The effect of personal goals, self-efficacy and self-satisfaction on injury rehabilitation.

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Running head: goal setting and injury rehabilitation

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Abstract
This study examined the effect of goal setting on injury rehabilitation. More specifically, the differences in personal goal setting, self-efficacy, self-satisfaction and
performance between injured and healthy subjects was examined. Two experimental
groups, and one control group (n=30) were used. The first experimental group consisted of
knee injured females (n=30), and the second of healthy women (n=29). The subjects
performed four trials of a specific knee extension task on an isokinetic dynamometer
(CYBEX 6000). Prior the third and fourth trial, subjects set personal goals and completed
self-efficacy and self-satisfaction scales. The results showed a significant (p<.001)
 improvement of performance for the two groups indicating the importance of personal goal
setting on injury rehabilitation. The correlation coefficients between self-efficacy, self-
satisfaction, goal setting and performance, were significant at .001 level. Structural
equation analysis indicated that personal goal setting was affected by level of ability, and
in turn had a direct effect on performance. Self-efficacy and self-satisfaction were affected
by ability or performance but they had no significant effect on personal goals or
performance. The findings indicate that personal goal setting might be an important
determinant for the improvement of performance in injury rehabilitation programs.

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rehabilitation.

The genesis of injuries is undoubtedly a complex, multifactor equation that may
include the athlete's physical and psychological state, skill level, training conditions,
expertise of coach and many other variables (13). One interactional theoretical model of
factors involved in athletic injury (1), combines cognitive, physiological, attentional,
behavioral, interpersonal, social and stress history variables that may influence injury
occurrence and prevention. A recent study (5) indicated that cognitive appraisal models
may be useful for understanding how athletes adjust psychologically to their injuries and
how emotional reactions to sport injury may influence the adherence on rehabilitation.
A number of recommendations have been advanced in textbooks (9, 16), for the application of psychological principles on recovery from athletic injury. Athletic trainers feel that a wide variety of psychological skills and strategies are important for the complete recovery from injury (20). The following factors have been identified in the literature as contributing to healing from illness and injury: positive attitudes, stress control, social support, goal setting, positive self-talk, mental imagery, trait anxiety, locus of control, stressful life events and self-concept (10, 13). Goal setting is an important first step in initiating positive action toward a speedy recovery, just as it is for high level achievement in other areas (10). Also, goal setting has been recommended for motivating the rehabilitation behavior of injured athletes (7, 8, 10, 17, 19, 20).

Goal setting refers to what an individual is trying to accomplish. This technique facilitates performance by focusing and directing the attention of the subject, enhancing persistence and promoting the development of new strategies for improving performance. It has been shown that specific, difficult and challenging goals led to higher levels of task performance than easy goals, no goals, or do-your-best goals. However, goals do not affect performance solely. Rather they function in conjunction with other psychological variables such as self-efficacy expectations, self-satisfaction and ability. Studies have shown that self-efficacy, ability, personal goal setting, self-satisfaction, and goal level positively affected performance (3, 4, 6, 15). Self-efficacy is defined as one’s expectation to successfully perform a specific behavior required to produce a certain outcome (2). Locke and Latham indicate that highly efficacious individuals set challenging personal goals, whereas inefficacious individuals set more modest goals for themselves (14). Individuals set goals on the basis on how confident they feel they can achieve this goal. Self-satisfaction also, is an incentive that expresses the discrepancies created by what individuals do and what they aspire to achieve. Its influence on goal setting models also
has been examined (3, 6, 14). It has been found that the higher the self-dissatisfaction with a standard performance, the greater the subsequent intensification of effort (3).

Researchers (6, 15) observed that assigned goals affect an individual's self-efficacy expectations and personal goals which in turn influence performance. The relation of assigned goals to performance is mediated by an individual's self-efficacy expectations and personal goals. Ability affects self-efficacy expectations or personal goals. A relevant study in a sport and exercise environment (18) indicated that perceived self-efficacy, self-satisfaction and the level of past performance influence personal goal setting. Furthermore, the mediating role of personal goal setting between self-efficacy and performance was supported.

The purpose of the present study was to examine the effects of goals, perceived self-efficacy, ability and self-satisfaction on performance of subjects undergoing injury rehabilitation. It was hypothesized that high self-set goals, strong perceived self-efficacy, self-satisfaction and ability enhance the level of performance of injured subjects.

Method

Design and Procedure

A total sample of 92 females (university students, university and recreational athletes) agreed to participate in the experiment. Their age ranged from 18 to 24 years (M=22.0, SD=2.31). Three groups were used. The first experimental group consisted of 32 knee injured females. In this group participated individuals who had knee arthroscopic surgery over six months period, physician’s recommendation for quadriceps strengthening, and their physical examination revealed no effusion or range of motion deficits. Quadriceps femors muscle weakness is observed in all individuals due to prolonged inhibition of muscle activity. The second experimental group consisted of 29 healthy women. The third group that was used as control group, consisted also of healthy women
This group performed four trials without setting any goal and subjects instructed to do their best. Also this group performed without completing self-efficacy and self-satisfaction scales, since these scales influence the subjects to set goals when they read them.

A CYBEX 6000 isokinetic dynamometer was used to measure knee extension. Knee extension was tested with the subjects being in a seated position, and 90° of knee flexion, and speed 270. In each trial the subjects performed four repetitions at 100% of perceived maximum effort. The score of the greatest repetition was used as performance score. The warm-up phase for all the subjects consisted of 10 min. period in an ergometric bicycle followed by 10 knee extension tentative repetitions. A pilot study with 30 students (who did not participate in the experiment later) determined the range of performance which was used to construct the self-efficacy and self-satisfaction scales.

Each subject completed 4 trials. Subjects were given a 10 min. warm up and then performed two trials. The mean scores on these two trials were computed and served as a measure of the ability variable. A 10 min. rest period was then given to enable the subjects to recover from fatigue. Subjects were informed about their performance, and completed the self-efficacy expectations and self-satisfaction scales. Afterwards, they set a personal goal for the next trial. Following the assessment of psychological variables, the third trial was performed. A 10 min. interval was also given. The subjects informed about their performance at the conclusion of the trial. Their self-efficacy and their self-satisfaction were assessed, a new personal goal was again set and the fourth trial was performed.

**Measures**

**Self-efficacy expectations.** Subjects were asked to rate the strength and magnitude of their self-efficacy expectations for fourteen performance levels from 30 to 160 Newtons. The format used is comparable to other studies in goal setting (3, 15). An example is "In
this specific test on the CYBEX instrument I can achieve a performance of 30 Newton" (Yes-No), and "How certain you are?" answered in a 10-point scale anchored by "certain" (10) and "uncertain" (1). Cronbach's alpha for these scales were .90, and .92 for the two trials respectively.

**Self-satisfaction.** Subjects were asked to indicate how satisfied they would be if they achieve a performance of 30 to 160 Newtons. Responses were given on a fourteen performance levels and a 7-point scale ranging from "extremely dissatisfied" (1) to "extremely satisfied" (7). Cronbach's alpha for these scales were .80, and .81 for the two trials respectively.

**Performance.** The scores that subjects achieved during the third and fourth trials were used as performance 1 and performance 2 variables respectively. Ability was indicated by the mean scores of the first two trials. During the first trial, the two experimental groups did their best without having any feedback from their performance. During the second trial subjects did their best by having an accurate feedback from their performance. The CYBEX dynamometer presents the performance of each repetition on a computer screen which serves as feedback. Performance is presented in several types of diagrams with the Newton scores in the top of the diagrams. Subjects where instructed to focus their attention on the screen of the computer during their trials. So during the third and fourth trials subjects performed by setting personal goals and by having feedback from their performance.

**Analysis**

Descriptive statistics (e.g. means, standard deviations) were calculated for variables measured in the study. Correlation coefficient was used to examine relations between the examined variables. One-way ANOVA were used to determine if a significant differences existed between groups at the beginning of the experiment. ANOVA with repeated
measures on the last factor were used to examine differences between groups across trials. Finally, the LISREL VI statistical package (12) was employed in order to examine the network of relationships between the examined variables. P values was set at p<.05.

**Results**

**Group differences** Table 1 presents means and standard deviations of all the examined variables for the three groups. To determine if there was any initial difference among the three groups, one-way ANOVA was conducted on the baseline performance. Results indicated no significant between groups differences (p=.12), and thus the performance data were analysed by a 3 X 3 (group X trials) ANOVA with repeated measures on the last factor (the first two trials were computed and analysed as one). Results produced a significant trial main effect (Hotteling criterion = 1.19, p<.001). Univariate analysis of variance revealed a significant main effect for groups on the second (F=29.57, p<.001) and third trial (F=48.93, p<.001). The two goal setting groups (healthy and injured) performed better than did the control group. Figure 1 presents the performance scores among the three groups on the three trials.

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Insert Table 1 and Figure 1 about here

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Follow up t-test analyses between injured and healthy groups indicated no difference on personal goals, self-efficacy and self-satisfaction scales. Also paired t-test analyses indicated that performance improved significantly from trial 1 to trial 2 and trial 3 for the injury group (t=6.45, and t=7.34, p<001, respectively). Similar were the results for the healthy group between trial 1 and trials 2 and 3 (t=6.26, and t=9.53, p<001). Finally the control group reduced significantly its performance from trial 1 to trial 2 (t=3.2, p<001) and from trial 1 to trial 3 (t=5.17, p<001).
The correlation matrix among the examined variables is also presented in Table 2. All the correlation coefficients between goal setting, self-efficacy, self-satisfaction and performance, were significant at .001 level.

Structural Equation Modeling

Since there was no difference between the two experimental groups, structural equation modeling analysis was used for the total of the subjects consisting these two groups (n=61). The LISREL VI statistical package (12) was employed in order to examine the network of relationships between the examined variables. Figure 2 presents the structural coefficients for the model. In this model self-efficacy 1 affected self-satisfaction 1 and self-efficacy 2. Paths from self-efficacy and self-satisfaction to performance were eliminated because there were not contributed to the fit of the model. The satisfaction 1 variable affected only satisfaction 2. The contribution of ability and performance 1 to personal goals, self-efficacy and self satisfaction was significant (p<.01) for the two stages of the experiment. The effects of personal goals on performance were also significant (p<.01) in both stages of the experiment. The goodness of fit index and the adjusted goodness of fit index for this model, as provided by LISREL, were 0.927 and 0.794 respectively which indicates an acceptable fit. Also the mean square residual was .029, which is also considered satisfactory.
The results of the present study indicate significant improvement (p<.001) of performance for the groups that set personal goals, indicating the importance of personal goal setting for the healthy subjects as well as for the injured ones. Furthermore, these results suggest the importance of goal setting in injury rehabilitation programs. These results indicate that under the goal setting conditions the injured subjects respond as the healthy ones. However, the control group consisting of healthy subjects reduced its performance for trial to trial because it performed under the “do your best” condition. According to goal setting theory (14) when subjects with general goals, such as do your best, receive specific feedback, they are encouraged to set specific goals. This happens because feedback is a way of making explicit what it means to do their best, and because the challenge of improvement is exciting. Hence in order to avoid the feedback, the control group did not see the computer screen.

Self-efficacy and self-satisfaction variables correlated with performance (p<.001). The more confident and satisfied the subjects of the two experimental groups were, the higher their personal goals were and in turn this influenced their performance. Their performance under the goal setting conditions increased significantly (p<.001) not only for the healthy subjects, but also and for the injured ones. Also, in both groups self-efficacy and self-satisfaction correlated (p<.001) with their performance and goal setting, indicating that the more confident and satisfied subjects set higher personal goals and performed better.

The subjects that set the highest personal goal setting, achieved the highest performance in all the trials. Also, the subjects with higher levels of self-efficacy had the higher level of performance. These results are similar for the injured and healthy subjects (see Figure 3). Similar were the variability between self-satisfaction and performance.
At the first stage of the structural equation analysis, self-efficacy and self-satisfaction were modelled to mediate the effect of ability on personal goal setting which in turn influences performance 1. It was also hypothesized that performance 1 affects subsequent self-efficacy and self-satisfaction and that they in turn influence both personal goal and performance 2. However, the indexes of fit provided by LISREL were not satisfactory. The modification indexes provided by the LISREL program, suggested ways for the improvement of the model. The purposed model of the structural equation analysis indicated that personal goal setting was affected by level of ability, and in turn this directly effected performance. The findings of the present study suggest that in both conditions goal setting was affected by previous performance. Previous researchers (11) have discussed the main impact of conceptions of ability on self-regulatory factors and motor skills acquisition. The structural equation analysis in the present study indicated that ability was the strongest regulator of performance.

The data further indicated that self-efficacy was also affected by previous performance, but it had no effect on personal goals or performance. The explanation for the weak contribution of the self-efficacy into the fit of the model may have been caused by the high effects of ability. This finding is consistent with previous work (18) in the sport environment, in which the same model was tested on swimming performance. Considering the role of self-satisfaction in the goal setting the results of the present study indicated that self-satisfaction and performance were not related. This finding is consistent with previous research (6), in which college students performed mathematics problems, or worked on a complex game simulation. Several models were tested in this study and self
satisfaction addel little to the prediction of performance in various models. The analysis of the present study provides consistent support for the main effect of ability and personal goal setting on performance. Furthermore, these results are in consistent with the findings of previous researchers (3, 15, 17), in which ability is a key determinant of self-efficacy, self-satisfaction and performance, and personal goal setting is a mediator between ability and performance.

Based on the findings of the present study, as well as the work of previous researchers, personal goal setting appears to be a significant determinant of performance in injury rehabilitation programs. It seems that the specific variables play a central mediating role in the motivation of rehabilitating individuals. Personal goal setting combined with strategies which increase self-efficacy may help athletes decrease recovery time.

It is well known that injuries negatively influence an athletes confidence. The fear for the repetition of the injury, or the delayed recovery can be problematic for the athlete, as well as the athletic trainer. It has been observed (10) that the “fast healers” were generally less fearful or concerned about reinjury compared to the “slower healers”. It appears that the use of goal setting theory is helpful for the injured athletes. Results of the present study showed that the injured athletes under the goal setting conditions behave similar to the healthy ones. Furthermore, it appears that goal setting may be an appropriate technique to help athletes to overcome their fears, to believe in themselves, or their therapists, to increase their effort, and to built their confidence.

Additional studies are needed to examine goal setting in the rehabilitation process in conjunction with relevant techniques that are suggested by researchers. Future studies should explore the paths between performance, goal setting and self-efficacy in injury rehabilitation programs.
Reference


### Table 1

**Means, and Standard Deviations for Performance, Personal goals, Ability, Self-satisfaction, and Self-efficacy**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ability (trials 1&amp;2)</td>
<td>73.36 (21.1)</td>
<td>79.05 (14.4)</td>
<td>75.15 (13.46)</td>
</tr>
<tr>
<td>2. Goal 1</td>
<td>84.87 (24.8)</td>
<td>92.14 (16.4)</td>
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</tr>
<tr>
<td>3. Self-efficacy 1</td>
<td>69.55 (23.7)</td>
<td>71.14 (19.3)</td>
<td>-</td>
</tr>
<tr>
<td>4. Self-satisfaction 1</td>
<td>68.64 (19.0)</td>
<td>70.55 (13.5)</td>
<td>-</td>
</tr>
<tr>
<td>5. Performance 1(trial 3)</td>
<td>82.16 (23.6)</td>
<td>86.03 (14.7)</td>
<td>72.33 (13.46)</td>
</tr>
<tr>
<td>6. Goal 2</td>
<td>87.38 (23.5)</td>
<td>91.24 (14.8)</td>
<td>-</td>
</tr>
<tr>
<td>7. Self-efficacy 2</td>
<td>73.85 (21.0)</td>
<td>73.76 (15.5)</td>
<td>-</td>
</tr>
<tr>
<td>8. Self-satisfaction 2</td>
<td>80.45 (25.3)</td>
<td>80.10 (16.6)</td>
<td>-</td>
</tr>
<tr>
<td>9. Performance 2(trial 4)</td>
<td>86.18 (25.6)</td>
<td>90.79 (15.3)</td>
<td>69.87 (13.30)</td>
</tr>
</tbody>
</table>

**Note:** Group 1: injured with personal goals, Group 2: healthy with personal goals, Group 3: control
Table 1

Intercorrelations for Performance, Personal goals, Ability, Self-satisfaction, and Self-efficacy

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ability (trials 1&amp;2)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2. Goal 1</td>
<td>.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Self-efficacy 1</td>
<td>.74</td>
<td>.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Self-satisfaction 1</td>
<td>-.67</td>
<td>-.71</td>
<td>-.71</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Performance 1(trial 3)</td>
<td>.93</td>
<td>.92</td>
<td>.73</td>
<td>-.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Goal 2</td>
<td>.93</td>
<td>.94</td>
<td>.74</td>
<td>-.70</td>
<td>.98</td>
<td></td>
<td></td>
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<tr>
<td>7. Self-efficacy 2</td>
<td>.76</td>
<td>.75</td>
<td>.74</td>
<td>-.72</td>
<td>.83</td>
<td>.84</td>
<td></td>
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<td>8. Self-satisfaction 2</td>
<td>-.64</td>
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<td>-.43</td>
<td>.67</td>
<td>.67</td>
<td>.68</td>
<td>.60</td>
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</tr>
<tr>
<td>9. Performance 2(trial 4)</td>
<td>.91</td>
<td>.91</td>
<td>.70</td>
<td>-.69</td>
<td>.97</td>
<td>.97</td>
<td>.83</td>
<td>.68</td>
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Note: all correlations are significant at .001 level
Figure 1. Performance scores of the three groups across trials
Figure 2.
Levels of self-efficacy expectations and performance in injured and healthy subjects
Figure 3
Path diagram of the estimated structural model. Path coefficients greater than .25 are significant at $p<.01$. 

GOF=927
AGOF=794