual’s effort, by enhancing persistence, and by facilitating the development of new strategies for improving performance.

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As for the role of goal setting in injury rehabilitation, it has been argued that when properly applied, goal setting provides the injured athlete with a sense of control and may enhance motivation, persistence, and commitment (13, 20).

In the sport domain, various studies have supported the predictions of goal theory. More specifically, it has been shown that specific, challenging goals lead to performance improvement relative to easy or nonspecific goals ("do your best") or no goals (14, 15, 17). Recently, similar results have been reported regarding performance of injured athletes (16).

Goals function in conjunction with other psychological variables such as self-efficacy and self-satisfaction. Self-efficacy is defined as one's expectation to successfully perform a specific behavior required to produce a certain outcome (1). The attainment of goals enhances one's sense of efficacy (4, 10), which in turn affects performance. Thus, it seems plausible to expect that injured athletes using goal setting would increase their sense of efficacy. Self-satisfaction represents the discrepancy between what individuals are aiming at and what they actually accomplish. The effect of this variable on performance within the goal-setting framework has been discussed in various studies (2, 9). Furthermore, various studies in sport and exercise environments (14, 15) and in injury rehabilitation (16) have indicated the importance of perceived self-efficacy and self-satisfaction on goal setting and performance.

In addition, it has been suggested that goal setting may also influence individuals' anxieties (5). Goals direct effort and provide athletes with a sense of control regarding their performance. Thus, goal setting may decrease anxiety by focusing an athlete's thoughts on specific actions, away from possible worries. The application of goal setting in injury rehabilitation may reduce the stress experienced by injured athletes.

In relevant surveys (7, 19), both injured athletes and athletic trainers favored the application of psychological techniques to the rehabilitation process. Goal setting appears to be especially popular among athletic trainers dealing with injury rehabilitation. Further, a study of injured athletes (7) reported that fast healers used goal setting and other psychological techniques to a greater extent than slow healers.

However, the effect of the application of psychological skills methods to the rehabilitation process has not yet been explicitly tested. That is, to our knowledge, there is only sparse empirical evidence regarding the incorporation of psychological skills in injury rehabilitation programs. Although it is commonly suggested that goal setting may have beneficial effects on injury rehabilitation (6, 11), this has yet to be tested.

Thus, the purpose of the present study was to examine the effects of a goal-setting program on the injury rehabilitation process. It was hypothesized that injured athletes using goal setting would exhibit greater performance improvement than injured athletes not using goal setting. A second purpose was to examine the effect of goal setting on a number of psychological variables such as self-efficacy,
anxiety, and satisfaction with performance. It was predicted that injured athletes who set goals would experience an increased sense of efficacy regarding performance, lower anxiety, and more satisfaction with their performance attainments compared to injured athletes in the no-goal condition.

Method

Sample

The participants were 40 undergraduate physical education student-athletes (26 males and 14 females) who were equally split into experimental and control groups; missing data resulted in only 17 participants for the control group. The participants met the following criteria: (a) They had undergone knee arthroscopic surgery at least 6 weeks and no longer than 8 weeks prior to the study, (b) they had a physician's recommendation for quadriceps strengthening, and (c) no motion deficits or effusion was observed during physical examination. All the participants gave informed consent for their participation in the study. Further, no incidents of pain occurred during any of the rehabilitation and the testing sessions.

Rehabilitation Protocol and Experimental Manipulation

The rehabilitation protocol was the same for all the participants; the duration was 4 weeks with three sessions per week. A CYBEX 6000 isokinetic dynamometer was used for the quadriceps strengthening program. Each session involved 10 sets of 10 repetitions at 300, 270, 240, 210, 180, 150, 150, 180, 240, and 300°/s, respectively. These were preceded by a 10-min warm-up on an ergometer bicycle.

The experimental manipulation involved setting specific performance goals and providing feedback to the participants regarding their performance. In every training session and prior to each set of repetitions on the CYBEX, the participants in the experimental group were informed by the experimenter about their performance during the respective set in the previous session. Then they put in writing a specific personal goal and began the set. Examination of the written goals showed that none of the participants set unrealistic goals. In addition, correlations of set goals with previous performance ranged from .95 to .98. While performing, the experimental group participants were provided with immediate feedback by means of the CYBEX computer monitor, which provided graphical representations of the performance.

Subjects in the control group trained without setting goals and without being provided feedback regarding their performance in the previous session. Further, they could not see the computer monitor in order to have immediate feedback while performing. Feedback was withheld from the control group because it has been argued that when subjects are provided with feedback, they tend to set personal goals and this confounds the experimental manipulation (9).
Measures

All measures were taken four times. Testing took place just prior to the first, fourth, eighth, and twelfth training sessions.

Performance. The participants were tested on knee extension using the CYBEX 6000 at 240°/s. After a 10-min warm-up, they were allowed four repetitions with a 30-s break after the first couple of repetitions. The highest score of the four repetitions was recorded as Performance 1, Performance 2, Performance 3, and Performance 4, respectively.

Experimental participants were requested to set a personal goal, in writing, during the 30-s break and were provided with feedback regarding their performance in the previous testing session as well as immediate feedback via the CYBEX computer. Control participants performed without setting goals and without being provided feedback.

Ability. The higher score of the first two repetitions of the first testing session, which occurred prior to the first training session, was recorded as subject’s initial ability.

Self-Efficacy. A common format for evaluating perceived self-efficacy was used (2, 10). Participants indicated the strength of self-efficacy by responding to questions such as, “In this specific test on the CYBEX dynamometer, I can achieve a performance of 30 newtons.” They indicated the magnitude of self-efficacy by replying to the question, “How certain you are?” on a 9-point scale anchored by certain (9) and uncertain (1). Subjects rated their self-efficacy estimations for 16 performance levels ranging from 50 to 200 N. Cronbach’s alpha was .91, .91, .90, and .90 for the four trials, respectively.

Anxiety. The Mental Readiness Form (8), a three-item measure of competitive state anxiety, was used to measure anxiety. Cronbach’s alpha for this scale was .68, .78, .89, and .84 for the four trials, respectively.

Self-Satisfaction With Performance. Subjects were requested to indicate how satisfied they would be if they achieved 16 performance levels ranging from 50 to 200 N. They used a nine-point scale anchored by extremely satisfied (9) and extremely dissatisfied (1). This type of measurement was used in previous studies (2, 4, 16). Cronbach’s alpha was .93, .92, .91, and .91 for the four trials, respectively.

Results

Preliminary Analyses

A t test on ability showed that the two groups did not differ significantly on ability prior to the experimental manipulation, t(35) = -.85, p = .401 (M experimental group = 108, M control group = 117). Furthermore, a MANOVA with the two groups as the independent variable and self-efficacy, anxiety, and satisfaction as the dependent variables indicated that the two groups did not differ on the psychological variables in the beginning of the experiment, F(3, 30) = 2.20, p = .108.
Group Differences

Performance. Table 1 presents descriptive data for the two groups across the four trials. Clearly, both groups benefited from the rehabilitation process. In order to examine whether the groups exhibited differential improvement across trials, difference scores on performance were calculated by subtracting the performance on each trial from that of the subsequent trial. Thus, four difference scores were computed representing performance improvement from trial to trial. This decision was justified by the fact that the two groups did not differ significantly on initial ability, certifying the random split of the sample. A MANOVA with the four difference scores as dependent variables and group membership as independent variable was performed, revealing a significant multivariate effect, $F(4, 32) = 7.24$, $p < .000$. Examination of the univariate tests revealed that improvement of the goal-setting group was significantly higher from the ability measure to the first trial, $F(1, 35) = 12.01$, $p < .001$, and from the third to the fourth trial, $F(1, 35) = 14.98$, $p < .000$.

Psychological Variables. The MANOVA approach to repeated-measures experiments with one dependent variable was used to examine whether the two groups differed on the psychological variables across trials. A 2 (Group) $\times$ 4 (Trial) analysis with repeated measures on the second factor was performed on the four self-efficacy scores. The group effect was not significant, $F(1, 32) = .01$, $p = .909$, nor was the Group $\times$ Trial interaction, $F(3, 30) = .16, p = .917$. The Trial effect was significant, $F(3, 30) = 7.51, p < .001$. As can be seen from Table 1, self-efficacy scores of the two groups increased across trials.

Table 1  Means and Standard Deviations for Performance, Self-Efficacy, Anxiety, and Self-Satisfaction for the Two Groups Across Trials

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To examine for possible group differences in pretesting anxiety across the four trials, a 2 (Group) × 4 (Trial) MANOVA with repeated measures on the second factor was performed on the four anxiety scores. Again, neither the Group interaction, $F(1, 32) = .58, p = .450$, nor the Group × Trial interaction, $F(3, 30) = 1.86, p = .157$, was significant, whereas the Trial effect was significant, $F(3, 30) = 9.32, p < .001$. Both groups lowered their levels of pretesting anxiety across trials.

Finally, to test whether the two groups had different satisfaction with their performance across the four trials, a 2 (Group) × 4 (Trial) MANOVA with repeated measures on the second factor was performed on the four satisfaction scores. The interaction of Group × Trial was significant, $F(3, 30) = 3.27, p < .05$. Figure 2 presents the pattern of change in satisfaction scores across the four trials. Satisfaction with performance increased for the goal group from Trial 2 to Trial 3 and from Trial 3 to Trial 4, whereas for the control group, it remained the same for these trials.

![Figure 1 — Performance of the two groups across the four trials.](image-url)
Figure 2 — Satisfaction with performance across the four trials. Lower scores indicate more satisfaction with performance.

Discussion

The results showed that goal setting improved the performance of injured physical education student-athletes. More specifically, injured physical education student-athletes who set specific personal goals for each of their isokinetic strength training sessions improved their performance significantly more than injured students who trained without setting goals. These results parallel those of recent studies (7) showing that athletes were more successful when they incorporated goal setting in their rehabilitation programs. Further, the results of the present study support empirically the recommendation for application of psychological skills methods in injury rehabilitation (3, 6, 11, 20).

In addition, the present study covered the whole rehabilitation process, a 4-week period. Previous studies examining goal setting in injured athletes (16) have only involved part of a rehabilitation program. Further, the experimental manipulation occurred in a real setting, as it was embedded in the participants’ rehabilitation program. For these reasons, the results may be thought to be more ecologically valid than those of previous studies.
The results of this study also complement results of other goal-setting studies in the sport and exercise domain (14, 15, 17). Those studies have shown that specific, difficult goals result in performance improvement relative to easy or nonspecific goals ("do your best") or no goals. The effect of goal setting on performance is one of the most promising findings in psychology, because it has been confirmed in various areas (9).

Contrary to what expected, with respect to the psychological variables examined, the control and experimental groups did not differ in self-efficacy and in pretesting anxiety across the four trials. Although the experimental group demonstrated higher performance improvement, this did not enhance self-efficacy and decrease anxiety relative to the control group. Because both groups improved in performance, it seems that this improvement resulted in comparative changes in these psychological variables in both groups. Nevertheless, this was not the case for self-satisfaction, which decreased for the goal-setting group relative to the control group. It seems that the continuous rise of standards against which performance was evaluated resulted in a decrease in self-satisfaction for the goal-setting group. Perhaps this acted as an incentive for performance enhancement, as other studies have shown (2).

Regarding potential limitations of this study, it may be argued that the provision of performance feedback to the experimental group limits the experimental manipulation. In fact, it has been claimed that such a methodology confounds the effects of feedback with those of goal setting (18). However, we chose to provide feedback to this group for two reasons. First, in our opinion, subjects need feedback so they can appraise their level of performance regarding their goal. That is, the goal-setting process involves a continuous comparison between self-set standards and performance attainments. Second, the alternative strategy of providing feedback to the control group as well presents additional problems, because it has been argued that control subjects who are provided with feedback tend to set goals, thus creating a further confounder (9). Nevertheless, the potential for confounding remains, and the results of this study should be treated bearing this caution in mind. A potential solution to this problem may be the inclusion of a third experimental group to which feedback is given in a no-goal condition.

Regarding future research in this area, more work needs to be done to establish the role of applying psychological skills to the process of injury rehabilitation. The potential benefits of techniques such as imagery or relaxation need to be tested solely or alongside goal setting. Furthermore, certain psychological characteristics of the injured athlete that may facilitate or inhibit the application of these methods need to be recognized.

References


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