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PSYCHOLOGICAL FACTORS IN KNEE AND ANKLE INJURY RECOVERY:

An Exploratory Study

by

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A thesis
presented to the University of Ottawa
in fulfillment of the
thesis requirement for the degree of
Master of Science
in
Kinanthropology

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ISBN 0-315-46781-9



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ABSTRACT

The purpose of the study was to determine whether athletes who healed very rapidly demonstrated greater evidence of psychosocial factors thought to be related to enhanced healing, than did slower healing athletes. The specific factors measured included: Positive Attitude, Outlook, Stress and Stress Control, Social Support, Goal Setting, Positive Self-Talk, and Mental Imagery. A survey format was used to measure the above items, as well as related items about beliefs and recommendations. Thirty-two former Sports Medicine Clinic patients, with either knee (MCL) or ankle (AS) injuries, participated in the study. Nineteen percent of these athletes had exceptionally fast recoveries. These subjects evidenced high scores on all variables tested, while those in the slowest healing group evidenced low scores. The most significant results were found in the more 'action' related factors of Goal Setting, Positive Self-Talk, and the use of Healing Imagery. This is a particularly encouraging finding for those working in an applied setting, as these are factors which are considered to be amenable to learning and change, i.e. within one's potential control.

ACKNOWLEDGEMENT

Many thanks to all those who helped bring this project to fruition. Their shared time, energy, and good will is much appreciated.

- To my advisor Dr. Terry Orlick, for his instructive suggestions throughout the project.
- In the formulation stage, to Sports Medicine Specialists Drs. Jon Halperin and Bernie Lalonde, and physiotherapists Guntis Obrascovs (Gunner), and Trevor Cleave; and to those exemplary world class athletes for relating their valuable injury experiences and insights to me.
- To Richard Glatt, for his assistance in the procedural and analysis stages.
- Last, but not least, to all those who participated in the study, without whom it would not have been possible.
- Thanks are also extended to my former advisor Dr. John Partington for his continued encouragement and support.

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INTRODUCTION

The topic of sports injuries has been enjoying increased attention in the Sport Psychology literature of late. The major focus has been on the psychological precursors and effects of injury, rather than on the more dynamic, action related factors in the rehabilitation process. If we are to be of greater assistance to injured athletes, it will be by focusing on the the mental aspects of enhanced healing. It was therefore the purpose of this investigation to study psychological factors which may enhance recovery from sports injury.

LITERATURE REVIEW

The same mind/body principles and techniques in operation towards maximizing athletic performance, may also be applied to rehabilitation. Applied Sport Psychology has been helping athletes to draw from their mental, as well as physical, abilities in their training and preparation for competition. These same methods can be employed towards enhanced healing. Until recently, the mind of 'modern man' has been a largely untapped and overlooked resource in mobilizing the body's healing powers. This was not always the case, as for centuries, much of ancient medicine and literature professed our minds to have almost everything to do with our health and well being. Visualization was considered one of the most potent prescriptions of those times (Achterberg, 1985; Samuels & Samuels, 1975).

The above philosophy was supplanted by Cartesian mind/body dualism during Descartes' time. "Society progressively delegated to the physician authority over the body below the neck, to the psychiatrist and psychologist the body above the neck, and to the clergy anything outside the body." (Peper, Ancoli, & Quinn, 1979, p.1).

Currently, the trend is returning to the notion of mind and body integration, hence the establishment of 'Behavioral Medicine' and 'Health Psychology'. The jumping off point towards this return is suggested to have been Cannon's principle of homeostasis (Cannon, 1932). It is defined as "the process whereby the brain and body interact in mutual regulation to maintain the internal milieu at critical levels when faced with environmental stress. This stability requires multiple levels of self-regulation between brain and body." (Tursky & Schwartz, 1986, p. 444).

Green, Green and Walters (1979) have further postulated the following "Psychophysiological Principle":

Every change in the physiological state is accompanied by an appropriate change in the mental-emotional state, conscious or unconscious, and conversely, every change in the mental-emotional state, conscious or unconscious, is accompanied by an appropriate change in the physiological state (p.132).

Much of the evidence supporting the "Psychophysiological Principle" derives from psychosomatic, biofeedback and placebo research. The mind's very substantial role in the etiology of disease (psychosomatic research), and in the successful use of biofeedback and placebos, in overcoming disease and pain is now widely accepted by leading thinkers in the medical community:

The results of countless placebo studies and the increasingly sophisticated use of biofeedback technology have caused the physical orientation of medicine to begin to undergo a change. It is no longer possible to see the body as an object waiting for replacement parts from the factory. Instead we now view the mind and body as an integrated system. (Simonton & Simonton, 1978, p.32).

Psychosomatic mechanisms towards recovery

Attitude is thought to play a paramount role in influencing the course of disease. Chances of survival in terminal illness are better with a positive outlook and fighting spirit, as opposed to being negative (Achterberg, Simonton & Simonton, 1977; Benson, 1984; Borysenko, 1982; Simonton & Simonton, 1984). Borysenko (1982) sums it up as follows: the cancer patients who live the longest are "unusual individuals who do not become anxious or depressed; they are reported to have faith and inner confidence." (p. 70). Benson (1984) adds that successful patients "want to be well and plan to be well. They say from the outset that they are going to do all they can to beat the disease." (p. 79).

Mechanisms of Biofeedback and Placebo Effect

The greatest 'discovery' in the biofeedback and placebo research, is that the actual triggering mechanism lies totally within the patient. Where the two diverge in their effects, is that with biofeedback, one is aware of direct control over his or her body, whereas, with the placebo, the individual is unaware. In the latter case, the patient is only aware of the belief that the healing process has begun.

Imagery appears to play a leading role in effecting the physical changes that biofeedback and placebos produce. It is believed that through imagery, biofeedback training generalizes outside of the clinic or laboratory setting (Barabasz & McGeorge, 1978; Green & Green, 1977; Korn & Johnson, 1983; Simonton, Simonton, & Creighton, 1978; Schwartz, 1984). Biofeedback serves to accelerate the learning process for some people, and perhaps more importantly, to satisfy sceptics.

Similarly, it is the symbolic processes in action which determine the placebo effect. The placebo, being a symbol of healing, triggers a healing visualization in the patient (Borkovec, 1985; Brody, 1985; Frank, 1961). The placebo has been shown to be effective even while patients are fully cognizant of the 'inert' property of the placebo (Park & Covi, 1965; Vogel, Goodwin, & Goodwin, 1980). This indicates, that the mere suggestion that healing should take place, can spontaneously result in a healing image.

Imagery Research

There are many claims as to the therapeutic benefits of imagery, however, few are backed up by well controlled investigations. The clinical evidence, nevertheless remains quite compelling. The topic does not readily lend itself to 'controlled' studies, while in the 'real world' there have been several attempts, most notably by the Simontons, which they reported in their classic book *Getting Well Again* (Simonton, et.al., 1978).

The Simontons and Creighton (1978) report positive results with the use of their relaxation and imagery procedure with patients diagnosed with medically incurable cancer, and given one year to live. Of the original 159 subjects in their study, 63 were still alive two years later. Of these 63, 22.2% had no evidence of cancer, 19.1% showed tumor regression, and 27.1% had stabilized. However, 31.8% did demonstrate some new tumor growth. Although methodological flaws, such as possible sampling bias and non standard procedures may be argued, Hall (1984) states in his review of the above results, that "nonetheless the outcome was quite impressive." (p. 161). The authors' conclusion is that the relaxation and visualization procedure enhanced the immune system (Simonton, et.al., 1978). No blood measures had been taken however.

Hall (1983) subsequently attempted to quantify the above conclusion by measuring number of white cells in the blood. He also sought to determine what individual differences may account for certain subjects being more responsive to procedures involving imagery. His study tested the effects of hypnosis plus imagery of the white cells being strong and powerful, devouring the weak and confused germ cells, on lymphocyte function. Twenty healthy subjects between the ages of 22 and 85 were used. Hypnotizability on the Stanford Hypnotic Susceptibility Scale, Form C, was used as a covariate. The results showed an increased immune response only for those high on hypnotizability.

Psychological Factors and Techniques in Sports Injury Recovery

The following is a brief summary of the variables that were examined in this study. As there has been little systematic research carried out on mental components of healing with athletes, much of the related literature, especially in Sport Psychology, is based on theory and clinical evidence.

Attitude and Outlook. The factors of attitude and outlook are considered to be critical in the rehabilitation process. "Athletes must be made to realize that recovery depends on their positive attitudes" (Arnheim, 1985, p. 216). This has already been mentioned in relation to cancer prognosis in the previous section on psychosomatic research.

Stress and Stress Control. As a high level of stress has been determined to predispose one to injuries (Bramwell, Masuda, Wagner, & Holmes, 1975; Coddington & Troxell, 1980; Cryan & Alles, 1983; Kerr & Minden, in press; Yaffe, 1983), it is felt to be an important factor in recovery also. Much depends, however, on an individual's manner of coping and the circumstances, e.g. having a reliable support system, or perceived control over an event or situation. It is suggested, therefore, that one be alert to any undue stress that an athlete may be experiencing and to exercise effective stress management (Rotella & Heyman, 1986; Sanderson, 1981; Suinn, 1977).

Social Support. Social support has been defined as: "information from others that one is loved and cared for, esteemed and valued, and part of a network of communication and mutual obligations" (Taylor, 1986, p. 207). It is theorized that those with higher levels of social support experience less stress when confronted with stressful events and also cope better. There is also evidence to support that social support both reduces the incidence of, as well as enhances recovery from illness (Taylor, 1986; Wallston, Alagna, DeVellis, & DeVellis, 1983; Cobb, 1976; Chambers & Reiser, 1953; Dimond, 1979; Robertson & Suinn, 1968).

In determining the effects of social support, it is important to also distinguish between the different forms it can take. It can have a negative impact if the kind of support is either inappropriate or not from the appropriate source (Schaefer, Coyne & Lazarus, 1981; Cohen & McKay, 1983).

While an athlete may have very limited control over the factors previously listed, the following are skills quite amenable to one's control.

Goal Setting. Goal setting is an important first step in initiating positive action towards a speedy recovery, just as it is for high level achievement. The ultimate goal in injury rehabilitation may be obvious, but it is also important to set many realistic short term and daily goals for most effective progress (Crossman, 1986; Faris, 1985; Massimo, 1985; Rotella & Heyman, 1986; Taylor, 1985; Steadman, 1982). It is further suggested that one visualize attaining their goals, i.e. do affirmation imagery (Gawain, 1978; Porter & Foster, 1986; Korn & Johnson, 1983; Simonton, et.al, 1978).

Positive Self-Talk. Maintaining positive self-talk is a necessary component of staying positive generally, whether it be about one's ability to perform or to heal. One cannot change the fact that one is injured, but one can control one's thoughts about it. While a certain amount of grieving may be a natural part of the process, it is ultimately much more conducive to focus on the positive (Dunn, 1983). It is further suggested that one carry on a positive dialogue with one's body parts, particularly those on which one is focussed on rehabilitating (Jaffe, 1980; Porter & Foster, 1986).

Mental Imagery. Imagining healing taking place, as well as full recovery, is a commonly suggested mental technique towards mobilizing one's own healing powers, and is increasingly appearing in the Sport Psychology literature (Arnheim, 1985; Porter & Foster, 1986; Rotella & Heyman, 1986; Swearingen, 1984).

Belief. The above mentioned techniques have little chance of success if the patient does not incorporate them within their belief system. Successful psychologically based therapy relies on the patient's willingness to participate in his or her own mental and physical well being. The patient's belief structure plays a large role in this regard. S.

Simonton (1975) states that before commencing with their program, they first try to understand their patient's belief structure, in order to best fit their program to meet the needs and values of the patient. Those who are the most enthusiastic, are also those who demonstrate a higher Internal Locus of Control than 'normal' (Achterberg, et.al., 1977).

Quinn (1979) drew up a list of belief categories related to healing which included:

- Beliefs about Psychological Relations to Physiological Processes.
- Beliefs about the Factors that Determine Health.
- Beliefs about the Possibility of {complete recovery}.
- Beliefs about the Competence and Credibility of the Therapeutic Model and Practitioner.
- Beliefs about Personal Self-Regulation. (Quinn, 1979, p. 203-204).

While there is substantial support in the literature regarding psychosocial factors associated with enhanced healing, there has been little comprehensive research to substantiate such claims. At this stage in our development, it is important to begin to look more systematically at the capacity of our mind to influence our health and well being, which is what this study attempted to accomplish.

STATEMENT OF THE PROBLEM

This study utilized a survey format, in an attempt to explore and identify psychological characteristics, conditions, or practices that relate to the healing process. More specifically, the purpose of this study was to determine if there was any relationship between the following psychosocial factors and recovery time from ankle and knee injuries: Attitude; Outlook; Level of Stress; Social Support; Positive Self-Talk; Goal Setting; and Healing Mental Imagery.

The procedure draws from two previous studies:

1. Orlick and Partington (1988) identified mental practices related to success in high performance sports. The authors interviewed 75 Olympic athletes about their preparedness for the Olympic Games. Out of the three major criteria for readiness: physical, technical, and mental, they found that measures of mental readiness were the only significant predictors for success at the 1984 Olympics.
2. Achterberg, Matthews-Simonton, and Simonton (1977) identified psychological characteristics related to recovery from terminal cancer. This study utilized an interview format which explored important psychosocial items identified as related to disease prognosis.

METHOD

Overview

This study was exploratory in nature. It sought to identify those psychological factors which may facilitate the speed of recovery from a sports injury and return to previous activity levels.

Selection of the subjects

Based upon consultation with several local Sports Medicine specialists and physiotherapists regarding comparability and frequency of various sports injuries, it was determined that the following injuries would be the best choice for the purposes of this investigation:

1. Knee Injuries - Medial Collateral Ligament (MCL) sprains, grade II.
2. Ankle Injuries - Anterior Talo Fibular (AS) sprains, grade II.

The subjects, were comprised of former patients from the Carleton Sports Medicine Clinic who had one the above mentioned injuries.

Materials Utilized

Sports Injury Survey.

The development of the survey (Appendix B) was drawn from two previous studies: 1) *Documenting athlete readiness for the 1984 Olympics, and evaluating sport consulting* (Partington & Orlick, 1986), and 2) "Psychology of the exceptional cancer patient: A description of patients who outlive predicted life expectancies." (Achterberg, Matthews-Simonton, Simonton, 1977). It also included questions on psychosocial factors

related to healing identified in the literature review. The survey was designed to elicit information about each athlete's rehabilitation experience. It consists of the following categories of information:

1. Biographical.
2. Physical.
3. Attitudinal.
4. Beliefs about the Mind/Body relationship.
5. Psychosocial Conditions.
6. Mental Activity.
7. Recommendations.

Procedure

The athletes were contacted by telephone by the author and an assistant, and requested to participate in a survey about the sports injury rehabilitation process. If they agreed, they were asked some preliminary biographical questions, as well as questions to gain information about the injury and their sports activities (see Appendix B, Part A).

Subjects were included in the study only if they met the following criteria:

1. They must have recovered.
2. They must have been minimally active prior to their injury, and subsequently returned to their previous activity level.
3. They must have undergone physiotherapy.

Once the above conditions had been met, the qualifying subjects were sent the Sports Injury Survey in a stamped self-addressed envelope, while the remaining subjects, i.e. those who did not qualify, were thanked and contact was concluded.

As the study required use of medical records, each athlete was requested to sign a release form on the front page of the Sports Injury Survey. Confidentiality of the medical records and all interview material was assured.

Analysis of the Data

Recovery from injury was defined as recovery to an 85-90% level of function. This was determined both by self-report, and by the physiotherapist's assessment. Had these two assessments differed, the physiotherapist's assessment would have taken precedence, providing no other probable physical cause was suspected e.g. meniscus damage. However, there was no disagreement between the self reports and the physiotherapists assessment.

The athletes were ranked according to their recovery time i.e. the athlete with the fastest recovery was ranked #1, the second fastest - #2 etc.

The data was analyzed statistically using the Multiple Regression procedure using Recovery Time as the Dependent Variable, against the following sets of variables: Attitude, Outlook, Level of Stress, Social Support, Self-Talk, Goal Setting, and Mental Imagery.

A content analysis of the qualitative data generated from the survey was also conducted.

RESULTS AND DISCUSSION

The *Results and Discussion* section is divided into two major sections.

- The first section presents and discusses the quantitative results;
- The second presents and discusses the qualitative results.

The Descriptive Statistics are presented in Appendix C, the Profile of Exceptional Patients in Appendix D, and the verbatim verbal responses to the majority of questions are presented in Appendices E-O.

Quantitative Results

Return Rate.

The return rate for the surveys was as follows:

- Ankle Sprains (AS): 21 returned / 25 sent. One respondent was eliminated due to an incorrect diagnosis i.e. fracture. The rate computed therefore is $20/25 = 80\%$.
- Knee Injuries - Medial Collateral Ligament (MCL): 12 returned / 16 sent = 75% (one additional survey had been lost in the mail).
- Total: 33 returned / 41 sent = 80%. This is considered a very good return rate for this kind of study.

Mean Recovery Times.

Recovery time ranged from between four to twenty weeks, with an overall average of 9.75 weeks. Table 1 displays the mean recovery times for each injury in this study.

Table 1: Mean Recovery Times

	Mean	Standard Deviation
Ankle	9.25	4.28
Knee	10.58	3.70
Total	9.75	4.06

Ranking

The results of the Ankle Sprains (AS) and Knee injuries, i.e. Medial Collateral Ligament injuries (MCL), were pooled as their recovery times are comparable. The athletes were then ranked according to their recovery time, and divided into three groups which were determined by the standard deviation.

1. Fast - that is, exceptionally fast healers defined as recovering in 5 weeks or less.
2. Average - defined as recovering in over 5 weeks and fewer than 13 weeks.
3. Slow - defined as recovery taking 13 weeks or longer.

See Table 2 for the distribution of the rankings.

The percentage of exceptional recoveries in this study (19%) corresponds to that found in the literature of exceptional cancer patients of 15-20% (Achterburg, Simonton & Simonton, 1977; Siegal, 1986).

Table 2: Distribution of the groups according to recovery times.

	Ankle		Knee		Total	
	n	%	n	%	n	%
Fast	4	20	2	17	6	19
Average	11	55	5	42	16	50
Slow	5	25	5	42	10	31
Total	20	100	12	100*	32	100

* Note: Due to rounding, the percentages for Knee injuries resulted in a total above 100%.

Statistical Analysis.

The major variables analyzed against the dependent variable Recovery Time were calculated as follows:

1. Attitude - total of questions #1-3, i.e. Degree of commitment to sport; Feelings about the injury disrupting the sport activity; and Determination to return to sport as soon as possible. (See Appendix B for specific questions.)
2. Outlook - total of questions #4a-4d, i.e. Outlook Initially (at the time of the injury); When visited the Carleton Sports Medicine Doctor; Midway through physiotherapy; and towards the end of rehabilitation.
3. Stress - difference between questions #10 and #9, i.e. between Control over Stress and Level of Stress.
4. Social Support - question #12. Upon observation of the verbal data, it was felt that these results were not meaningful as the responses indicated a widely differing interpretation to the question as worded. This variable was, therefore, not used in the whole regression model.

5. Positive Self-Talk - frequency of self talk (#14a) by the extent to which it was positive in terms of the percentage reported (#14b).
6. Goal Setting - Total of questions #16-18, i.e. the extent to which they set Daily and longterm goals for recovery, and returning to sport goals.
7. Imagery - question #20a, i.e. extent of healing imagery.

Table 3 displays the results of AS and MCL data combined for each of these variables tested alone against Recovery Time using the regression procedure: 1) Using all the data; and 2) Comparing the Fast healers to the Slow. The variables were ranked according to their level of significance and size of r squared. As can be seen in Table 3, Goal Setting, Positive Self-Talk, and Healing Imagery were the top three variables for both data sets, and elimination of the middle Average group led to more dramatic results, where the regression models explained a greater proportion of the variation (i.e. r squared = the proportion of variation due to the model or variables tested).

The stepwise regression procedure was conducted using all variables excluding the variable Social Support for the reason cited earlier, (i.e. highly insignificant positive correlation). The regression model (in the order in which they appear in the survey) is as follows:

Recovery Time = Attitude + Outlook + Stress Level + Goal Setting +
Positive Self Talk + Healing Imagery.

For all the data analyzed together, each additional variable added to the model contributed minimally to the r squared, and the probability of F increased above the 10% level (i.e. above $p=.10$) beyond the two variable combination. The results clearly indicate more dramatic differences with the middle group taken out, i.e. Fast versus Slow comparison. Here, the probability of F remained below the 1% level throughout (i.e. below $p=.01$), and each additional variable included in the model (up to the five variable combination), made a much greater contribution to the r squared. See Tables 4 and 5 for the stepwise regression outcome for each data set.

Table 3: Statistical Results: One variable regression

The variables are listed in the order of their significance and size of r squared.

1) All data:

Variable	Mean	s.d.	Statistic		
			r ²	F	P(F)
1. Positive Self Talk	4.0	4.0	.155	5.310	.029
2. Goal Setting	17.4	10.1	.096	3.193	.084
3. Healing Imagery	2.6	3.5	.052	1.654	.208
4. Outlook	10.5	7.7	.046	1.446	.239
5. Stress	1.1	4.1	.009	0.272	.606
6. Support*	7.9	2.2	.002	0.070	.793
7. Attitude	23.3	4.1	.002	0.050	.825

2) Fast vs. Slow data:

Variable	Mean		s.d.		r ²	F	P(F)
	Fast	Slow	Fast	Slow			
1. Goal Setting	27.2	14.8	2.0	7.1	.746	41.050	.0001
2. Positive Self Talk	8.7	2.7	3.6	3.6	.446	10.481	.006
3. Healing Imagery	5.3	2.2	4.9	3.0	.166	2.790	.1170
4. Outlook	12.3	7.6	8.3	8.1	.017	.241	.631
5. Attitude	27.4	24.3	1.8	1.8	.007	.100	.757
6. Support	8.0	8.1	2.1	2.3	.001	.017	.897
7. Stress	2.0	0.7	4.3	4.6	.000	.001	.982

* Positive correlation

Table 4: Stepwise Regression Results - Using all the data

Best Models: Recovery Time =	r ²	F	P(F)
1. Positive Self Talk	.155	5.31	.0286
2. Positive Self Talk + Outlook	.173	2.93	.0697
3. Positive Self Talk + Outlook + Stress	.188	2.09	.1250
4. Goal Setting + Positive Self Talk + Attitude + Stress	.203	1.65	.1909
5. Goal Setting + Positive Self Talk + Attitude + Stress + Healing Imagery	.214	1.36	.2729
6. Goal Setting + Positive Self Talk + Attitude + Stress + Healing Imagery + Outlook	.221	1.13	.3740

6 variable model predictive equation:

$$\text{Recovery Time} = 8.418 + (-.056)\text{Goal Setting} + (-.406)\text{Positive Self Talk} + (-.147)\text{Healing Imagery} + (.225)\text{Attitude} + (-.053)\text{Outlook} + (-.155)\text{Stress}.$$

The top three variables associated with fastest recovery time being Goal Setting, Positive Self Talk, and Imagery (see Table 3), is an observation of great interest and relevance to Sport Psychology, as these factors are commonly propounded in Applied Sport Psychology. Of all the variables tested, these are also the most amenable to change, in

Table 5: Stepwise Regression Results - 'Fast' vs. 'Slow' data

Best Models: Recovery Time =	r ²	F	P(F)
1. Goal Setting	.731	35.35	.0001
2. Goal Setting + Attitude	.791	22.71	.0001
3. Goal Setting + Attitude + Stress	.825	17.33	.0002
4. Goal Setting + Positive Self Talk			
+ Attitude + Stress	.866	16.19	.0002
5. Goal Setting + Positive Self Talk			
+ Attitude + Stress + Healing			
Imagery	.871	12.13	.0009
6. Goal Setting + Positive Self Talk			
+ Attitude + Stress + Healing			
Imagery + Outlook	.879	9.69	.0026
6 variable model predictive equation:			
Recovery Time = 60.581 + (-.59)Goal Setting + (.51)Positive Self Talk			
+ (.22)Healing Imagery + (-1.58)Attitude + (-.07)Outlook			
+ (-.80)Stress.			

that they are comprised of activities and skills which can be taught. That is, they are more within a person's potential control, than the other variables studied. Consequently, they were analyzed together in a three variable model using a stepwise regression procedure (see Table 6). The results showed, that in comparison to the best one variable models for each data set, the two variable combination of Positive Self-Talk and Goal Setting improved the r squared for the entire data set only. Healing Imagery made only a

modest improvement to the r squared for both data sets, and the probability of F jumped above 10% for the entire data set, while remaining below 1% for the Fast/Slow data set.

Table 6: Statistical Results - Sport Psychology Skills

	Model	Data	r ²	F	P(F)
Recovery Time =	Positive Self Talk	All data	.172	1.874	.158
	Goal Setting				
	Healing Imagery	Fast/Slow	.735	10.177	.002
Recovery Time =	Positive Self Talk	All data	.169	2.837	.075
	Goal Setting	Fast/Slow	.734	16.554	.0004

3 variable model predictive equation - All data:

$$\text{Recovery Time} = 12.4 + (-.038)\text{Goal Setting} + (-.352)\text{Positive Self-Talk} + (-.099)\text{Healing Imagery}.$$

3 variable model predictive equation - Fast vs. Slow:

$$\text{Recovery Time} = 22.08 + (-.552)\text{Goal Setting} + (-.116)\text{Positive Self-Talk} + (-.064)\text{Healing Imagery}.$$

Best 2 variable model predictive equation - All data:

$$\text{Recovery Time} = 12.53 + (-.057)\text{Goal Setting} + (-.368)\text{Positive Self-Talk}.$$

Best 2 variable model predictive equation - Fast vs. Slow:

$$\text{Recovery Time} = 22.00 + (-.539)\text{Goal Setting} + (-.100)\text{Positive Self-Talk}.$$

Although the remaining variables of positive attitude and outlook, and low level of stress, produced less significant results, they nevertheless corroborate the hypothesis of their contributing to faster recovery time. For future studies, the questions used to 'tap'

the variables Stress, and outside Support require greater precision and clarity of estimation, as verbal responses from subjects in this study indicated varying perceptions of these factors and how to rate them.

Qualitative Results

This section presents and discusses the results from the qualitative data which were derived from the verbal responses to questions. Complete verbatim responses are presented in Appendices D-N. In most cases these questions allowed subjects to verify or elaborate on numerical ratings, and others allowed an opportunity for open-ended responses to relevant questions about healing.

Differences were found between the verbal responses of those who had exceptional recoveries (i.e. Fast group) and those who were slow, which support and add to the quantitative findings of this study. They will be presented in the order in which they appear in the survey. As with the numerical data, there was much greater consistency in the answers within each of the extreme groups, i.e. Fast and Slow groups, than in the middle Average group which evidenced much greater variability.

Generally, the Fast patients' responses were positive right across the board to all the questions and were more elaborate as well. The average group contained a mixture of positive and negative responses, indicating the factors balanced out in the longrun to produce average results. The slow group tended to be negative and evidenced more hindrances (in the psychological domain) in their responses. It was also observed, that for some, there was a sense of 'gain' or satisfaction that came from being injured.

In many cases the responses could be categorized into either an 'internal' or 'external' nature. They are defined thus: Internal - of mental or psychological nature, and/or indicative of 'Internal Locus of Control', over which 'I' have control; External - of a physical nature which happen to 'me', and/or of 'External Locus of Control', over which 'I' have no control.

The Fast Group had more responses of an 'internal' nature, thus indicative of greater 'Internal Locus of Control'. The complete profile of the exceptional patients is included in Appendix D. The following is a synopsis and commentary of the verbal responses to questions. They are presented in the order in which they appeared in the survey.

Beliefs

WHAT HELPED THE MOST.

In response to question #6 "What, if anything, do you think helped you the most to get better?", the Fast healing group tended to have internal responses, e.g. creative visualization, determination, desire, attitude, goal setting, social support, while the Slow group - external, e.g. Physiotherapy and rest.

WHAT HINDERED THE MOST.

When asked in question #7 "What, if anything, do you think hindered you the most to get better?", the Fast group tended to not even respond to this question. If they did, they responded as such: "the cast was a constant reminder", indicating that it was the 'constant reminder' that was the greatest annoyance/hindrance - a mental factor. Otherwise, the remainder of the responses from the slower healers, were of an external nature.

MIND OVER BODY.

While the overall numerical response for all groups to question #8 "Do you believe that what you think can affect your healing?" (0-10), indicated a high belief in the mind/body relationship (mean = 8), there was a wide range of answers regarding how the mind effects recovery. The Fast group again tended toward answers of an internal nature. Examples of the responses are as follows:

- Internal - "My thoughts, and the energy in them, create my reality."

- "Chemical imbalances and hormones influence our mental state. The opposite must also be true."

- "Positive thinking gets the juices flowing."

- External - where the mind propels one into positive action, e.g. going to physiotherapy, so the physiotherapy can have its effect.

While there was a strong belief in the extent to which the mind affects the body, there were different views as to how it is effected - whether internally, where the mind has a direct impact on healing, or externally, where the mind plays the role of mere catalyst/motivator for the physical action which effects the healing.

Internal responses indicate that the subject perceives him or herself to have direct control over the healing process, while external responses depict the mind more as motivating one to go to physiotherapy and do the exercises. The Fast healing group tended to have more elaborate answers of an internal nature thus indicating a sense of personal control, while the Slow healing group had less elaborate and external responses. They seemed to perceive healing as something that happens to you, and that an individual can have little direct effect, other than going to physiotherapy. The Average healing group displayed a wide range variety of responses.

In sum, the athletes' beliefs regarding factors which help or hinder healing, as well as explanations as to how the mind/body interaction occurs, indicated varied perspectives on a person's role in injury rehabilitation. That is, the Fast group seemed to evidence greater 'Internal Locus of Control', whereas the slower group evidenced greater 'External Locus of Control' in their answers. To a great extent this involves the belief factor, in that if one believes they have control over recovery, they are more likely to exercise that control. To what extent beliefs are susceptible to change is open to debate. Becoming better educated in the mind/body relationship may help to enlighten, but it is uncertain whether a person will choose to utilize such knowledge, i.e. accept responsibility for his or her

own healing. Such is the case with biofeedback - where the immediate feedback educates the individual to self-regulate bodily processes heretofore considered beyond control, yet a significant proportion of people choose not to take advantage of their own internal resources - they opt for ill health instead! i.e. for the 'status quo'(Green & Green, 1977).

Level of Stress.

The answers to both question #9 "What was the level of stress in your life during your recovery period?" (0-10), and #10 "Overall, how much control did you feel you had over the stress?" (0-10) were considered together in the statistical analysis. The explanations to the responses were each very unique. The perception of Stress is a very individualized matter, and does not readily lend itself to comparison with other people. In response to the same question, some of the respondents referred only to the stress of being injured, rather than the level of stress in their life in general.

As the literature suggests, it is not so much the level of stress, but perceived control over events that is the critical factor in dealing with stress. In response to the question regarding control, there were again those who referred only to the injury, while others gave rather vague responses. More in depth probing is required to distinguish between individuals and groups with regard to level of stress.

Social Support

Question #12 asked: "Did you get much support from people during your recovery such as from friends and family, coach, teammates, etc.?" (0-10) "Please describe the kind of support you had, if any, and from whom." While there were no differences found among the athletes regarding their numerical responses on the 0-10 scale, there were differences detected regarding their descriptions and interpretations of support. The differences were regarding superficial support contrasted with emotional or moral support. e.g. help with chores, versus receiving emotional support and encouragement. In some

cases, there even appeared to be evidence of secondary gain, i.e. getting extra attention and favours, as for example, one respondent especially relished, "They were my slaves!"

Talk

Question #13 asked: "How often did you talk, or did people ask you about your injury?", followed by "Please describe how you responded.". The greatest distinguishing factor here appeared to depend mostly on the frequency with which the subject was asked about their injury or rehabilitation. This aspect is therefore considered an external factor largely out of the control of the subject. While there are alternative replies to such questions, (some described the injury, while others preferred to describe the physiotherapy, and when they anticipated being able to return to their sport), the subjects were, more often than not, compelled (due to the insistent curiosity of their questioners), to describe how the injury occurred. Some reported annoyance with this, while others seemed to appreciate the interest.

Self-Talk

Question #14 asked: "Did you ever find yourself 'talking' to yourself?" (0-10), and: "What did you usually say to yourself?" (% +/-). The responses to this question enabled a relatively straightforward content analysis. This permitted the comments to be easily coded and incorporated into the statistical analysis as Positive Self-Talk. The Self-Talk ranged between being very positive and encouraging to being self-deprecatory, self-pitying, and blameful. The differences found between the groups of subjects were the most clear-cut of all the open-ended variables tested, where the Fast group was totally positive, the Slow group tended to be totally negative and unforgiving, and the Average group - a combination of both.

One exceptional athlete was very introspective about her injury: "I would have a conversation with my other self and ask myself what it made me realize about me and

how to go about it to make the most of what could be done". The Slow group is in direct contrast to the Fast group. They reported a lower frequency of Self-Talk, most of which was predominantly negative. The Average group tended to simultaneously evidence a bit of both - hence neutralizing their self-talk. The following are examples of Self-Talk reported. The Positive Self-Talk comes from the Fast group, the negative from the Slow group:

Positive Self-Talk:

- I can do anything.
- When I had my velcro cast, I took it off and tried to walk. (that's a no no) I told myself 'I can do it', and that I was to beat the odds and recover sooner than normal.
- I want to go spring skiing.
- I have to work to get my leg as strong . . . as the other one.
- It's feeling pretty good.
- I do not hurt (i.e. my ankle does not hurt).

Negative Self-Talk:

- Talked to myself about how frustrated I was, and that it would probably take forever to get better.
- What a stupid thing to do.
- Dumb mistake.
- Stupid fool!
- Stupid Injury.
- Why me?

Fear of Reinjury.

The responses to question #15, "Did you have any thoughts, imaginings, or worries about reinjury? Please explain." ranged from being very fearful of reinjury; fear generating greater caution; planning to take preventive measures, exercise greater caution,

or to be more conscientious, e.g. taking lessons, thinking "twice before doing something crazy!"; to no fears or worries at all. While there was no indication as to the frequency of the incidence of such fears and worries (the question was not designed to elicit such information), it was observed that, as the ranking progressed, the fast healers were less fearful or worryful of reinjury as compared to the slower healers.

Where fears of reinjury did surface in the faster healers, they were modified by a desire to just be more careful, and to exercise greater control in the future. Respondents in the slower group tended to dwell on the negative possibilities.

Goal Setting.

The questions asked about goal setting were as follows: #16, "Did you set any goals for recovery? (0-10)"; #17, "Did you set any longterm goals for recovery? (0-10)"; #18, "Did you set any goals about your return to sports? If so, to what extent? (0-10)"; and were also asked to provide examples for each case.

This variable was fairly straightforward in terms of reporting the extent of Goal Setting. It has been suggested that goal setting also involves a form of imagery (albeit a left brain version of imagery) (Syer & Connelly, 1984). This appears logical, for how could setting a goal, and conceiving achieving the goal *not* conjure up an image? It is likely that once a goal is set, a person will periodically contemplate achieving that goal. In fact, setting a goal in itself, is a statement of expectation and hence a conceptualization of success. Being able to *conceive* of a goal is much like Affirmation Imagery. Setting a goal may also serve to conjure up an image of those activities in which one can engage that are consistent with achieving that goal. It would also follow, that daily goals, being the most pragmatic, would also be the most effective towards this end. The results from this survey confirm this, in that Daily Goal Setting was found to be more related to Recovery Time than either the Longterm or Return to Sport Goal Setting.

Imagery.

The three basic questions for imagery were as follows: #20, "a) Did you do any healing imagery, where you tried to see or feel the body parts heal? (0-10)"; "b) Did you do any imagery during physio., of physio. promoting recovery, seeing and feeling recovery? (0-10)"; "c) Did you do any imagery trying to imagine yourself totally recovered and performing your sport well again? (0-10)"; and were asked to describe their imagery for each case. These were followed with extensive questions regarding the frequency, the extent to which the imagery was internal/external/could be felt, and the extent of control over the imagery.

While the data generated from the imagery questions were rather unwieldy for a statistical analysis, there remained a sense from the overall 'picture', that the responses provided did follow the predicted pattern. This was the case particularly for 'Replay Imagery' in question #21, "Did you ever replay your injury? If yes, how often?" It appeared that positive (i.e. healing and/or performance) imagery was related to a faster recovery time only when the subject did not also report extensive injury Replay Imagery. This suggests that one may counteract the other. There have been reported case studies with athletes (Foster & Porter, in press), where negative images, e.g. of the injury as it occurred, inflamed, torn, etc. has interfered with positive images of healing and recovery. Obtaining more complete answers regarding the extent of 'Replay Imagery' may help to complete the 'picture'.

Of the three kinds of imagery questioned, Healing Imagery evidenced the greatest relationship to Recovery Time. The results, while promising, are somewhat inconclusive due to the small number who responded to all the imagery questions. {Where they were not answered, a 0 was assigned.}

Despite the complexity of the imagery questions, the lack of concise measures and incomplete knowledge of the precise details of the imagery that did occur - making it very

difficult to compare the responses, it is nevertheless felt, that imagery remains a very worthwhile and compelling factor to study and to harness our internal healing (and performance) resources.

Lessons and/or Benefits

Question #22 asked whether the 'time out' that the injury provided resulted in any valuable lessons learned, or new perspectives attained which contributed towards future achievement, i.e. a beneficial experience and opportunity that may otherwise not have been taken. In response, the Fast group had more positive things to say and derived greater benefits in the form of lessons learned, which enhanced both their insight and their enjoyment of their sport. In addition, athletes who learned from the experience and took it as an opportunity, fared better in terms of their recovery time. In other words, these athletes made the 'most of a bad situation'. This is consistent with the findings of a pilot project involving interviews with world class athletes where there was always a substantial gain in insight or approach to training that subsequently substantially improved the athlete's training and/or performance (Ievleva, 1987, unpublished pilot study).

Perhaps the element of first accepting the injury, and then taking advantage of what can be learned from the experience about oneself or one's relationship to one's sport, may enhance the recovery process, as is depicted by the most exemplary healer of the entire study in the following quote: "I would have a conversation with my other self and ask myself why I had created this situation, where it stemmed from in me, what it made me realize about me and how to go about it to make the most of what could be done." The reverse may also be true, that is, non-acceptance and resistance to the lessons and insights that may be derived from the process, may retard recovery. This is supported in the literature regarding psychosomatic ailments, where it has been suggested that if one treats only the symptoms, and neglects the psychological component which may have led

to the problem in the first place, the problem will resurface in another form. Indeed, an injury or illness may serve merely as a signal of something in the psychological domain that has been neglected. Once this 'signal' is heeded, it may then more easily be extinguished, i.e. promote faster recovery - health and well-being (Jaffe, 1980). It is suggested therefore, that we take greater opportunity to 'listen' to our bodies and heed our 'inner' voices. This may be accomplished both as a preventive measure, as well as towards enhanced healing, not to mention performance.

Conclusions

The results from this study found a modest relationship between certain psychological factors and recovery time. The most significant findings were regarding the psychological practices of Positive Self-Talk, Goal Setting, and Healing Mental Imagery. These are the variables which hold greater relevance for healers and 'healees' alike, for these are the very variables most within a person's control.

While the statistical results for the variables of Stress Level and Social Support were insignificant in terms of being directly associated with the rate of healing in this study, the trends observed in both the quantitative and qualitative data, suggest that a much more detailed approach is warranted to uncover some of the complexities of these factors. Perhaps with a greater number of subjects together with greater precision in estimation of Levels of Stress, Control over Stress, Social Support, and Imagery, more significant results may have been achieved.

On the whole, it is felt that the results support the capacity of the mind to take an active role in promoting (and/or retarding) healing.

RECOMMENDATIONS

This section provides a summary list of important factors and techniques related to enhanced injury rehabilitation. It derives from both suggestions in the literature, as well as from the results and interpretation of this study. It concludes with recommendations for conducting such surveys in the future.

Suggestions Towards Enhanced Injury Rehabilitation

For the injured person:

- Goal Setting:
 - Set long term, short term and especially daily goals.
 - Plan out physiotherapy and mental practice.
 - Practice Affirmation Imagery of achieving goals.
- Talking about the Injury:
 - Emphasize how the recovery is going.
 - If the injury must be described, always attempt to follow it with a positive statement about recovery (if not out loud, at least to oneself).
- Positive Self-Talk:
 - Plan positive things to say to oneself about the rehabilitation and future performance possibilities.
 - Be alert to negative self-talk, acknowledge it, address any pertinent issues it may raise, and then reverse it.
 - Be kind to oneself and forgiving.
 - Talk positively to the healing part.
- Imagery:

Practice positive affirmation and healing imagery.

Find out as much as possible about the physical components of physiotherapy and healing, and incorporate them into healing imagery.

Be alert to any negative imagery and 'replays' of the injury. Change the image to a positive, healing one.

- **Stress Control and Relaxation**

Take advantage of the 'time out' as an opportunity to rest and reflect.

Avail oneself of relaxation techniques particularly if under undue stress.

For others helping an injured person:

- **Social Support:**

Show compassion while encouraging and supporting progress.

Support the athlete's capacity to influence his or her own healing.

Encourage/maintain involvement with the sport and sports 'buddies'.

- **Flexibility:**

Be alert to individual concerns and reactions to the injury.

Listen.

Recommendations for Future Research

The following changes are suggested for future surveys of the same nature:

Comparing Recovery Rate to Return Rate. It was observed that a few subjects from the clinic who were exceptionally slow in their recovery also did not respond to the survey. It may have been interesting to note the recovery rate for those who do not return their survey.

Mind/Body. It is suggested that this question be expanded from, "Do you believe that what you think can affect your healing?" to include feeling as well, conscious or unconscious, thereby allowing for a broader concept of 'mind'.

Stress and Control Over Stress.

- Stress Level - expand to become more explicit, e.g. regarding the amount of change or adjustment that has occurred in the person's life, and the extent to which it is positive or negative, desired or not desired, etc.
- Control Over Stress - expand to include element of choice, as well as sense of control, over events. Perhaps it would be more useful to request the subject's methods of coping with stress as well as obtaining their definition for the meaning of stress and control. Questioning the extent to which the subject had time for rest and relaxation, and to describe their methods may be highly useful in this regard.

There are several new stress scales developed to account for the mediating factors of desirability and control in the effects of stress. Perhaps using these scales (although lengthier), or an adaptation, may yield a more precise estimate of actual stress. (Cohen, Kamarck, & Mermelstein, 1983; Ross & Mirowsky, 1979; Sarason, Johnson, & Siggel, 1978).

Social Support. In light of the results of this survey and the literature, it is suggested that future investigations make a distinction between different kinds of support, i.e. between superficial support and emotional/moral support, encouragement, support of one's capacity to heal oneself, etc. It may also be useful to determine the extent to which the support provides a 'secondary gain', i.e. is the person receiving more support during their injury that they would otherwise *not* be receiving? Perhaps it would be interesting to question the extent to which the athlete appreciated the support, or the extent to which they themselves may have felt the support contributed to their recovery.

Goal Setting. Maintain the same format with the possible addition of the element of Affirmation Imagery, e.g. "to what extent could you 'see' the goal being achieved?" or "how often did you see yourself achieving these goals?" etc.

Mental Imagery. This section requires much restructuring in order for it to more readily conform to statistical analysis. It is suggested that greater consideration be given to 'replay' imagery as this may counteract any benefits of positive healing or performance imagery. Perhaps a format similar to the one used for Self-Talk (percentage positive / percentage negative) may yield more conclusive results.

Fears of Reinjury. Include a rating scale to determine frequency.

Attitude and Outlook. It is felt that since Self-Talk is both the active form of, and highly correlated with Attitude and Outlook, that it alone sufficiently taps this factor.

Subject Memory. It has been suggested that the subjects also rate the extent to which they feel their memory serves them correctly regarding the answers they gave in the survey (David Coppel, personal communication, September, 1987).

In view of the results from this study and Behavioral Medicine research, it is hoped that additional applied research is carried out on the mental aspects of healing, and that Sport Psychology practitioners and athletes alike will make greater use of the strategies discussed in this paper towards enhanced injury rehabilitation as well as performance.

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Appendix A
THESIS PROPOSAL

INTRODUCTION

Injuries have become an integral part of athletic participation. Few serious athletes emerge at the end of their career without ever having had one. The statistics are quite staggering. The ABC News Nightline show broadcast on September 22, 1986, reported that after only a few games into the season, the NFL listed 340 already injured players, which amounts to one in five. Many of these injuries were quite severe - most notably to Joe Montana, the all-star quarterback of the San Francisco Forty-niners, "who on this 46th pass on opening day, twisted his torso the wrong way, ruptured a disc in his back and ended up in surgery." (ABC News Night line, 1986, p. 1). "The NFL Players Association says that in its most recent study among all 1650 pros, there were 1660 injuries." (ABC News Nightline, 1986, p. 1). A recently released study by the NBA reports that "30% of pro basketball players this year have or will have suffered a fractured foot or lower leg." (ABC New Nightline, 1986, p. 2). All this despite vast improvements in conditioning of the athletes as well as in equipment and rules.

In alpine skiing, one can expect to lose an average of one season of competition once every four years to injury (T. Orlick, personal communication, September 17, 1986). Many other sports involve a high risk of injury.

The central purpose of this study is the treatment of injury rather than the incidence. Many athletes are left to their own devices of coping with debilitating and sometimes career ending injuries. Some are fortunate to have a strong support base, others may have a devastating time, even for those who appear very well adjusted on the surface. Petitpas (1986) cites a case of a star high school football player whose injury precluded any further participation. This player displayed a convincing adjustment to all those around him. He subsequently shocked everyone by his suicide. Much of this could be alleviated by the manner of treatment and attention that the injured athlete receives at the outset. Too often, the medical profession responds only to the physical side of injury, oblivious to the person behind it. This is reflected by an examination of Sports Medicine textbooks, where the attention is focused on physical aspects. Psychological aspects are mentioned only in passing, if at all. Of the few exceptions, are the following books which include chapters on the psychological component of sports injury: *Sports injuries: Mechanisms, prevention, and treatment* (Schneider, 1985); *Sports Medicine* (Strauss, 1984); and Arnheim's (1985) text *Modern principles of athletic training*, where he actually provides suggestions regarding the psychological component of recovery.

The mental side of healing is gaining greater recognition, as evidenced by comments in recent sports injury journals by practitioners. Dunn, head Athletic Trainer at Western Kentucky University at Bowling Green, Kentucky, asserts that despite

all the highly sophisticated resources in expertise and equipment "designed to cure the injured athlete, most trainers would agree that correcting the physical malfunctioning is only half the battle." (Dunn, 1983, p. 34). Steadman, Chairman, Medical Group of the U.S. Alpine Ski Team, divides rehabilitation into three categories: "psychological rehabilitation, physiologic rehabilitation, and rehabilitation of the injured area." (Steadman, 1982, p. 289). Dr. Gary Faris, a Certified Trainer and Staff Psychologist at the Fort Collins Sports Medicine Clinic in Colorado, agrees that in order to attain the goals of rehabilitation, one must address the emotional state as well as the physical.

To treat a knee and ignore the brain and emotions that direct the choreography of that knee is not consistent with total care of the patient. Any comprehensive rehabilitation plan will want to interface the proper external rehabilitation procedures with proper internal state of mind of the patient. When these two factors come together, successful results are tremendously enhanced. A positive state of mind promotes better attendance and attentiveness to, and more intensity toward the external rehabilitation procedures, which yield successful results. (Faris, 1985, p. 546).

It is clear that psychological factors in injury rehabilitation deserve greater attention. However, there have been no systematic studies to determine which factors and what role they play in the recovery process. This study seeks to explore factors that may influence the speed of recovery. It is hypothesized that certain psychological characteristics may either enhance or retard healing. This is based on the principle of mind/body interaction or the 'psychophysiological principle' posited by Green and Green (1970):

Every change in a physiological state is accompanied by an appropriate change in the mental-emotional state, conscious or unconscious; and conversely, every change in the mental-emotional state, conscious or unconscious, is accompanied by an appropriate change in the physiological state. (Green, Green & Walters, 1970, p. 3).

Statement of the Problem

This study is an exploratory investigation, using a survey format, seeking to identify psychological characteristics, conditions, or practices which relate to the healing process. Specifically, it sought to determine if there was any relationship between the following psychosocial factors and recovery time from ankle and knee injuries: Attitude; Outlook; Level of Stress; Social Support; Self-Talk; Goal Setting; and Mental Imagery.

The procedure draws from two previous studies:

1. Partington and Orlick (1986) identified mental practices related to success in sports. The authors interviewed 75 Olympic athletes about their preparedness for the event. Out of the three major criteria for readiness: physical, technical, and mental, they found that measures of mental readiness were the only significant predictors for success at the 1984 Olympics.
2. Achterberg, Matthews-Simonton, and Simonton (1977) identified psychological characteristics related to recovery from terminal cancer. This study utilized an interview format which explored all psychosocial items identified as related to disease prognosis.

LITERATURE REVIEW

The greatest discovery of my generation is that human beings, by changing the inner attitudes of their minds, can change the outer aspects of their lives. . . . It is too bad that more people will not accept this tremendous discovery and begin living it. (William James, 1950, p. 258).

The Literature Review is divided into two major sections. The first section covers sports injury literature. The second section covers relevant Behavioral Medicine literature.

SPORTS LITERATURE

The review of sports literature relevant to injury is divided into four parts. The first part summarizes research identifying psychological factors that may predispose an athlete to injury. The second part examines the psychological effects of injury. The third part discusses psychological care of the injured athlete. The fourth part outlines suggested psychological techniques which can be used to enhance recovery from a sports injury.

Psychological Factors in Sports Injury.

Athletic injury is an area of Sport Psychology that has recently been gaining greater attention. For example, the 1986 Conference of the Association for the Advancement of Applied Sport Psychology (AAASP) devoted a full workshop to the subject. Initially, sport psychology researchers interested in injury sought to identify personality characteristics that may predispose an athlete to injury, i.e. to be 'injury prone' (Bergandi, 1985; Rosenblum, 1979; Sanderson, 1977). Such studies yielded little useful information, because they failed to show conclusively any direct relationship of a particular personality trait to injury. In addition, because the personality of an individual is not easily amenable to change, it may be futile to consider changing an individual's personality as an injury prevention technique.

What is reportedly highly practical, is to exercise effective stress management, and to be alert to any undue stress affecting an athlete (Rotella & Heyman, 1986; Sanderson, 1981; Suinn, 1977). Research has shown a strong relationship between high scores on life stress events e.g. death of a family member, divorce, change in residence etc., and the incidence and/or severity of injury (Bramwell, Masuda, Wagner, & Holmes, 1975; Coddington & Troxell, 1980; Cryan & Alles, 1983; Kerr & Minden, in press; Yaffe, 1983). High levels of stress predisposes one to injury, however, much depends on an individual's manner of coping and the circumstances, e.g. having a 'support system' they can count on, or the degree of perceived control over an event.

Psychological Effects of Injury.

An injury itself is generally a considerable source of stress. It can be a tremendous blow to an athlete's self-image and sense of self-worth (Deutsch, 1985; Faris, 1985; Lewis-Griffith, 1982; Salisbury, 1984; Steadman, 1982). For some, however, an injury may provide relief if it is viewed as a viable 'time out' from the pressures of having to perform at a high level in a sport (Heyman, 1986; Moore, 1985).

For most serious athletes, an injury means more than just pain and a disruption of plans, "it is an assault on their idea of themselves." (Salisbury, 1984, p. 56). When the greater part of one's effort and time is spent developing athletic prowess, the sudden loss of ability due to injury may lead to feelings of loss, emptiness, and worthlessness. It is important to recognize that, for high performance athletes, the meaning of an injury is very much wrapped up in feelings of self-worth and sense of well being, not to mention livelihood for the professional athlete. As Faris succinctly put it: "In their world, many of the criteria for being a worthwhile human being become suddenly unattainable." (Faris, 1985, p. 545).

For many athletes, the inability to participate in their sport results in a sense of loss. Since many serious athletes commit a great amount of their time and energy to their sport, an interruption in training can be quite frustrating and sometimes traumatic. It is not uncommon that a "clinical depression" may set in if proper steps are not taken in adapting to the new circumstance. According to Nideffer (1983), this is particularly evident with the 'addicted' athlete. With the loss of ability to train and pursue one's immediate goals, there are many other concomitant losses to consider such as the loss of conditioning and metabolism changes, loss of purpose in life, decrease in social benefits due to less time spent with fellow athletes, and in some cases, loss of income.

Other psychological factors which may affect an injured athlete are the anxiety of how the injury will affect future abilities, guilt of letting their team down, or inappropriate perceptions of the injury and pain. The latter may actually hinder proper recovery. Lack of appropriate perceptions can take the form of denial or lack of awareness regarding the injury. Denial can lead to aggravation of an injury, while through a lack of awareness, one may unconsciously tense up the injured area, thus reducing flexibility, and increasing the likelihood of further damage (Nideffer, 1984; Salisbury, 1984; Weiss & Troxel, 1984). It is a natural response for the body to tighten up when injured or in pain. This serves as a kind of protective mechanism i.e. 'favouring' it. However, this constricts the blood flow, increases the sensation of pain, and slows down the healing process (Bresler, 1984b).

The above problems may originate from pressure within the athlete him or herself, or from external sources such as family, friends, teammates and most of all coaches. The coach is in an excellent position to ensure that proper measures are taken to return an athlete to competition form - both physically and mentally (Crossman, 1986; Massimo, 1985). However, according to Taylor (1985), some coaches have the opposite effect.

Some coaches expect an injured athlete to come back without problems. It's a matter of guts, they say, and they may use the fear and guilt approach to drive that athlete back to maximum effort. This system works best for coaches with a large pool of talent from which to obtain substitutes.(p. 4).

Pargman (1986) interviewed 18 injured athletes at Florida State University. He asked them whether

any of their coaches had made inquiries into their feelings about, or their psychological adjustments to not being able to participate or of being deprived of doing what is for many of them a veritable raison d'etre. Every one of the athletes assured {Pargman} that no coach had ever made such an inquiry. Only the trainer did on a few occasions. Apparently, these injured athletes need an opportunity to talk about their injury.(p. 7).

Psychological Care of the Injured Athlete. Drawing upon the reported interventions for sports injury rehabilitation, a common sequence appears. The first step in the psychological care of an injured athlete is the assessment of psychological state. This is important because one's psychological state can affect the rehabilitation process, and it is also important to identify the extent to which a particular athlete may need counselling. Several different approaches towards obtaining this information, while somewhat subjective, have been proposed by Heil (1986a), Pargman (1986), and Petitpas (1986). After ascertaining the severity of the injury, the practitioner assesses the level of psychological distress which the athlete appears to be experiencing. This is recorded on a rating scale (e.g. 0-4). In this rating, the practitioner also considers the appropriateness of the distress regarding the severity of the injury and loss of ability (Heil, 1986a). Another assessment tool used is an adjective checklist which explores each of the following: frustration, anger, guilt, relief, disappointment, and anxiety over re-injury (Pargman, 1986). Petitpas (1986) assesses the ego-involvement i.e. "the degree to which the player's identity is tied up in his sport", as well as their coping style. An athlete's coping style includes skills at problem solving, belief system concerning the healing process, as well as confidence in recovery. Heyman (1986), Heil (1986a), and Petitpas (1986), then address the patient's level of life event stress that preceded the injury. This is important, as evidence suggests that high levels of stress may precipitate injury (Bramwell, et.al., 1975; Coddington & Troxell, 1980; Cryan & Alles, 1983; Kerr & Minden, in press; Yaffe, 1983). As unresolved stress related problems may impede full recovery (Glover & Weisenfeld, 1985), it is important to ensure that steps are taken to alleviate the tension that stressful life events may create, hence the need for an effective stress management program including counselling (Rotella & Heyman, 1986).

There may be certain 'secondary gains' to being injured such as the attention from trainers and sympathy from peers, or relief from a pressure situation (i.e. an honourable way of bowing out from the responsibilities of living up to high expectations), freeing up time and energy to pursue other important goals such as education. It is important to discover the extent of secondary gain that is in operation as this has an obvious impact upon recovery. It may be more 'beneficial' from the athlete's perspective to remain on the injury list (Petitpas, 1986).

Related to coping style is the degree of optimism the injured athlete displays. A positive outlook indicates adjustment to the new condition, and orientation towards improvement. In contrast, a negative outlook indicates preoccupation with the implications of the injury which leads to little effort towards improvement. It is therefore suggested that outlook may have an important impact on recovery time (Heil, 1986a).

One's 'support system' i.e. family, friends, teammates etc. can have a significant effect on how one copes with being injured. How they respond, can affect how the athlete responds. It is therefore important to understand what other influences are in operation outside of the clinic (Petitpas, 1986).

It is also important to be alert to other risk factors in the athlete's behavior (Heil, 1986a; Petitpas, 1986). Cases of suicide have been reported of injured athletes who had appeared to be very well adjusted - perhaps too well adjusted? (Petitpas, 1986). While one cannot control all aspects of an individual's thought processes and behavior, one can be more aware of inconsistent signals. Petitpas suggests that the following warning signs are indicative of poor adjustment:

- An attitude of anger, depression, confusion, or apathy.

- An obsession with the question of when they will be able to play again.
- Remarks such as, "things are going great," or "no problem", or others that indicate that the athlete is going out of his or her way to convince you that the injury does not really matter to them.
- Repeatedly "coming back too fast" from an injury.
- Exaggerated storytelling or "bragging" about accomplishments (in or out of sports).
- Dwelling upon minor somatic complaints.
- Remarks about "letting the team down" or other guilt feelings.
- Dependence on the therapy process or therapist.
- Withdrawal from teammates, coaches, or therapists.

If any of these warning signs is present, it may be an indication that the athlete is in need of help in adjusting to the injury. Attending to both the physical and the psychological aspects of an injury will hasten the recovery and help the athlete maintain a "competitive edge." (Petitpas, 1986).

Heil (1986a) uses the Profile of Mood States test (POMS) as an additional tool in the assessment of psychological state of injured athletes. He further suggests that determining the injured athlete's perception of level of self-efficacy (i.e. the degree to which they feel they have control over the rehabilitation process), may help in predicting the athlete's future orientation on recovery, and hence speed of recovery (J. Heil, personal communication, October 12, 1986).

The reactions to injury, particularly severe injury, parallels the grieving process that follows a major loss. Typically, there are four stages that one goes through: 1) denial or disbelief, 2) anger, 3) depression, and 4) finally an acceptance of the situation and hopefully resolve to overcome it (Arnheim, 1985; Lewis-Griffith, 1982). Such feelings are normal reactions to an acute injury (as opposed to a chronic injury), and a cyclical occurrence of these are not uncommon (Arnheim, 1985; Faris, 1985; Salisbury, 1984). When counselling an athlete, it is important to allow them to express their feelings and to not contradict them. "It is time well spent, for if the athlete's mental attitude is sour, the outcome will be retarded." (Faris, 1985, p. 549). Staying involved with one's sport in some capacity, has also been suggested to help alleviate much of the loss associated with being sidelined with an injury (Massimo, 1985; Salisbury, 1984).

One can provide the injured athlete with the best care possible, both physical and psychological, but for best results, it is ultimately up to the athlete to take responsibility for his or her own well being and commitment to the sometimes very lengthy rehabilitation process. "Trainers must educate all of their injured charges to understand that rehabilitation and full recovery are a cooperative venture, with major responsibility resting on the athlete's shoulders." (Arnheim, 1985, p. 207).

Psychological Techniques Towards Recovery.

Besides the physical work required from the athlete in injury rehabilitation, there are specific mental activities an athlete can pursue that are felt to have the capacity to enhance recovery, in much the same way that mental activities enhance athletic performance. Part of the purpose of this study is to determine whether faster healing athletes draw upon these types of activities more than slower healing athletes.

COMMITMENT.

The first step towards recovery is commitment (Faris, 1985). It takes persistence and patience to attain full potential and this applies to full recovery from injury. Profiles of highly successful people show commitment as a necessary element (Orlick & Partington, 1986; Schuller, 1973).

GOAL SETTING.

Goal setting is another necessary ingredient for high level achievement. It has become an integral part of virtually every Sport Psychology program. While the ultimate goal in injury rehabilitation may be clearly evident, it is important to set many realistic intermediate goals to make effective progress. By setting realistic short term goals, an athlete is better able to maintain confidence and a sense that progress is being made (Crossman, 1986; Faris, 1985; Massimo, 1985; Rotella & Heyman, 1986; Taylor, 1985; Steadman, 1982).

ATTITUDE.

Once having set goals, it is important to believe that they may be accomplished. This can be difficult in the longer rehabilitations where the end can seem so far off, or not be seen at all. The quality of recovery depends on maintaining the proper attitude (Arnheim, 1985; Dunn, 1983). "Athletes must be made to realize that recovery depends on their positive attitudes, as well as on the physiological healing processes and that they can aid recovery by means of conscientious and persistent effort." (Arnheim, 1985, p. 216). While one cannot change the fact that one is injured, and may be facing a lengthy rehabilitation process, one can change the way he or she thinks about it. Botterill suggests that rather than using adjectives, verbs can be used to gain a better perspective e.g. "it's not that you're depressed, but that you're depressing. . . . People have a choice of what they think, why not just think positive; why be depressing, when you could be 'tennisning'?" (C. Botterill, personal communication, October 21, 1986). He maintains that, rather than thinking about all that has gone wrong, and how one's life is disrupted due to the injury, it is more conducive to focus on the positive. Dunn (1983) has adapted the following prescription for achieving goals from Dr. Schwartz's book, *The Magic of Thinking Big* (Schwartz, 1981):

1. Refuse to talk negatively about health. A person may receive a little sympathy but will never get respect or loyalty by complaining. This is particularly true in athletics.
2. Refuse to worry about poor health. Worry is a negative emotion and fear of ill health or injury in athletics often results in injury or illness due to unconscious adjustment in activity.

3. Be genuinely grateful of good health. This will help keep a person's thoughts focused on the positive aspects of their health.
4. Finally, a person should understand that the body responds to its own needs. Very gradual exercise, not in excess, is an important tool in rehabilitation. (Dunn, 1983, p. 34).

SELF-TALK.

Monitoring one's inner dialogue can be effective in taking control of negative thoughts. According to Rotella (1986) and Salisbury (1984), negative self talk may be purged with practice. This is done by first planning to think in positive terms, and secondly, by responding to negative thoughts that may still occur, as a cue to switch to a positive thought.

PHYSICAL ACTIVITY.

When possible, the athlete should be encouraged to remain physically active in an alternative activity (providing it does not interfere with the recovery process). Aside from the fitness aspect - staying active has several benefits: Dissipating the excess energy resulting from the sudden drop from training; maintenance of a sense of control; stress reduction; and keeping up self-image (Crossman, 1986; Salisbury, 1984; Steadman, 1982; Willis, 1983).

RELAXATION.

For those whose injury precludes any form of physical activity, meditation or relaxation training is recommended "to cope with the anxiety and depression that accompany exercise deprivation." (Massimo, 1985, p. 69). Staying loose and relaxed (as opposed to tense) has the added advantage of facilitating recovery. When the body is more relaxed, blood circulation is enhanced. The greater the blood flow, the faster injured tissues are repaired (Benson, 1975; Bresler, 1984a, 1984b). As one's tension level may increase due to the stress of being injured, especially in the injured area, it is important to have an effective stress management strategy in place to enhance recovery (C. Botterill, personal communication, October 21, 1986).

Swearingen, Orthopedic Surgeon and clinical instructor at the University of Colorado School of Medicine, sees many skiing injuries which tend to fall into the 'severe' category. He employs mental techniques to lower activation level right in the emergency room in the attempt to couple the injury with a state I consider conducive to body rest and healing." (Swearingen, 1984, p. 102). Following treatment at the hospital, Swearingen then instructs his patients in meditation. He draws upon the work of Benson (1975) on relaxation, believing that the state of rest generated through meditation is conducive to healing (Swearingen, 1984).

MENTAL IMAGERY.

Since the injured athlete is unable to practice physically, mental practice becomes that much more important if one is going to maintain their level of competence. Imagery can be an effective tool in this regard. Not only does it provide a medium by which to rehearse one's skills in sport, but it also provides an opportunity to prepare for situations that one rarely encounters in physical practice or competition. With imagery practice, one can be better prepared to cope with any number of situations, and in this way, retain

confidence in one's ability and dissipate any lingering fears upon return to competition (Rotella & Heyman, 1986).

Imagery can be used in rehabilitation in the following ways:

1. To visualize the healing taking place to the injured area internally (Arnheim, 1985; Rotella & Heyman, 1986; Swearingen, 1984).
2. To visualize both returning to competition and performing at one's best (Dunn, 1983; Rotella & Heyman, 1986).
3. To visualize effectively moving through specific situations that put the most demand on the injured area (Taylor, 1985).
4. To image individual skills required for best performance - to stay sharp mentally.
5. To maintain the 'feel' that characterizes best performances (Orlick & Partington, 1986).
6. To practice 'emotive rehearsal' which involves rehearsing feeling positive, enthusiastic, and confident about returning to training and competition, as well as rehearsing thoughts of those around showing admiration for those efforts (Rotella & Heyman, 1986).

Arnheim (1985) and Swearingen (1984), both medical practitioners who draw upon the mind's capacity to heal, explain healing imagery as follows:

It is important that the athlete be educated about the physiological process of healing. Once the healing process is understood, the athlete is instructed to imagine it taking place during therapy and throughout the day. If an infection is being fought, the body's phagocytes can be imagined as "Pac Men" gobbling up infectious material. When tissue is torn, clot formation and organization can be imagined, followed by tissue regeneration and healing. Whether healing is speeded up in this manner has not been scientifically proven at this time. However, it does help the athlete psychologically to be part of the process and to take major responsibility for rehabilitation (Arnheim, 1985, p. 217).

{Swearingen draws} pictures depicting the four stages of the healing process - clot formation around the fracture, the change of the clot into fibrous tissue lattice, calcium crystallization on the latticework, and restructuring of new bone around the fracture site. . . . My impression is that since I adopted this approach {i.e. meditation and visualization}, the necessary time in the cast and the morbidity during the healing process have both been significantly reduced. (Swearingen, 1984, p. 104).

Once full recovery has been attained, fear of reinjury may hold an athlete back. Such fear results in tension in the formerly injured area, which contributes to the actual possibility of reinjury. A combination of relaxation and imagery (Systematic Desensitization) has been reported useful in counteracting fear of reinjury (Nideffer, 1976, 1983; Rotella & Campbell, 1983). It is based on the principle that it is impossible to be both relaxed and anxious at the same time. After first identifying the fear, the athlete will then, using a relaxation technique, enter a relaxed state at which time they will then

visualize the situation they are fearful of. In this way the anxiety provoking scenario is associated with the relaxed state. Case studies support the effectiveness of this practice (Nideffer, 1976; Rotella & Campbell, 1983).

SUMMARY. While there is little empirical support for some of the procedures mentioned in this paper, there is a plethora of anecdotal evidence which suggests that athletes who are very determined and positive about rehabilitation, as well as being able to imagine or 'see' their recovery and successful resumption of their sport activity, fare much better than those with negative outlooks.

BEHAVIORAL MEDICINE LITERATURE

The review of Behavioral Medicine literature relevant to healing has been divided into six main sections:

1. Mind/Body Orientation - a historical perspective on the use of the mind in healing.
2. Psychosomatic Research - research on psychological factors in the etiology and recovery from disease.
3. Biofeedback and Placebo Research - evidence of biofeedback and placebo effectiveness.
4. Mechanisms of Biofeedback and Placebo - suggested mechanisms in the mind which trigger the biofeedback and placebo effects.
5. Mediating Factors - psychosocial factors which mediate the effects of psychologically based interventions.
6. Mind/Body Regulation - psychologically based techniques to promote health and healing.

Mind/Body Orientation.

The use of the mind in healing, such as visualization, is far from a new idea. Samuels and Samuels suggest that "in fact, visualization may be the most ancient healing technique used by primitive man." (Samuels & Samuels, 1975, p. 209). According to Shamanistic philosophy, illness represents the soul's disharmony with the body. When ill, a Shaman was hired to perform spiritual rituals which enabled the sick person to visualize him or herself as regaining harmony and returning to good health. Egyptian followers of Hermes believed "everything is mind {and} disease was thought to be cured by visualizing perfect health." (Samuels & Samuels, 1975, p. 30). Many other ancient cultures such as the ancient Greeks (e.g. Plato and Aristotle), and ancient Indian and Oriental civilizations (e.g. Hindus and Buddhists) are known to have used visualization in various forms for healing. Some healing involved invoking the power of the gods through dreams and visions, other forms of healing drew upon spiritual rituals which trigger the healing images. They believed that through meditation and visualization, one could reach the

spiritual center which formed the Universe. These philosophies believed in the primacy of spirit over matter, of mind over body; they believed that matter is a manifestation of spirit. They believed that visualizations manifest themselves as health or disease in the physical body.(Samuels & Samuels, 1975, p. 216).

This belief continued for many centuries. The renowned 16th century Swiss alchemist and physician Paracelcus said that "the power, of the imagination is a great factor in medicine. It may produce diseases in man and it may cure them."(Hartmann, 1973, p. 129).

The above philosophy, however, was soon to be supplanted by Cartesian mind/body dualism during Descartes' time. "Society progressively delegated to the physician authority over the body below the neck, to the psychiatrist and psychologist the body above the neck, and to the clergy anything outside the body."(Peper, Ancoli, & Quinn, 1979, p. 1).

The current trend in medical practice is to return to the notion of mind and body integration, hence the terms "Integral Medicine", or "Behavioral Medicine", or "Health Psychology". The jumping off point towards this return is suggested to have been Cannon's principle of homeostasis (Cannon, 1932). This principle stipulates that the body and brain are in a constant process of self monitoring to maintain a certain level of balance. If imbalance occurs, the mind or body will give a signal such as physical or mental disorders. Tursky and Schwartz (1986) explain homeostasis as "the process whereby the brain and body interact in mutual regulation to maintain the internal milieu at critical levels when faced with environmental stress. This stability requires multiple levels of self-regulation between brain and body."(Tursky and Schwartz, 1986, p. 444).

Green, Green and Walters (1979) have further postulated a "psychophysiological principle" similar to that found in basic yoga principles that goes as follows:

Every change in the physiological state is accompanied by an appropriate change in the mental-emotional state, conscious or unconscious, and conversely, every change in the mental-emotional state, conscious or unconscious, is accompanied by an appropriate change in the physiological state.(Green, Green, & Walters, 1979, p. 132).

Gordon and Fadiman (1984) have stipulated what they consider to be the "Ground Rules For Integral Medicine" among which are:

1. Integral practitioners recognize that distinctions between body, mind, and spirit are peculiar to the last several hundred years of Western thought and that all state of disease and health are at once physical, mental, and spiritual.
2. Integral practitioners regard their clients as active partners in diagnosis and treatment, as well as in health maintenance. . . . to mobilize their own physical and mental powers to promote the healing process.
3. Integral practitioners treat people, not illness.(Gordon & Fadiman, 1984, p. 7-10).

This final point has become a theme among progressive medical practitioners, who report that if it is followed, better results may be obtained. In the book *Getting Well Again*, the authors suggest that:

one of the greatest advances in modern medicine, . . . is the new vision that doctors and others are gaining in regard to the amount of control a person may learn to exert over the mental processes that influence a wide variety of physical processes. (Simonton, Matthews-Simonton, & Creighton, 1978, p. 27).

Psychosomatic Research.

ETIOLOGY. The common element of most psychosomatic problems is stress. Benson (1975) defines stress as "environmental conditions that require behavioral adjustment." (p. 59). This means that any change that one encounters in life, whether positive or negative, which requires one to change in any way is considered a stressor.

Research into the relationship between stress and illness initiated by Selye (1956) has been increasingly substantiated by many others. These studies indicate that high levels of stress seem to precipitate many diseases, including cancer. The common explanation for this, is that stress, depending on the individual's manner of coping, suppresses the immune system (Bathrop, 1977; Achterberg & Lawlis, 1978; LeShan, 1959, 1966, 1977; Simonton, et.al. 1978; Solomon, 1969; Solomon & Amkrauk, 1972; Solomon & Moos, 1964; Solomon, Amkraut, & Kasper, 1974).

The establishment of the relationship between stress and illness sparked the development of the Social Readjustment Rating Scale (SRRS) by Holmes and Rahe (1967). Numerical values are assigned to stressful life events according to their probable impact on the person. The scale includes both positive as well as negative items which indicated the need for change and adaptation. Using the SRRS, Holmes and Rahe (1967), and later Rahe (1973), were able to predict illness with a high level of statistical accuracy. This was further supported by by Holmes and Masuda (1970), where those participants scoring in the top third reported 90% more illness than those in the bottom third. According to Holmes (1967), if one's total life change score for one year is over 300, one has an almost 80% chance of becoming sick in the near future; if the score is between 200 and 299, one's chances of sickness are reduced to 50%; and if 140 to 199, there is a 37% chance of illness. What is also significant however, is that not all those who score high on stress levels become sick. One's coping mechanisms can mediate the effects of stress. Therefore, stress may only predispose a person to illness. If the stress can somehow be dissipated, then the person may avoid an illness, however, if they cannot (or do not), then the risk is much greater.

Type 'A' personalities, defined as 'compulsive strivers' and perfectionists, have also been identified as being prime candidates for heart disease, hypertension and related syndromes (Friedman & Rosenman, 1974). This term was established by Dunbar (1947) who was the first to make the association between Type A personalities and heart attack victims.

Thus, the research indicates that when one is overloaded with stress without giving one's body a chance to restore itself, he or she becomes susceptible to the variety of psychophysical complaints common today such as high blood pressure, lung disease, ulcers, asthma, arthritis, cancer, depression and many more. It is for this reason that practicing an

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effective stress management program such as relaxation is recommended to reverse this process (Benson, 1975; Bresler, 1984a).

PROGNOSIS. The general finding regarding how the mind can influence the course of disease is that attitude plays a paramount role in it. Chances of survival in terminal illness are better with a positive outlook as opposed to negative (Benson, 1984; Simonton & Simonton, 1984). Another characteristic associated with successful outcomes in cancer treatment is having a fighting spirit (Achterberg, Simonton, & Simonton, 1977; Borysenko, 1982). In fact, as well as tending to be highly successful and creative, Achterberg and the Simontons (1977) have found those who overcome the disease are generally:

verbal, confrontive, at times scrappy . . . If more than two of these exceptional patients are in a room together, the air is thick with the contention of their very prominent egos. They have been known to be hostile, compulsive, and demanding upon occasion; rarely are they docile or obsequious.(p. 417).

This is in contrast to the finding that those who are unable to cope and relieve anxiety and depression have the most rapid progression of the disease (Blumberg, 1954). Many studies have indicated that those who survive the shortest amount of time are typically described as 'despairing and helpless', i.e. poor copers. Hence, developing 'coping skills', which foster a sense of control, has been determined as important for longer survival of cancer patients (Benson, 1984; Weisman, Worden & Sobel, 1980).

In sum, the cancer patients who live the longest are "unusual individuals who do not become anxious or depressed; they are reported to have faith and inner confidence."(Borysenko, 1982, p. 70). These patients " want to be well and plan to be well. They say from the outset that they are going to do all they can to beat the disease."(Benson, 1984, p. 79).

Biofeedback and Placebo Research.

Biofeedback research indicates that people are capable of exerting conscious control over previously thought involuntary functions of the body. The placebo response is also a well documented phenomenon. The Simontons (1978) succinctly conclude that:

The results of countless placebo studies and the increasingly sophisticated use of biofeedback technology have caused the physical orientation of medicine to begin to undergo a change. It is no longer possible to see the body as an object waiting for replacement parts from the factory. Instead we now view the mind and body as an integrated system.(p. 32).

BIOFEEDBACK. In their introduction to the book *Mind/Body Integration: Essential Readings in Biofeedback*, Peper, Ancoli, and Quinn (1979) state that:

The goals of biofeedback are to develop an increased awareness of relevant internal physiological functions, to establish control over these functions, to generalize control from an experimental or clinical setting to everyday life, and to focus attention on mind/body integration.(p. 1).

Green and Green (1977), foremost researchers and developers of biofeedback, explain how it works in their book *Beyond Biofeedback*. By:

enhancing a person's sensitivity to (or bringing to consciousness of) psychophysiological processes ordinarily too subtle to be sensed makes it possible to develop a measure of voluntary control over these processes. . . . Biofeedback training is a tool for learning psychosomatic self-regulation.(p. 42).

Put more simply:

The body will do what you tell it, if you learn how to tell it. The way of telling it involves quietness plus a visualization of what you want the body to do.(Green & Green, 1977, p. 3).

Applications of biofeedback are quite various and numerous. Knowledge of its uses and benefits is constantly growing. The question is more appropriately, where can it not be applied. Research in many laboratories has demonstrated voluntary control over previously thought autonomic functions such as:

blood flow, heart rate, blood pressure, brain waves, gastrointestinal functions, and air flow in bronchial tubes (for asthma control). Increased, and in some cases restored, control in paralyzed or spastic muscles has also been demonstrated.(Green & Green, 1977, p. 43).

The following is a representative sample of research which confirms the above statement. The strongest evidence regarding biofeedback effectiveness is found with the electromyogram (EMG). EMGs are used for neuromuscular conditions (i.e. those involving nerve injury and paralysis), for muscle reeducation, and for muscular relaxation which relieves tension headaches (Blanchard & Young, 1979; Budzynski, Stoyva, & Adler, 1970; Fernando, 1979; Pelletier, 1984).

Thermal biofeedback has been found useful in the treatment of vascular headaches, otherwise known as migraines. By focusing on handwarming, a patient can increase the blood flow to the hands and which consequently relieves the vasodilation causing the migraine (Pelletier, 1984; Sargent, Walters, & Green, 1979). The success of such a practice depends on the timing i.e. at the onset of symptoms, and the tenacity of self-regulation as well as other psychological and physiologic factors. Sargent, et.al. (1979) conclude:

From our clinical experience, it seems all normal individuals have the physiologic capability to produce warmth in their hands. Psychological factors seem to be important in determining success or failure in learning to increase blood flow into hands. Persons who are comfortable with the hypothesis that thoughts and feelings have an influence over bodily processes seemed to learn much faster.(p. 504).

In a study by Schwartz (1981), it was found that individuals could learn to regulate their blood pressure independent of the heart rate, in a single session. This has positive implications for the treatment of hypertension and cardiovascular disorders. Pelletier (1984) considers the results of this study as "one of the most convincing and remarkable demonstrations of the specificity of human self-regulation."(p. 76).

The Greens and Walters (1979) have explored another interesting dimension of biofeedback. They have found that theta brain wave feedback enhances their subjects' capacity for imagery and creativity. This relates somewhat to evidence suggesting relaxation practice enhances one's ability to practice imagery which is discussed later in the chapter.

PLACEBO. The word placebo is derived from Latin meaning 'to please' (Levine & Gordon, 1985). Brody (1985), in a discussion of proposed definitions argues:

that the most adequate definition is one that locates the placebo effect by making explicit reference to healing via the imagination or via symbolism; that relates the placebo effect to other 'general' therapies by virtue of its all-pervasive presence within the healing practice; and that recognizes the triple relativity of the placebo effect to the tenets of the dominant biomedical theory, to physician beliefs, and to patient beliefs. (Brody, 1985, p. 55).

Here, the placebo is distinguished from placebo effect. The first refers to the inert sugar pill called a placebo, while the latter refers to any influence not explained biomedically that affects healing. It is now generally recognized, as most studies show, that the placebo is effective for an average of 35% of treated patients, for a variety of disorders, and sometimes as high as 60% (Brenner, 1984; Brody, 1985). It is further acknowledged that the placebo effects become more pronounced as the suggested potency of the medications increases (White, Tursky & Schwartz, 1985c). The list of dependent variables responsive to placebo manipulations is, like that for biofeedback quite extensive. Examples of some that are relevant to sport are: reaction time, grip strength, pulse rate, blood pressure, pain, short term rote memory, and self-perceptions of relaxation and activation (Ross & Buckalew, 1985). Beneficial placebo effects have also been found on the following medical conditions: cough, mood changes, angina pectoris, headache, seasickness, anxiety, hypertension, status asthmaticus, depression, common cold, lymphosarcoma, gastric motility, dermatitis, and pain symptoms from a variety of sources (White, Tursky, & Schwartz, 1985b).

Mechanisms of Biofeedback and Placebo.

Although the mechanisms through which biofeedback and the placebo become effective may be similar, if not the same, they do diverge in that with biofeedback one is aware of direct control over his or her body, whereas, with the placebo, the individual is unaware. In the latter case, the patient is only aware of the belief that the healing process has begun.

BIOFEEDBACK. The Greens have viewed biofeedback as merely a means to expand our consciousness, and thereby control over our bodies (Green & Green, 1977). Peper, Ancoli and Quinn (1979) conclude that:

in many ways, 'becoming conscious' is what biofeedback is all about. It teaches us that we have the ability to control ourselves and brings into awareness the fact that our mind/body is a system, with changes at any level affecting the entire system. In short, to stay healthy, we learn to listen to our bodies, and therefore our minds.

In this process feedback enhances the autonomy of the individual.
 . . . In fact, health occurs when mind/body/spirit are in synchrony.

.....

In essence, feedback enhances the signal-to-noise ratio so the mind can listen to itself (and since the mind and body are integrated, this is equivalent to the mind listening to the body). Relaxation, autogenic

therapy, meditation, and yoga reduce the noise levels, while electronic feedback signals increase the signal level. In each case, the signal-to-noise ratio is optimized and people are in closer contact with themselves.(p. 563-564).

It has been shown, however, that biofeedback is not a necessary requirement for the mind to influence bodily processes. Since imagery appears to play an important role in eliciting the desired response, imagery alone may accomplish the desired results. In fact, it is in this very manner that the learning generalizes outside of the clinical or laboratory setting (Barabasz & McGeorge, 1978; Green & Green, 1977; Korn & Johnson, 1983; Simonton, et.al., 1978; Schwartz, 1984). Biofeedback merely serves to accelerate the learning process for some people, and perhaps more importantly, to satisfy the sceptics.

PLACEBO EFFECT. The placebo effect has been recorded as far back as in ancient Greek Medicine. It is suggested that the practitioner's treatment triggers an emotional response in the patient which results in healing. "Recent studies of the effect of emotional arousal on endogenous levels of endorphins, interferon, and catecholamines hold promise for elucidating the connecting links in the postulated psychosomatic chain."(Brody, 1985, p. 42). It is henceforth suggested that it is this emotional process which is in effect when a placebo is used.

Another suggestion posits that it is self-fulfilling prophesy and autosuggestion within the patient that triggers a healing response (Brody, 1985; Evans, 1985). Two studies support this contention by showing that patients recover even while fully cognizant of the 'inert' property of the placebo (Park & Covi, 1965; Vogel, Goodwin, & Goodwin, 1980).

A more common explanation for how the placebo works is via symbolic processes. This is not exclusive to the pill form, as there is a symbolic effect in every healing action performed by a medical practitioner. The placebo is a symbol of healing, and this symbol triggers a healing visualization in the patient (Borkovec, 1985; Brody, 1985; Frank, 1961). It is not necessary that the patient be aware of this visualization, or to have knowledge of the precise manner in which the 'real' drug (for which the placebo is an imposter) operates. The procedure can occur much like a computer. We simply push the right button, and out comes a result. It is not necessary for us to comprehend how the computer computed it's often complex functions. Such a suggestion was posited by the Greens (1977) about biofeedback.

There are other possible mechanisms involved in the placebo effect. Evans (1985) suggests the placebo effect may operate by reducing anxiety and thereby having an analgesic effect upon pain suffering. He also suggests that the placebo response may be mediated by endorphins stimulated by the emotional response.

While the actual mechanism of the placebo effect lies within each individual patient, reliance remains on the expertise of practitioners or on the assumed efficacy of the drug (Plotkin, 1985). Furthermore, ethical concerns prevent dispensing placebos. Nevertheless, since the placebo effect occurs independently of a 'placebo', there is still a wealth of knowledge to be gained for use by practitioners to gain optimal health gains for their patients (Brody, 1985). On this point Plotkin (1985) adds:

Clearly, the challenge for the modern healing arts is to develop methods for freeing persons to exercise their self-healing competencies without reducing their sense of self-control and responsibility. From this point of view, it is

not good enough that patients in fact have that control and are exercising it; they must also recognize that fact. The potential benefits and ramifications of developing competence - mobilizing procedures that also enhance our sense of competence, autonomy, and self control are enormous and wide reaching.

.....
Clearly, programs designed for the development of such self-healing skills and attitudes belong in a prominent and early place in our educational and health promoting systems. (Plotkin, 1985, p. 251).

Such 'self-healing' tools currently in existence in the practice of 'Behavioral Medicine' include: Relaxation techniques, self-hypnosis, imagery and visualization techniques, meditation and biofeedback. These techniques and the programs that teach them to patients provide "a format for consciously exercising the self-healing skills that they already possess and that they would otherwise be 'covertly' exercising under the guise of 'placebo treatments' or other treatments in which the therapist is appraised to be the active agent." (Plotkin, 1985, p. 251).

MEDIATING FACTORS.

There are mediating factors not inherent in a treatment which may either enhance or detract from the treatment's effectiveness. Table 1 and Table 2 sum up all the identified factors that contribute to the final effect. Table 1 by (Schwartz, 1983; White, Tursky, & Schwartz, 1985, p.445) lists mediators as levels of processes involved in treatment. "The levels are synthesized using a systems perspective. The processes are organized from micro to macro levels. Note that each higher-numbered process incorporates processes described by the lower-numbered processes." (Schwartz, 1983, p. 36).

Table 7

Nine Major Levels of Processes Linking Biological, Psychological, and Social Systems

1. Homeostatic-cybernetic self-regulation
2. Classical conditioning
3. Operant conditioning
4. Motor skills learning
5. Discrimination training
6. Cognitive-emotional-behavioral-environmental self control
7. Education and insight
8. Motivation and belief
9. Social interactions

Table 2 contains a summary of nominated placebogenic variables devised by White, Tursky and Schwartz (1985), derived from the chapters in their book *Placebo: Theory,*

Research, and Mechanisms. The variables are "schematically ordered from macro to micro levels. This ordering is necessarily arbitrary at this time."(p. 442). While the title of the table implies the list applies to the placebo effect, it may apply to all treatments involving psychological factors as well.

Table 8

Biopsychosocial Determinants of Placebo Response

Cultural context

- A. Belief system
- B. Faith

Environmental milieu

Instruction

Suggestion

Preparation characteristics

Doctor-patient relationship

Patient's expectations and needs

Patient's personality

Psychological state

Symptom severity

Discomfort severity

Anxiety/stress

- A. Central evaluative processes
- B. Cognitive processes

Cognitive schema

Self-schema

Self-control

Expectancy

Outcome expectancy

Efficacy expectations

Operant behavior

Symbolic processes

Imagination

Covert rehearsal

Emotions

Central nervous system influences upon physiology

- A. Immune system
- B. Stress mechanisms
- C. Endogenous opiates

Classical conditioning

Spontaneous remissions

An important factor not clearly evident on the preceding lists, is that of secondary gain that may be derived from an illness or disability. This was briefly alluded to earlier in the Sports Literature Review. An injury or illness provides permission to reduce responsibilities, get time off work, in effect escape. Not only does it provide this release

from pressure, it allows one to do it without guilt or need for justification (Meilman, 1984; Simonton, et.al. 1978). Another concomitant gain from injury or illness is the kind of attention and sympathy such a state receives (Korn & Johnson, 1983; Meilman, 1984; Simonton, et.al. 1978). Meilman (1984), in working with patients with chronic pain, notes that in some cases, a disabling condition is rewarded with financial compensation. "In our own setting, we have found that anyone receiving \$1,000.00 a month or more in compensation payments has little chance of doing well." (Meilman, 1984, p. 7).

It is therefore important to recognize the reinforcement principles that are in operation. Korn and Johnson (1983) note that it is a peculiarity of our system that it tends to 'reward' sick and pain behavior. They suggest that more care should be given to reinforcing 'wellness' or improvement.

The Greens (1977) noticed in their early studies utilizing thermal feedback in relieving migraines (hand-warming), that for a significantly large portion of the subjects, mostly housewives, the migraines served a purpose. That is, the migraine was an 'easy' way out of confronting a problem in their lives. Being free from pain forced some to face difficult issues, while others actually opted to maintain the status quo, i.e. and the pain. Brenner (1984) regards the psychological component of an ailment a serious consideration in treatment, and cautions that if we neglect it, and just treat the symptom, the problem may resurface in either a recurrence or in some other form in the body.

The Simontons and Creighton (1978) have also noticed that for many of their cancer patients, their illness was the only state in which they would/could accept attention from their family. Some of these patients were those who, in emotional terms, tended to always 'give' without 'getting', thus creating a deficit. They were unable to request the attention/affection they needed. Hence, the disease finally allows them to expect and receive the care they lacked or denied previously. This cycle causes them to prefer maintaining their ill status and its concomitant 'benefits', rather than deal with the inadequacies of their lives. It is therefore very important, in fact the Simonton's consider it an integral part of their program, to treat the psychosocial aspect of a patient's disease. For this reason, the Simonton's request that a family member or another individual close to the patient be present throughout their treatment program which includes psychotherapy, use of psychological techniques of relaxation and imagery, as well as any medical treatment indicated.

Because of the serious consideration given secondary gain, the Simontons (1978) suggest an exercise designed to identify all possible benefits to an illness, so that they can then be dealt with accordingly. This exercise has been adapted here to relate to sports injury. The first step is to list all stresses that occurred prior to the injury, and then to next list all the benefits of being injured. Typical benefits are:

1. Permission to skip training or avoid competition.
2. Receiving attention and nurturing e.g. from a physiotherapist/trainer, peers, family etc. that one might otherwise not get.
3. An opportunity to regroup and/or gain a new perspective, to reassess goals etc.
4. An incentive for personal growth.
5. Removal of pressure and expectations, at the same time ascertain sources of motivation of submitting oneself to such pressures.

As can be seen, some of these benefits, while they may retard recovery, may nevertheless be positively adaptive for an individual's 'self-growth' i.e. towards an enhanced quality of life. As mentioned previously, pain or illness can often be a signal from the body that an imbalance has occurred in a person's life. An injury, therefore, may in some cases provide a necessary 'time-out' that the athlete may not have initiated on his or her own.

Any successful psychologically based therapy relies on the patient's willingness to participate in his or her own mental and physical and well being. The patient's belief structure plays a large role in this regard. S. Simonton (1975) states that before commencing with their program, they first try to understand their patient's belief structure, in order to best fit their program to meet the needs and values of the patient. "If we get into a conflict with their beliefs, they constantly fight us, and will almost get worse in spite of us, or to spite us." (p. 40). The Simontons do report encountering substantial resistance. "More than 80 percent of {the patients} refuse to participate in any form of psychotherapy." (Simonton & Simonton, 1975, p. 41). Those who do, demonstrate a higher level of Internal Locus of Control than 'normal' indicating a greater sense of responsibility towards life's outcomes (Achterberg, Simonton, & Simonton, 1977).

Quinn (1979) has drawn up a list of belief categories that are considered important to address. Some of the categories may be interrelated.

1. Beliefs about Psychological Relations to Physiological Processes.
2. Beliefs about the Factors that Determine Health. {That is, whether health is primarily affected by, for example, heredity or genetics, luck or fate, exercise, nutrition etc.} Many people do not, however, recognize the role of emotional stress, their beliefs about themselves (self-concepts), about the world (i.e. hostile or benign), about other people (as threats or resources), and associated attitudes that determine their readiness to respond in a consistently favorable manner to experience.
3. Beliefs about the Causes of One's Particular Expressions of Illness or Disease. {External factors are usually cited here.}
4. Beliefs about the Possibility of Cure or Relief.
5. Beliefs about the Competence and Credibility of the Therapeutic Model and Practitioner.
6. Beliefs about Personal Self-Regulation. (Quinn, 1979, p. 203-204).

Mind/Body Regulation: Psychological Interventions

The foregoing has been a discussion explicating the mind/body relationship. This section features methods towards achieving integration and positive change. Biofeedback, as already discussed, is one such tool, however, there are inherent problems with it i.e. access, cost, transfer of learning etc. The techniques described in the following section have similar benefits and have the advantage of ease of transport (being within one's own body that is). Each element relates to the other elements, and some overlap.

COMMITMENT. Although motivation and a sense of responsibility tie in closely with commitment, without commitment there is not much point in venturing any further. Just as commitment is the single most common element of success in sports (Orlick & Partington, 1986), it is also essential in the practice of any mental technique towards health. One must be willing to accept and trust one's ability to influence the body in order to participate in recovery (Korn & Johnson, 1983).

The Simontons and Creighton (1978) in their chapter "Participating in Your Health", recommend drawing up a list of first how one may have participated in their illness. Such a list would include the number of stresses encountered in recent life. These stresses can be any kind of life event that required change; or stresses from the environment such as pollutants; or, in the case of athletes, they can be related to the training workload. The Simontons and Creighton (1978) are quick to add that "the object of such self-examination is not to invoke guilt, but to identify behaviors to be changed if patients are to live full and healthy lives." (p. 105). In fact, they have noticed that those who recover from cancer following their program lead much more satisfying lives than previous to the disease onset, i.e. the process of self-examination and change that the illness inspired led to an increase in quality of life.

GOAL SETTING. Like commitment, setting goals, daily, weekly, monthly etc. is integral to high achievement. It is also generally recommended to set both minimal and ideal standards and all the steps required towards reaching them. Just as goal setting is an important element in any Sport Psychology program, so is it in recovering optimal health as well.

In *Getting Well Again* (Simonton, et al., 1978), the authors state that the purpose of goal setting, or "Creating the Future", is fourfold:

1. As an act of commitment to recovery.
2. Indicates confidence in ability to achieve them.
3. Indicates a stance of control and promotes a positive self-image. It is important to maintain an attitude of control over the rehabilitation process (i.e. having a high internal locus of control?)
4. Provides a focus on which to direct energy rather than lamenting the illness or injury (p. 171-184).

To enhance internalization of goals, imagery of the goals being met i.e. 'end-result imagery' or 'affirmation imagery' is recommended (Korn & Johnson, 1983; Simonton, et al., 1978). The procedure for this type of imagery described in *Getting Well Again* (Simonton, et al., 1978), is adapted here for recovery from injury rather than cancer. It goes as follows:

1. Select a goal.
2. Relax.
3. See yourself with the goal already met.
4. Imagine, with as many details as possible, the feelings you would have having reached your goal.

5. See the response of others close to you regarding your achievement.
6. Go over the steps it took to reach your goal and experience satisfaction at each level.
7. Allow yourself to feel happy about reaching your goal.
8. Gradually come back to the present.
9. And then open your eyes and commence action on that first step.

For those who have difficulty seeing their goals being achieved, or who get negative images, it is suggested they stop and acknowledge their doubts and fears, and then to make a list of all the positive attributes that will enable reaching the goal e.g. talent, treatment, tenacity etc., to recognize that they have the tools and are in control. In some cases, cognitive restructuring counselling may be required (Simonton, et.al., 1978).

RELAXATION. Recognizing that there are as many methods of counteracting stress as there are people, practicing relaxation regularly provides an easily taught and effective tool for stress management. Since the stress link to illness and injury has become somewhat well established, it indicates a need for better and more effective methods for coping with it (Benson, 1975; Bresler, 1984a). Aside from the health benefits, relaxation training has other benefits such as enhancing creativity and imagery ability (Green & Green, 1977; Green Green, & Walters, 1979; Patterson, 1979).

Several investigators have reviewed the reported effects of a variety of relaxation techniques such as Transcendental Meditation (TM), autogenic training, progressive relaxation, biofeedback, and hypnosis. They compared findings on the lowering effect on such measures as respiratory rate, oxygen consumption, carbon dioxide elimination, cardiac output, and EEG records. The general conclusion is that there is very little difference in the psychophysiological effects between the various techniques studied. Autogenic Training, developed by the Schultz (1969), seems to have a slight advantage. It is one of the more sophisticated and advanced of all the techniques (Benson, 1975; Bresler, 1984; Korn & Johnson, 1983; Patterson, 1979). Relaxation techniques can, therefore, be discussed in terms of how the body responds, rather than according to each specific technique used. Hence, the coining of the phrase "Relaxation Response" by Benson (1975).

Many studies have documented the health benefits of regular elicitation of the Relaxation Response. It has been effective in reducing blood pressure (Benson, Marzetta, & Rosner, 1973, 1974; Benson, Rosner, Marzetta, & Klemchuk, 1974a, 1974b), in reducing blood lactate level (Beary & Benson, 1974), which has significant implications regarding recovery from the heavy training that many serious athletes engage in. Borysenko (1982) also finds "behavioral interventions based on elicitation of the relaxation response provide a unique facilitation of coping" (p. 80) in cancer patients.

Teaching relaxation techniques has become an integral part of practice in the Behavioral Medicine and Stress Management fields (Benson, 1975; Bresler, 1984a, 1984b; Patterson, 1979; Rossman, 1984). In his work Rossman (1984) has found from his teaching of progressive relaxation, that it relieves a wide variety of stress related syndromes:

- * including tension and migraine headaches, chronic pain syndromes of all types; functional gastrointestinal disturbances; atopic symptoms such as

hayfever, eczema, and asthma; mild hypertension; menstrual dysfunction and symptoms directly attributable to anxiety. . . . It would be difficult, if not impossible, to name the full range of clinical syndromes in which the patient's ability to relax can be beneficial - because it is almost always beneficial, though by no means curative. (Rossman, 1984, p. 242).

Bresler (1984a) also observes:

Many stress researchers believe that appropriate stress management can help cut cholesterol levels and the incidence of high blood pressure and heart attacks.

Although many doctors advise their chronically ill patients to relax, few bother to teach them how to do it. Given what is known about the harmful effects of excessive stress, it seems amazing to me that Americans are not systematically taught how to relax. (Bresler, 1984a, p. 24-25).

Rossman (1984) echoes this last sentiment:

Given the pervasiveness of stress and tension in medical and psychiatric patients and in the "worried well" in modern society, it seems that relaxation skills should be something we all learn in elementary school. (Rossman, 1984, p. 242).

Relaxation practice helps open up the avenues in our minds towards regulating our bodies (Green, et al., 1979). Through such practice we can become more aware of our bodies, more connected. With the addition of imagery, it is also possible to instill physical and behavioral change (Green, et al., 1979; Patterson, 1979; Rossman, 1984; Korn & Johnson, 1983). Following work with biofeedback, such suggestions are now indisputable.

Through the 'inward' direction of our technological efforts, we have discovered that our self-regulatory abilities might extend to the very core of our physiology or at least to biological areas once thought to be uncontrollable, viz., autonomic nervous processes." (Patterson, 1979, p. 198). Regarding their evidence from using biofeedback to monitor the effects of autogenic training the Greens and Walters (1979) also conclude:

Both the literature of autogenic training and our research indicate that psychophysiological processes definitely could be self-regulated, and to allow for the existence of psychosomatic disease without postulating the opposite, psychosomatic health, would be an absurdity. If we can make ourselves sick, then we must also be able to make ourselves well.

Since physicians are saying these days that about 80% of human ailments are psychosomatic in origin, or at least have a psychosomatic component, it seems reasonable to assume that about 80% of our disabilities can be cured, or at least ameliorated, by the use of special training programs for psychosomatic health. (Green, Green & Walters, 1979, p. 126). Where is the limit to this capacity for psychosomatic self-regulation? Nobody knows, but research indicates that the limits lie much further out than was at first suspected. (Green, Green & Walters, 1979, p. 130).

IMAGERY. Before discussing literature about imagery, it should be noted that few programs involving imagery do so without first eliciting in some form the 'relaxation response' to 'quiet' the mind. According to Jaffe and Bresler (1984), "Attaining a state of bodily relaxation is a prerequisite for all work with therapeutic guided imagery, for it provides inhibition of somatic muscle activity and verbal thoughts and allows mental images to become dominant." (Jaffe & Bresler, 1984, p. 61). The usual method is some form of progressive relaxation or meditation, other methods involve hypnosis, and some have even taken advantage of a patient being under anesthesia. It was originally thought that while anesthetized, a patient is totally unaware of the events around them including conversations. However, it has been found, that when hypnotized following surgery, patients can recall what was said during or following surgery. It appears that what is said can influence the patient's recovery in either a positive or negative way, depending on the content (Green & Green, 1977; Korn & Johnson, 1983; Silva, 1977). Pearson (1961) demonstrated that patients receiving positive suggestions about a quick recovery while 'unconscious' i.e. under anesthesia, had an average hospitalization stay of 2.4 days less than the control group.

The Greens (1977) report the successful results of post surgical suggestions by a doctor who attended one of their biofeedback workshops:

After testing reflexes to make certain that the patient was coming to consciousness, he would begin talking in a very low voice, telling the patient how well the operation had gone, how nicely the body had responded, how well the repairs were made. He planted the idea that there would be little pain, and possibly none at all; the tissues would recover very quickly; there would be no infection; the patient would be walking in a very short time. Nurses in intensive care soon noticed that his patients recovered more rapidly than others and asked him to work with other patients too. (Green & Green, 1977, p. 327).

Although the patients of the above doctor tended to have speedier recoveries than others, the use of his somewhat unorthodox procedure stirred up a controversy among the other doctors, and he was eventually forbidden to continue such practice by the medical director of the hospital. It was argued that his procedure was unethical without prior permission from the patient. "One would think that there would be little trouble in getting such permission in advance but the opportunity to do that was denied the doctor, and that potent technique for accelerating healing was discontinued in that hospital." (Green & Green, 1977, p. 328).

The preceding evidence suggests the programability of the unconscious for promoting the healing process. While being under anesthesia or hypnosis may be efficient in accessing the unconscious, using relaxation and imagery offers a similarly effective method which is more practical.

The use of imagery in healing has long been accepted by followers of Eastern philosophies. These philosophies are sometimes considered too esoteric for the average Westerner. Jose Silva, founder of the Silva Mind Control Method, responds in reference to the above, "what could be more stranger and more esoteric than the powerful prescription drugs with their health threatening side effects?" (Silva, 1977, p. 73).

Silva Mind Control is a commercial program designed to teach people how to expand the powers of their mind. It is, as mentioned in the opening of this section, not at all a novel approach. Silva draws from the Coue method (Coue, 1974) which is based

on two basic principles: "1) We can think of only one thing at a time, and 2) When we concentrate on a thought, the thought becomes true because our bodies transform it into action."(Silva, 1977, p. 61).

Silva's procedure for self-healing has six steps. The first two are essentially getting into a relaxed state. The remainder are:

1. to think in positive terms.
2. see the illness or wound briefly.
3. quickly erase the unhealthy image and replace it with a healthy image, one of well being. Enjoy this image and linger on it.
4. And then conclude with the repetition of the Coue phrase: "Each day, in every way, I am getting better and better."

Silva recommends this procedure be followed at least once a day for about fifteen minutes, and that "there is no 'too much'"(Silva, 1977, p. 75). There are numerous reports of graduates of the Silva Mind Control Method being able to control headaches, asthma, fatigue and high blood pressure.

Simonton adapted "Mind Control" techniques to his treatment of cancer patients. In an address to the 1974 Convention of Mind Control in Boston, he remarked:

You see, I began with the idea that a patient's attitude played a role in his response to any form of treatment and could influence the course of his disease. As I explored this, I found that Mind Control - biofeedback and meditation - concepts gave me a tool to use in teaching the patient how to begin the interaction and become involved with his own health process. I would say that is the most powerful single tool that I have to offer the patient emotionally."(Silva, 1977, p. 81).

The repetitive feature of the Mind Control Method i.e. repetition of Coue's phrase, corresponds to what Benson (1984) calls the "Faith Factor". Benson found that the benefits of practicing his relaxation technique were augmented if one also believed in the technique, and incorporated this belief in the process. Whereas his relaxation method was basically one of meditation, i.e. focus on breathing while repeating any meaningless word or phrase as a 'mental device', he now recommends that this mental device can be more effective if it has some significant positive meaning to the person. While he does not favour any religious philosophy, he does concede that religion conforms easily to this concept. Nevertheless, a person need only repeat whatever they find most personally meaningful.

IMAGERY METHODS. Of those medical practitioners who advocate the use of imagery as an adjunct to medical treatment, their procedures are quite similar. They basically involve:

1. Elicitation of the relaxation response.
2. Imagining the body healing.
3. Seeing the body exactly as one would like it to be.

4. And seeing the body functioning well at desired activities.

Daily practice is generally recommended to attain best results (Jaffe & Bresler, 1984; Korn & Johnson, 1983; Rossman, 1984; Simonton, et.al., 1978). What precisely is to be imaged is determined individually. An image that works for one person, may not be as effective for someone else. For example, among the Simontons' cancer patients, one patient saw her white cells as 'killer sharks' attacking the cancer cells, whereas another saw the white cells as white knights (Simonton, et.al. 1978). The important feature is that one see one's own bodily resources as being powerful and effectual. The Simontons also include suggestions of chemotherapy or radiation treatment being effective, although the emphasis is on one's own body leading the battle towards recovery.

Seeing the healing process can be enhanced by knowing precisely what it looks like physiologically. However, it is not essential that it be realistic, but that it symbolize positive change (Green & Green 1977; Jaffe & Bresler, 1984; Simonton, et.al., 1978). Through imagery of one's body healing, one develops an increased awareness and rapport with it. Some advocate first 'listening to your symptom' before commencing with the healing imagery. One first makes contact with and acknowledges the diseased or injured part before proceeding. This can be an important element, as pain or illness is often the body's signal that something is wrong i.e. disharmony (Gendlin, Grindler, & McGuire, 1984; Jaffe & Bresler, 1984; Rossman, 1984; Simonton, et.al., 1978). If one were to completely deny this, one is not 'listening' to the body's signals, and even though a cure may be effected, the problem may resurface elsewhere if it is not dealt with effectively (Brenner, 1984).

IMAGERY THEORY. While there may be considerable agreement as to the benefits of practicing imagery, there are various explanations regarding how it works. Imagery is generally viewed as a way of programming the body to do what you want it to do. The following is a collection of quotes by prominent researchers in this area discussing how imagery causes change.

By forming an image, a person makes a clear mental statement of what he or she wants to happen. And, by repeating the statement, he or she soon comes to expect that the desired event will indeed occur. As a result of this positive expectation, the person begins to act in ways consistent with achieving the desired result and, in reality, helps to bring it about. (Simonton, et.al., 1978, p. 157).

We visualize what we want to have happen globally and the body converts the command visualization into the individual neural process for execution. The body seems to know what to do if the person knows what is desired.

The body does not seem to care about the scientific accuracy of the command, or about the results per se. It simply carries out commands. Negative, destructive commands are followed, it seems with as much success as positive commands. It is this very fact that gives rise to the peculiar physiological behaviors called psychosomatic diseases. Patient's visualizations of success or failure, sickness or health, and ideas about their body and mind together determine to an important extent what happens to them. (Green & Green, 1977, p. 168-169).

I propose that a major effect of imagery is the making and breaking of connections at biological, psychological, and social levels, and this alters the systems purpose. (Schwartz, 1984, p. 42).

Ley and Freeman (1984) have found in their studies that engaging in imagery causes electrical activation of the right hemisphere as well as leading to elevations of cerebrospinal fluid levels of serotonin metabolites. They conclude: "Thus, imagery might be involved in the disease/healing process by virtue of its activation of the right hemisphere and consequent protection of the left hemisphere from catecholamine depletion." (Ley & Freeman, 1984, p. 62).

EVIDENCE OF THE EFFECTS OF IMAGERY IN HEALING. There are many claims regarding the potential of imagery for therapeutic benefits. However, most claims are based on clinical case studies and are not sufficiently backed by well controlled investigations. The following is a presentation of the evidence, such as it is, that exists to date.

Practitioners have observed that practicing imagery allows the patient to feel a greater sense of control. Imagery can help mediate the effects of stress, as an 'antidote' to feeling helpless (Ley & Freeman, 1984; Simonton & Simonton, 1984).

Korn and Johnson (1983) make the observation from their practice and that of their colleagues that "most surgeons agree that emotional and psychological preparation of the surgical patient is important in determining the outcome of the procedure." (p. 186). Patients respond better when effective communication of the surgical procedure and expectations are made. Anderson and Masur (1983) have reviewed over fifty studies testing the effectiveness of various methods of psychological preparation for invasive medical and dental procedures i.e. surgery, in speed of recovery. The studies include 24 using 'Information Preparatory Approaches' which simply supplied the patients with detailed procedural information regarding their operation. The results indicate that more often than not, having preparatory information has a beneficial impact on outcome. Because of the procedural anomalies in this type of research, it is difficult to make any conclusive statements regarding what kind of information, and in what manner, are best results to be expected.

Seven of the studies examined a variety of brief psychotherapeutic approaches. Here the patients were given an opportunity to explore their feelings and fears, as well as in some cases are provided with emotional support and reassurance. While the results were promising, "the efficacy of brief psychotherapy as a preparatory strategy remains to be demonstrated." (Anderson & Masur, 1983, p. 11).

Sixteen studies used modeling preparatory approaches which involved the viewing of films of other patients undergoing the same procedure as the prospective patients. In some cases, the model was presented as coping very well. Most of the research in this area was with children. The results demonstrate the effectiveness of modeling, however more research is needed to determine the best timing for each age group, as well as greater exploration of the types of models which are most effective for whom.

Fifteen of the studies reviewed utilized behavioral preparatory approaches. These approaches include relaxation, systematic desensitization, and behavior management. While there were procedural problems with some of the studies, particularly the early ones, the results are encouraging. Relaxation training may be beneficial, but it is important to take individual characteristics and preferences into account. The desensitization studies were also

promising. Behavioral instructions and rehearsal also seemed to enhance recovery although it is unclear to what extent the patients used them on their own.

Eight studies involved cognitive-behavioral approaches. These procedures involved use of selective attention, distraction, self talk and stress inoculation including imagery. Cognitive-behavioral approaches yielded the best overall results. However, it is unclear to what extent patients actually practiced the techniques.

Seven studies utilized hypnotic approaches. These contained methodological flaws such as lack of random assignment i.e. mostly case studies, and inadequate statistics i.e. regarding outcome measurement. Nevertheless, the evidence indicates the beneficial utility of hypnosis.

Anderson and Masur (1983) conclude:

Given that potential preparation benefits include the improved well-being of the patient, reduced medical costs, and the fulfillment of legal-ethical requirements, it is surprising that health-care providers are still debating whether such preparation is necessary. . . . Although many hospitals have developed programs for children, they have not provided similar treatments for adults. . . . As physicians and nurses may be unwilling to assume additional job requirements, psychologists can play an important role in the development, testing, and implementation of programs. An interdisciplinary approach is needed, however, to ensure that the programs are optimally effective in design and utilization. (Anderson & Masur, 1983, p. 35).

Studies by Bowers (1966) and Cheek (1961) provide support that mental processes can accelerate the process of wound healing. Korn and Johnson (1983) report many more successful case studies, but admit that more systematic research is needed in this area.

The Simontons and Creighton (1978) report positive results with the use of their relaxation and imagery procedure with patients diagnosed with medically incurable cancer, and given one year to live. Of the original 159 subjects in their study, 63 were still alive two years later. Of these 63, 22.2% had no evidence of cancer, 19.1% showed tumor regression, and 27.1% had stabilized. 31.8%, however, did demonstrate some new tumor growth. Although methodological flaws such as possible sampling bias and non standard procedures suggest the procedure may be effective only for a select population, Hall (1984) states in his review of the above results, that "nonetheless the outcome was quite impressive." (p. 161). The conclusion made from this study was that the relaxation and visualization procedure results in the enhancement of the immune system (Simonton, et.al., 1978). However, no blood measures were taken.

Hall (1983) subsequently attempted to quantify the above conclusion by measuring number of white cells in the blood. He also sought to determine what individual differences may account for certain subjects being more responsive to procedures involving imagery. His study tested the effects of hypnosis plus imagery of the white cells being strong and powerful, devouring the weak and confused germ cells on lymphocyte function. Twenty healthy subjects between the ages of 22 and 85 were used. Hypnotizability on the Stanford Hypnotic Susceptibility Scale, Form C, was used as a covariate. The results showed an increased immune response only for those high on hypnotizability.

Hypnotizability has also been shown to correlate highly with other typically right brain activities involving the imagination such as daydreaming, highly sensitive senses, vivid memories of early experiences before the age of two, psychic and healing experiences. Therefore, having a more developed imagination may lead to greater psychosomatic plasticity (Barber, 1984). Jaffe and Bresler (1984) have also observed that the autonomic nervous system responds better to images rather than words or verbal commands - which are left brain activities. This lends credence to the proverb: 'A picture is worth a thousand words.'

In conclusion, although further systematic research is required, reports on the benefits of imagery on healing have been generally quite positive (McMahon & Sheikh, 1984). There are, however, many problems inherent in such research such as the difficulties of measurement, individual differences in subjects, as well as the many factors listed in Tables 1 and 2. It is an area worthy of greater attention for both researchers and practitioners. The notion that each of us has the capacity to influence our own health and wellbeing with our minds, is far too valuable a resource to overlook. Not only does it make good medical sense, but also good business sense if one considers the astronomical cost of health care in our society.

METHOD

This chapter discusses the methodology followed in this study beginning with an Overview, followed by Selection of the Subjects, Materials, Procedure, and Analysis of the Data.

Overview.

This study was exploratory in nature. It was an attempt to explore and identify psychological characteristics, conditions, or activities that relate to the healing process. Specifically, it sought to identify those psychological factors which may facilitate the speed of recovery from a sports injury and return to previous activity levels.

Selection of the Subjects.

Based upon consultation with several local Sports Medicine specialists and physiotherapists regarding comparability and frequency of various sports injuries, it was determined that the following would be the best choice:

1. Knee Injuries - Medial Collateral Ligament (MCL) sprains, grade II.
2. Ankle Injuries - Anterior Talo Fibular (AS) sprains.

The subjects, are comprised of former patients from the Carleton Sports Medicine Clinic who had one the above mentioned injuries.

Materials.

SPORTS INJURY SURVEY.

The development of the survey (Appendix A) was drawn from two previous studies: 1) *Documenting athlete readiness for the 1984 Olympics, and evaluating sport consulting* (Partington & Orlick, 1986), and 2) "Psychology of the exceptional cancer patient: A description of patients who outlive predicted life expectancies." (Achterberg, Matthews-Simonton, Simonton, 1977). It also included questions on psychosocial factors related to healing identified in the literature review. The survey was designed to elicit information about each athlete's rehabilitation experience. It consists of the following categories of information:

1. Biographical.
2. Physical.
3. Attitudinal.
4. Beliefs.
5. Psychosocial Conditions.
6. Mental Activity.
7. Recommendations.

Procedure.

The athletes were contacted by telephone by the author and an assistant (undergraduate student), and requested to participate in a survey about the sports injury rehabilitation process. If they agreed, they were then asked the questions regarding biographical and physical information about the injury and their sports activities (see Appendix A, Part A). The remainder of the survey was sent to those qualifying according to the following criteria:

1. They must have recovered (question 10a).
2. They must have been minimally active prior to their injury (question 7a), and subsequently returned to their previous activity level (question 7c).
3. They must have undergone physiotherapy (question 12).

Once the above conditions had been met, the qualifying subjects were sent the survey in a stamped self-addressed envelope, while the remaining subjects, i.e. those who did not qualify, were thanked and contact was concluded.

As the study requires use of medical records, each athlete was requested to sign a release form on the front page of the Sports Injury Survey. Confidentiality of the medical records and all interview material was assured.

Analysis of the Data.

Recovery from injury was defined as recovery of 85-90% of function level. This was determined both by self-report, and by the physiotherapist's assessment. Where these

two differ, the physiotherapist's assessment will take precedence providing no other probable physical cause is suspected e.g. meniscus damage. Generally, there was complete agreement.

The athletes were ranked according to their recovery time i.e. the athlete with the fastest recovery was ranked #1, the second fastest - #2 etc.

The data was analyzed statistically using the Multiple Regression procedure using Recovery Time as the Dependent Variable, against the following sets of variables: Attitude, Outlook, Level of Stress, Social Support, Self-Talk, Goal Setting, and Mental Imagery.

A content analysis of the qualitative data generated from the survey was also conducted.

Appendix B
SPORTS INJURY SURVEY

To:

From: Lydia Ievleva
Department of Kinanthropology
University of Ottawa
(613) 828-3380

Thank you for agreeing to participate in this study.

The purpose is to gain a greater understanding about the psychological side of sports injury rehabilitation. This will involve both the use of information from the completed questionnaire, as well as from your injury records. All information will be kept confidential.

If you have any questions, please do not hesitate to call.

Please sign your name below to confirm your interest in participating in this study.

Please answer the questions as honestly and with as much detail as possible. Your contribution will help towards increasing our understanding of the rehabilitation process.

Most of the questions include a scale from 0 to 10. Simply circle the most appropriate number according to the scale provided. Add any additional explanatory comments wherever you feel it would help clarify your answer.

Part A

1. Name:
2. Age/Date of Birth:
3. Phone number:
4. Address:

5. Injury:
6. Sport(s)/Activities:

7. How much time did you spend training or participating in your sport/activity (days/week)?
 - a. before the injury:
 - b. during rehabilitation:
 - c. now:
8. Date of Injury:
9. Date visited doctor:
10. Date of recovery -
 - a. Recovery of 85-90% of function:
 - b. return to previous activity level:
11. What was your degree of functioning?(using percentages i.e. 0-100%, e.g. 50% of former functioning ability)

- a. Upon injury:
 - b. When saw doctor:
 - c. When returned to full participation:
 - d. Now:
12. Did you undergo physiotherapy? If yes, how often?
- a. Days/week:
 - b. How many weeks:

Part B

1. How important is your sport to you? (0-10, 0=not at all important; 10= the most important thing in my life.)

0 1 2 3 4 5 6 7 8 9 10
2. How did you feel about your injury disrupting your sport activity? (0-10, 0=did not bother me at all; 10=extremely unhappy/upset about it.)

0 1 2 3 4 5 6 7 8 9 10
3. How determined were you to get back to your sport(s)/activity(s) as soon as possible? (0-10, 0=not all determined; 10=more determined than for anything else in my life.)

0 1 2 3 4 5 6 7 8 9 10
4. How would you describe your outlook about your recovery? (-5=as negative as could be; +5=as positive as could be.)
 - a. Right after your injury:

-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5
 - b. When you began physiotherapy:

-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5
 - c. Midway of your rehabilitation:

-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5
 - d. Towards the end of your rehabilitation:

-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5

5. How do you feel about your rate of recovery? (0-10, 0=very slow; 10=very fast; 5=about average.)

0 1 2 3 4 5 6 7 8 9 10

6. What, if anything, do you think helped you the most to get better?

7. What, if anything, do you think hindered you the most to get better?

8. Do you believe that what you think can affect your healing? (0-10, 0=not at all; 10=absolutely.)

0 1 2 3 4 5 6 7 8 9 10

If so, how do you think this happens?

9. What was the level of stress in your life during your recovery period? (0-10, 0=no stress at all; 10=under extraordinary amount of stress)

0 1 2 3 4 5 6 7 8 9 10

Please explain:

10. Overall, how much control did you feel you had over the stress? (0-10, 0=absolutely no control; 10=totally within my control)

0 1 2 3 4 5 6 7 8 9 10

Please explain:

11. How was your health generally during your recovery period?

12. Did you get much support from people during your recovery such as from friends and family, coach, teammates, etc.? (0-10, 0=no support at all; 10=allot of support.)

0 1 2 3 4 5 6 7 8 9 10

Please describe the kind of support you had, if any, and from whom:

13.

- a. How often did you talk or did people ask you about your injury? Please specify times per day/week/or month.

- b. Please describe how you responded:

- c. To what extent did you talk about how the injury happened in comparison to how your recovery was going? e.g. 50/50, 60/40 etc.

14. Did you ever find yourself "talking" to yourself about your injury?

- a. If so, how often? (0-10, 0=never; 10=all the time.)

0 1 2 3 4 5 6 7 8 9 10

What did you usually say to yourself?

- b. To what extent was this self-talk positive in comparison to negative i.e. % positive/% negative? e.g. 50/50, 40/60, etc.

15. Did you have any thoughts, imaginings, or worries about reinjury? Please explain:

16. Did you set any daily goals for recovery? (0-10, 0=never; 10=every day.):

0 1 2 3 4 5 6 7 8 9 10

Please provide examples:

17. Did you set any longterm goals for recovery? (0-10, 0-not at all, 10-very much so.):

0 1 2 3 4 5 6 7 8 9 10

Examples:

18. Did you set any goals about your return to sports? If so, to what extent (0-10, 0-not at all, 10-very much so.):

0 1 2 3 4 5 6 7 8 9 10

Examples:

19. Many athletes prepare for their sport by "mentally rehearsing" events, routines, or plays. This is in addition to their physical and technical training. Some plan this kind of "rehearsal" practice, that is they schedule pre-planned 15-20 minute sessions for themselves before going to sleep, or prior to going out to train and practice. For other athletes, this "mental rehearsal" practice just seems to happen to them, almost like daydreaming. Such athletes seem to slip into these performance daydreams almost anywhere and anytime, such as while driving to the training or competition site. We call both the pre-planned mental practice sessions, and the performance daydreaming as "mental imagery". During mental imagery, some athletes "see" what they have to do, others "feel" the performance, and still others both see and feel their sport activities.

- a. Did you ever do any mental imagery about your sport before your injury? (0-10, 0-never, 10-alot.)

0 1 2 3 4 5 6 7 8 9 10

Examples:

20. Did you ever do mental imagery, or visualize about your recovery?(0-10, 0-never, 10-all the time.)

0 1 2 3 4 5 6 7 8 9 10

If yes,

- a. did you do any healing imagery, where you tried to see or feel the body parts heal? (0-10, 0=never; 10=all the time.):

0 1 2 3 4 5 6 7 8 9 10

Please describe your imagery:

- i. How often did you do it? # times/day: #
days/week:

- ii. How did you experience the 'healing imagery'?

- 1) Did you actually 'feel' or sense healing take place? e.g. increased blood flow, tissue bonding etc. 0=no sensation; 10=strong sensation of healing; or never feel that way.)

0 1 2 3 4 5 6 7 8 9 10

- 2) Did you "see" the healing taking place as if you are viewing the healing? (0-10, 0=no view; 10=very vivid view; or never view myself in that way.)

0 1 2 3 4 5 6 7 8 9 10

- 3) In your healing mental imagery, can you direct or control the picture or feeling which you want, that is, is it easy or difficult to feel and 'see' yourself being as you want to be? (0-10, 0=impossible to make it happen; 10=very easy to direct/control.)

0 1 2 3 4 5 6 7 8 9 10

- b. Did you do any imagery during physio., of physio. promoting recovery, seeing and feeling recovery? (0-10, 0=never; 10=all the time.):

0 1 2 3 4 5 6 7 8 9 10

Please describe your imagery:

- c. Did you do any imagery trying to imagine yourself totally recovered and performing your sport well again? (0-10, 0=never; 10=all the time.):

0 1 2 3 4 5 6 7 8 9 10

Please describe your imagery:

- i. When did you do it?
- ii. Was it preplanned, or did it just happen?
- iii. # of times/day:
- iv. # of minutes/day:
- v. # of days/week:
- vi. When you do performance imagery, how do you experience the 'imagery'?

- 1) Do you have an *inside view* - seeing what you actually see when you are doing what you imagine? (0-10, 0=no inside view; 10=vivid, inside view, like being there; or never view myself that way.)

0 1 2 3 4 5 6 7 8 9 10

- 2) Do you have an *outside view* - as if you are watching yourself on video? (0-10, 0=no video picture; 10=vivid video image; or never view myself in that way.)

0 1 2 3 4 5 6 7 8 9 10

- 3) Do you *feel* the actions and sensations as if you are actually experiencing them? (0-10, 0=no feel at all; 10=as if actually experiencing them)

0 1 2 3 4 5 6 7 8 9 10

- vii. In your performance imagery, can you direct or control the picture or feeling which you want. That is, is it easy or difficult to feel and 'see' yourself as you want to be? (0-10, 0=impossible to make it happen; 10=very easy to direct/control.)

0 1 2 3 4 5 6 7 8 9 10

21. Did you ever replay your injury? If yes, how often?

22. Some athletes find that the 'time out' that an injury provides actually serves a positive function in their sport and life. That is, valuable lessons are learned, or a new perspective is attained which contribute towards future achievement. Although noone would wish to have an injury, it is sometimes viewed as a beneficial experience, an opportunity that may otherwise not have been taken. Did you find this to be the case for you? If so, please explain.
23. What sort of advice would you give another athlete with the same injury as you had to enhance their recovery?
24. What would you recommend others do to help an injured athlete during rehabilitation?
25. Are there any additional comments you would like to make about your injury rehabilitation experience?

Thanks for your cooperation. If you are interested in seeing a summary of the results from this survey, I will send you a copy. Please indicate your interest by circling either the "Yes" or "No" below.

Yes

No

Comments:

Appendix C

DESCRIPTIVE STATISTICS FOR EACH QUESTION AND VARIABLE

The following are the descriptive statistics for all the questions in the survey with a numerical score, plus the combinations used in the statistical analysis of the variables tested. The capitalized items with the * symbol indicate the data which were used in the regression procedures.

	SUBJECTS					
	ALL		FAST		SLOW	
	\bar{x}	s.d.	\bar{x}	s.d.	\bar{x}	s.d.
1. Commitment	7.2	1.4	8.4	0.9	7.6	0.8
2. Disruption	8.1	2.1	10.0	0.0	8.4	1.4
3. Determination	7.9	1.7	9.0	1.2	8.1	1.1
* ATTITUDE (Total 1-3)	23.3	4.1	27.4	1.8	24.3	1.8
4. * OUTLOOK (Total a-d)	10.5	7.7	12.3	8.3	7.6	8.1
a) Initially	1.4	2.8	1.6	3.8	0.5	2.8
b) Beginning of physio.	2.4	2.7	3.2	3.5	1.6	2.6
c) Midway of rehab.	2.9	2.0	3.0	2.4	2.3	2.1
d) Towards end	3.8	1.6	4.4	0.9	3.2	1.3
5. Recovery Rate Perception	5.0	2.7	5.6	2.3	3.7	2.7
8. Mind/Body	8.0	1.6	8.4	1.5	7.7	1.3
9. Level of Stress	5.2	2.9	5.0	4.2	5.4	3.4
10. Control over Stress	6.5	2.7	7.8	1.5	6.1	2.7
* CONTROL - STRESS (10-9)	1.1	4.1	2.0	4.3	0.7	4.6
12. * SUPPORT	7.9	2.2	8.0	2.1	8.1	2.3
13. % Positive Talk	45.4	20.4	48.8	16.5	37.0	22.1

	SUBJECTS					
	ALL		FAST		SLOW	
	\bar{x}	s.d.	\bar{x}	s.d.	\bar{x}	s.d.
14. * POSITIVE SELF-TALK	4.0	4.0	8.7	3.6	2.7	3.6
a) Self-Talk frequency	2.7	3.2	5.8	4.2	2.3	3.2
b) % Positive Self-Talk	54.7	19.1	54.0	13.2	40.0	8.2
16. Daily Goals	4.5	3.9	8.2	1.2	3.2	3.3
17. Longterm Goals	6.0	3.9	9.0	1.6	4.7	3.2
18. Sports Goals	6.9	3.7	10.0	0.0	6.9	2.9
* GOAL SETTING (Total 16-18)	17.4	10.1	27.2	2.0	14.8	7.1
19. Imagery before injury	5.7	3.7	7.0	4.2	4.9	2.9
29. General Recovery Imagery	4.0	3.6	6.5	4.1	4.9	2.9
a) * HEALING IMAGERY	2.6	3.4	5.3	4.9	2.2	3.0
i. Extent of 'feel'	1.3	2.3	3.2	3.3	1.0	2.5
ii. Extent of 'seeing'	1.9	3.0	2.4	3.9	1.9	2.8
iii. Extent of 'control'	2.6	3.4	4.1	3.8	3.1	2.5
b) Imagery of Physiotherapy	2.4	3.6	3.7	4.3	3.1	3.6
c) Imagery of Sport	5.0	3.9	5.5	4.5	5.6	2.8
i. Extent of 'inside' view	3.5	3.9	3.8	4.8	3.0	3.6
ii. Extent of 'outside' view	5.6	4.1	3.5	4.8	5.2	4.4
iii. Extent of 'feel'	4.7	3.5	4.0	4.7	4.2	3.0
iv. Extent of control	6.3	3.3	5.8	4.6	5.7	3.3

Appendix D

PROFILE OF EXCEPTIONAL PATIENTS

The following are the verbal responses to the survey questions in *PART B*. Some of the answers have been edited slightly to correct grammar or spelling. This was kept to a minimum to maintain the authenticity of the responses. Unless otherwise indicated, the numbers in brackets, e.g. (10) is the number circled by the respondent on a scale from 0-10.

What helped the most:

- MCL-1: Support from my friends (people I dance with); creative visualization.
- MCL-2: 1) Time, 2) Staying off my leg at the onset of injury, and 3) knowing how to strengthen it through physio.
- AS-1: Rehabilitation.
- AS-2: To make myself focus solely on recovering and to set a goal on when I'll get back into basketball. I decided my goal was a tournament and decided that I want to start. And I did.
- AS-3: Determination and support from my family.
- AS-4: The desire to return to action.

What hindered the most:

- MCL-1: Having to go back to dancing after one week.
- MCL-2: Not starting physio sooner.
- AS-1: Trying to push myself.
- AS-2: Was the fact that I had to lug around that cast. I knew I was injured, but the cast was a constant reminder.
- AS-3: Nothing.
- AS-4: Lack of patience.

Belief in thinking affecting healing:

- MCL-1: (10) My thoughts and the energy in them create my reality.
- MCL-2: (10) I believe that what I think effects how I feel towards something and can set it in motion, an attitude - if positive, I can take positive action. This relieves unnecessary stress about it.
- AS-1: (7) If you have a negative attitude.
- AS-2: (10*) You must always have a positive attitude towards your injury because if you don't this will just hinder your recovery. it is very hard at times, but you must be able to overcome anything.
- AS-3: (7) By thinking positive.
- AS-4: (8) I think if you have a positive attitude, it helps alot in recovery.
- RCT-1: (5) Stress, mental attitude.
- RCT-2: (8) Our minds and bodies are together, not separate; if one is not 'operating' at peak efficiency, the other will not either.
- RCT-3: (10) Chemical imbalances and hormones influence our mental state. The opposite must also be true. A positive self-image will benefit recovery in the same sense that depression can lead to psychosomatic illnesses. Positive thinking gets the juices flowing.

Level of stress and control over stress:

• MCL-1:

Stress: (9) We had an important show a month after my recovery and were still in the creative process

Control: (6) I first thought it was very bad (I first thought the menisque was torn before going to the clinic.). An injury like that can end a dancer's career. My goals in life were threatened and I felt my control over it all was not enough to keep my subconscious from worrying.

Stress: (4) I had courses I had to take and complete, and had trouble getting around (on crutches); plus a family to care for in the usual way.

Control: (8) I just plugged away at what I could manage and friends/family helped me.

• MCL-2:

Stress: (4) I had courses to take and complete and had trouble getting around (crutches), plus a family, to care for in the usual ways.

Control: (8) I just plugged away at what I could manage and friends and family helped me.

- AS-1:

Stress: (7) It just bothered me i couldn't play at 100%

Control: (9)

- AS-2:

Stress: (8-10) I for one thing never want any help doing anything. When I was injured, I walked home. I thought that it was just a strain. But it was torn ligaments. Ha I thought. To answer your question, I was always quick tempered. And always getting mad at people who tried to help. I feel I can do things myself.

Control: (7) Sometimes it is hard to have constant control especially if you're an emotional rollercoaster. All I wanted to do was get better. And do things for myself and get back into basketball.

- AS-3:

Stress: (0)

Control: -

- AS-4:

Stress: (1) I normally have very little stress, so my injury wouldn't make any difference.

Control: (9)

Social Support:

- MCL-1: (10) My friends - took me to the hospital, paid for it all, lent me money, bought me food, took me out, thought about me, imposed hands on my knee, chanted yogic chants, you name it . . .
- MCL-2: (10) Family - helped me around the house; friend - helped me get info/texts from school; professors - understood me missing a few classes.
- AS-1: (8) Friends asking to help me; coach's concern.
- AS-2: (5) I was basically on my own. My parents felt it was stupid that I got hurt. It was my own fault. My teammates were supportive because they felt I was the team. And I hated that (school team). My city team was supportive some what. They all wanted me back.

- AS-3: (10) Family - they did things for me, reassured me that I would be better soon. Friends - my friends included me in things even though I was a 'cripple'.
- AS-4: (7) Many friends called to see how I was doing and wished me well in my recovery.

Talk about the injury (% -/+):

- MCL-1: (60/40) I would inform my friends upon request about my condition (pain, mobility) and mostly about how I felt and what I was discovering about me through this injury.
- MCL-2: (50/50) Just told how it happened.
- AS-1: (40/60) Optimistic
- AS-2: (30/70) With a time period, e.g. I'll be out of my cast in 2-3 weeks. It did bother me when they asked, but I did not show it.
- AS-3: (70/30) I said that at times it hurt, and at times it didn't. I told them I had torn the ligaments very badly and I would be out of my cast in 6 weeks.
- AS-4: (-) I said I strained the ligaments in my ankle.

Self-talk (0-10; % +/-):

- MCL-1: (10; 40/60) I would have a conversation with my other self and ask myself why I had created this situation, where it stemmed from in me, what it made me realize about me and how to go about it to make the most of what could be done . . . it was a hot discussion.
- MCL-2: (0; -).
- AS-1: (7; 60/40) Why didn't I do something different to avoid injury?
- AS-2: (9; 60/40) Tell myself I did not hurt (i.e. that my ankle did not hurt). Tell myself I can do anything. When I had my velcro cast, I took it off and tried to walk. That's a 'no no'. I told myself I can do it. And that I was beating the odds and recovering sooner than normal.
- AS-3: (0; 40/60) {This answer is a bit unclear as they answered '0' first, so where does the 40/60 come from?}
- AS-4: (3; 70/30) More of how I could make sure it doesn't happen again.

Mental Imagery - Healing:

- MCL-1: (10) The work of the blood flowing soothing the tissues, the fibers relaxing, expanding; my breath inhaling health, exhaling pain.
- MCL-2: (0) Not in the sense of actually picturing it, but I could anticipate it.
- AS-1: (7) I could actually feel myself walking without pain; felt that I really could do anything.
- AS-2: (5) At times I tried to make myself see my injury healing.

Mental Imagery - of physio. promoting recovery:

- MCL-1: (10) I would feel the ligament getting stronger, firmer.
- MCL-2: (1) I anticipated - could visualize full movement in my leg.
- AS-1: (8) That I could actually feel no pain when walking.

Mental Imagery - returning to sport fully recovered:

- MCL-1: (9) I would do the show (material) in my head on a stage.
- MCL-2: (4) I can imagine trying to ski again - wondering if I can be relaxed about it initially.
- AS-1: (8) Just imagined playing at 100% again.
- AS-2: (10) Playing in a game. That I was the best.

Mental Imagery - replay of injury:

- MCL-1: Not the injury in itself, just the pain, and often it kept creeping back on me . . .
- MCL-2: Yes, I only tried to 'replay' it when asked to describe it to the doctors and physiotherapists.
- AS-1: Yes, not too often.
- AS-2: Yes, I tried not to. When I did I always tried to change it.
- AS-3: Yes, almost every day.
- AS-4: First week only, probably three times a day.

Lessons/benefits from injury experience:

- MCL-1: Yes, I had time to reflect on injuries and the fear of success; the relationship I have with my body and where I was going with this attitude. It made me also realize how important to my health was confidence and trust and how much control I could have on my life. {from # 14. c. . . . My work implies a continuous striving for better performance and spiritual growth, so in a sense, my performance is better because I learn about myself (mind, heart, body) through this injury. . . . }
- MCL-2: What I learned was to really prepare - for me to take lessons - to get back into the sport. I was so ready and could imagine so well enjoying skiing with my family, that I skipped the warm-up (lessons for me) and dove right into the sport and didn't handle a tense stretch very well.
- AS-1: {Yes} It gives you a chance to rest and take a break from your sport.
- AS-2: Yes, in a way I finally realized that I can now visualize my game and have better basketball performances.
- AS-3: {no response}
- AS-4: {no response}

Advice to other athletes with the same injury:

- MCL-1: Creative visualization, support of friends, confidence in themselves, 'talking' to the injury.
- MCL-2: Go to physiotherapy as soon as possible; Stick with the regimen faithfully.
- AS-1: Don't push your injury, make sure it's healed.
- AS-2: That they never feel as if this injury is the last draw. That they find it in their heart what is really important to them. Which is to recover as quickly as possible and return back to the sport. The way to do that is to have a positive attitude and set goals for yourself. Not too too high.
- AS-3: Think positive; don't put too much pressure on it at once; take things slowly.
- AS-4: Have a positive attitude, and work hard for a quick recovery.

Recommendation for others to help an injured athlete

during rehabilitation:

- MCL-1: Be supportive and caring.
- MCL-2: While encouraging the exercises from physio, also speak positively about the recovery and the future in the sport.
- AS-1: Support them.
- AS-2: That they never feel discouraged, and when they begin to feel discouraged, to think of the goals that they set and realize that they are close at hand. And that they should not provoke any setbacks. If they do they must realize that they must get back into the fight frame of mind.
- AS-3: Do as told; don't try to rush your recovery; do things at a slow pace.
- AS-4: The same as above, and listen to your doctor.
- RCT-1: Include in 'team' events, i.e. go to club, or practices.
- RCT-2: Be patient with them.
- RCT-3: Give positive support. Remind them if they slack off. Give them large amounts of cash in small, un-marked bills.

Additional comments

about the injury rehabilitation experience:

- MCL-1: Knowing you can cure yourself makes it harder to accept injuring yourself in the first place . . .
- MCL-2: This survey has prompted me to think more about it.
- AS-1: What your mind can perceive, your heart can conceive. Be the best you can be.
- RCT-3: Yes, I wouldn't mind marrying a physiotherapist. They give great backrubs.

Appendix E

WHAT HELPED THE MOST TO GET BETTER

6. What, if anything, do you think helped you the most to get better?
- MCL-1: Support from my friends (people I dance with); creative-visualization.
 - MCL-2: Time; Staying off my leg at onset of injury; and knowing how to strengthen it through physio.
 - MCL-3: Determination
 - MCL-4: Using the exercise bike in the physiotherapy room at Carleton (degree of motion).
 - MCL-5: Physiotherapist's advice, plus use of removable cast which enabled me to begin therapy earlier.
 - MCL-6: My desire to function at the same level as before the injury.
 - MCL-7: Physio.
 - MCL-8: -
 - MCL-9: Taking physiotherapy, and a desire to recover quickly.
 - MCL-10: Physiotherapy.
 - MCL-11: Observing the young and old people at therapy trying very hard to do their exercises.
 - MCL-12: Attitude and therapy.
 - AS-1: Rehabilitation.
 - AS-2: To make myself focus solely on recovering and to set a goal on when I'll get back into basketball. I decided my goal was a tournament and decided that I want to start. And I did.
 - AS-3: Determination and support from my family.
 - AS-4: The desire to return to action.

- AS-5: Positive attitude.
- AS-6: Determination.
- AS-7: The healing was quick. Credit to doctors I guess.
- AS-8: Physiotherapy.
- AS-9: Exercise.
- AS-10: Therapy and exercises.
- AS-11: Physiotherapy.
- AS-12: My desire to return to my tennis group.
- AS-13: Physiotherapy, and the desire to ski again before the winter was over.
- AS-14: Therapy; ankle brace; ice.
- AS-15: Time; rest (no physical activity, then slowly getting back into activity).
- AS-16: The encouragement from my new coach.
- AS-17: Wanting to play sports again.
- AS-18: Physiotherapy, and knowing it is O.K. to exercise in order to recover from injury.
- AS-19: Having a positive outlook. I knew eventually my foot would get better. Also, the physiotherapy helped since practically after every visit my foot felt better.
- AS-20: My job as a phys. ed. teacher necessitated a 'stick to it' attitude so I could function on a daily basis.

Appendix F

WHAT HINDERED THE MOST

7. What, if anything, do you think hindered you the most get better?
- MCL-1: Having to go back to dancing after one week.
 - MCL-2: Not starting physio sooner.
 - MCL-3: -
 - MCL-4: -
 - MCL-5: Not applicable.
 - MCL-6: Only the injury. O.K., maybe my age!
 - MCL-7: Too active.
 - MCL-8: -
 - MCL-9: Feeling the pain in my knee and knowing how vulnerable it was.
 - MCL-10: Lack of time to do more physiotherapy.
 - MCL-11: Boredom and frustration.
 - MCL-12: -

 - AS-1: Trying to push myself.
 - AS-2: Was the fact that I had to lug around that cast. I knew I was injured, but the cast was a constant reminder.
 - AS-3: Nothing.
 - AS-4: Lack of patience.
 - AS-5: -
 - AS-6: -
 - AS-7: Reinjury - banging it or twisting it!

- AS-8: Re-injury.
- AS-9: Being in a cast for six weeks - too long, the muscles get too weak!
- AS-10: Length of time before starting therapy.
- AS-11: Early activity.
- AS-12: -
- AS-13: Nothing.
- AS-14: Therapy.
- AS-15: Being too active too soon (am contradicting myself, aren't I?) began walking too soon, that is.
- AS-16: The cast I had to wear for three weeks.
- AS-17: Rushed too much.
- AS-18: Fear of reinjury.
- AS-19: -
- AS-20: Being on my feet most of the day.

Appendix G

MIND/BODY

8. Do you believe that what you think can affect your healing? (0-10) If so, how do you think this happens?

- MCL-1: (10) My thoughts and the energy in them create my reality.
- MCL-2: (10) I believe that what I think affects how I feel towards something and can set in motion an attitude - if positive. I can take positive *action*. This relieves unnecessary stress about it.
- MCL-3: (10) If you believe in a goal, you work towards it.
- MCL-4: (10) If you have a positive outlook with regards to your recovery, you will push yourself to a greater extent, i.e. through more pain.
- MCL-5: 5) Positive attitude during rehabilitation gets you through painful and repetitive exercises.
- MCL-6: (8) Positive thinking at worst can't hurt, at best has helped me.
- MCL-7: (7) Negative response.
- MCL-8: (6) If you have a positive outlook, then physio becomes easier to go to regularly.
- MCL-9: (7) By having a positive outlook towards recovering, you try to do your physio as well as possible.
- MCL-10: (8) -
- MCL-11: (10) Mind over matter.
- MCL-12: (9) A positive attitude keeps one trying and only by trying can success in anything be achieved.
- AS-1: (7) If you have a negative attitude
- AS-2: (10*) You must always have a positive attitude towards your injury because if you don't this will just hinder your recovery. it is very hard at times, but you must be able to overcome anything.

- AS-3: (7) By thinking positive.
- AS-4: (8) I think if you have a positive attitude, it helps alot in recovery.
- AS-5: (10) Your attitude reflects on the number of hours you do exercises to rehabilitate yourself.
- AS-6: (10) When one has a negative outlook, things don't happen. But, if you have a positive outlook, things do seem to happen.
- AS-7: (7) I don't know.
- AS-8: (7) I believe a positive attitude promotes quick recovery.
- AS-9: (9) Positive thinking improves your well-being.
- AS-10: (6) You become too dependant on having crutches.
- AS-11: (5) If you have a positive attitude, you'll work harder in rehabilitating yourself.
- AS-12: (8) A positive outlook.
- AS-13: (10) A positive attitude, and the desire for a rapid rehabilitation provides the required motivation. {Also, from Comments at the end of the survey: I think that the psychological attitude, dreams and desires have a great impact on the extent and length of the rehabilitation.}
- AS-14: (0) -
- AS-15: (7) If a positive attitude is present; present activity and anticipation of future levels of fitness encourage a person to take better care of their bodies (injured part).
- AS-16: (9) If you aren't thinking positive about it, you might be lazy and not do your exercises.
- AS-17: (7) ?
- AS-18: (6) Body/mind interconnection; positive outlook affects healing process.
- AS-19: (7) If you think negatively, there is hardly any motivation to make the injury heal. Moping does not help.
- AS-20: (8) A positive outlook allows you to see the small advances, stick to it, and keep your goal in sight!

Note: The responses for the Rotator Cuff Tendonitis (RCT) patients are also included here for interest sake.

- RCT-1: (5) Stress, mental attitude.

- RCT-2: (8) Our minds and bodies are together, not separate; if one is not 'operating' at peak efficiency, the other will not either.
- RCT-3: (10) Chemical imbalances and hormones influence our mental state. The opposite must also be true. A positive self-image will benefit recovery in the same sense that depression can lead to psychosomatic illnesses. Positive thinking gets the juices flowing.
- RCT-4: (5) -
- RCT-5: (10) Yes.
- RCT-6: (8) -
- RCT-7: (5) I feel a more positive attitude helps you put more into your physio exercises etc.
- RCT-8: (5) -
- RCT-9: (10) Positive attitude, helping yourself, doing the right exercises and following directions.
- RCT-10: (6) ?
- RCT-11: (5) Mind affects matter; but the mechanism is too complex for the layman to explain.
- RCT-12: (7) Positive thinking encourages positive actions (self-fulfilling prophesy). 'Mind over matter'.
- RCT-13: (6) -
- RCT-14: (10) A positive attitude will usually result in better compliance with recommended courses of treatment. In addition, a positive outlook may in itself be helpful.
- RCT-15: (5) -

Appendix H

— STRESS AND CONTROL

9. What was the level of stress in your life during your recovery period? (0-10) Please explain. 10. Overall, how much control did you feel you had over the stress? (0-10) Please explain.

• MCL-1:

Stress: (9) We had an important show a month after my recovery and were still in the creative process

Control: (6) I first thought it was very bad (I first thought the menisue was torn before going to the clinic.). An injury like that can end a dancer's career. My goals in life were threatened and I felt my control over it all was not enough to keep my subconscious from worrying.

• MCL-2:

Stress: (4) I had courses to take and complete and had trouble getting around (crutches) plus a family to care for in the usual ways.

Control: (8) I just plugged away at what I could manage and friends/family helped me.

• MCL-3:

Stress: (7) Sports activities lowers stress, so less activities increased stress.

Control: (9) You compensate. I did less physical activities, but more social activities e.g. outings with friends and family.

• MCL-4:

Stress: (7) Final exams at University.

Control: (8) I had lots of time to sit around and study.

• MCL-5:

Stress: (6) I suffer from 10 days of premenstrual stress every month.

Control: (3) Since PMS is a hormonal condition, there is little I can do to control it.

• MCL-6:

Stress: (8) 1) Family wished that I remain at home, not at work (teacher); 2) Cumbersome apparatus; 3) Frustration because of limited mobility - funny looking.

Control: (7) 1) I maintained that I should be as active as I felt was possible; 2) With time, the brace cast worked into my routine; 3) We all got used to it!

• MCL-7:

Stress: (2) -

Control: (2) -

• MCL-8:

Stress: (7) In a bad mood; physical pain because of injury.

Control: (5) I had to be positive and get better fast.

• MCL-9:

Stress: (7) It was stressful in that I couldn't do much of any sports I enjoy, and also I am a hockey referee and lost some extra income because of the injury.

Control: (9) It was stressful not to be able to do many of the things that I wanted to do, but I also knew that it was only a matter of time and that I could occupy some of my time doing other things.

• MCL-10:

Stress: (10) Relocating my business; 6 months behind in my work; had a number of large proposals to complete; short of support personnel.

Control: (2) I took a "TIME:TEXT" course and used their system - it helped a great deal. But I still had a great deal of stress given the demands on me in the allotted time frame.

• MCL-11:

Stress: (0) Just impatient.

Control: (2) -

• MCL-12:

Stress: (2) A cast keeps you relatively inactive for a period of time. I found this frustrating.

Control: (6) -

• AS-1:

Stress: (7) It just bothered me i couldn't play at 100%

Control: (9)

• AS-2:

Stress: (8-10) I for one thing never want any help doing anything. When I was injured, I walked home. I thought that it was just a strain. But it was torn ligaments. Ha I thought. To answer your question, I was always quick tempered. And always getting mad at people who tried to help. I feel I can do things myself.

Control: (7) Sometimes it is hard to have constant control especially if you're an emotional rollercoaster. All I wanted to do was get better. And do things for myself and get back into basketball.

• AS-3:

Stress: (0)

Control: -

:AS-4:

Stress: (1) I normally have very little stress, so my injury wouldn't make any difference.

Control: (9) -

• AS-5:

Stress: (2) The stress did not change in my life.

Control: (10) -

• AS-6:

Stress: (8) Work related stress.

Control: (7) -

• AS-7:

Stress: (4) My normal level of stress due to my work is above average.

Control: (2) The injury did really ~~add any~~ stress.

• AS-8:

Stress: (1) I went on with life as much as I could in the same Manner, if possible.

Control: (10) I felt almost no stress.

- AS-9:

Stress: (4) Too long in cast!

Control (9) I can control my stress. Stress does not bother to a point!

- AS-10:

Stress: (5) Perhaps a little more stress build up than normal. I relieve my frustrations in sport.

Control: (8) I knew I'd be getting better so it helped knowing that.

- AS-11:

Stress: (4) -

Control: (8) I couldn't play tennis with my group, so I enrolled in a French Immersion programme (4 days, 9-3:30)

- AS-12:

Stress: (7) Things were tough at work, and having a cast on one leg, in winter, is very awkward and cumbersome.

Control: (5) Work I could do something about, but the cast was permanent.

- AS-13:

Stress: (5) In pain, could not sleep well.

Control: (0) Pain took over.

- AS-14:

Stress: (7) Marital - between myself and spouse; began building own home.

Control: (5) No control because it involved another person, but control of my reaction to it (which wasn't always successful, but I think I handled it well generally).

- AS-15:

Stress: (1) The new team I went to was very supportive. The coach said that I had already made the team even though I couldn't practice.

Control: (9) I had already made the team.

- AS-16:

Stress: (7) I was very frustrated with how slow the recovery was going.

Control: (6) -

• AS-17:

Stress: (9) Having to cancel some social activities; not being able to walk as before without pain or discomfort; not being able to get as much done as before (in the home and outside). Since I don't have a car, so much of my time is spent getting to and from a place, whether work, running errands, shopping, etc.

Control: (5) I tried not to let the pain and inconvenience get to me; and tried to adjust to the fact that I couldn't get as much done as before, by rationalizing that there was always tomorrow if not everything can be accomplished today.

• AS-18:

Stress: (4) During recovery, I could not participate with house chores (dishes, vacuum, etc.), and the fact alone that I was just sitting around (when I injured myself I had to elevate my leg for two weeks, then wear a cast for two weeks afterwards still keeping my leg elevated) put a lot of pressure on my friend - along with his full-time job and part-time university studies. Also, missing work for three weeks did not help.

Control: (8) I had control because I knew it was just a temporary situation.

• AS-19:

Stress: (7) I've always been active in my job and my recreation. Having to make adjustments caused a fair amount of stress.

Control: (9) Stress can be managed if the source is identified and understood. Mine was very simple.

• AS-20:

Stress: (6) I found the cast very frustrating as I never had one before. I was upset because I missed the basketball season, and I knew I wouldn't be able to start training for football soon enough.

Control: (7) Learned how to cope with injury. I was able to develop more mobility, I was out of cast before exam time which made things easier.

Appendix I
SOCIAL SUPPORT

12. Did you get much support from people during your recovery such as from friends and family, coach, teammates, etc.? (0-10) Please describe the kind of support you had, if any, and from whom.

- MCL-1: (10) My friends - took me to the hospital, paid for it all, lent me money, bought me food, took me out, thought about me, imposed hands on my knee, chanted yogic chants, you name it . . .
- MCL-2: (10) Family - helped me around the house; Friends - helped me get information/texts from school; Professors - understood me missing a few classes.
- MCL-3: (9) More time spent with family; friends would drop in; would go out often in the evenings; encouragement from co-workers.
- MCL-4: (7) Nothing too extensive; parents and friends inquiring about recovery, i.e. how it is feeling.
- MCL-5: (9) Family took over many tasks. Husband helped by driving me everywhere. My supervisor at work lightened my workload. Sports friends offered sympathy and advice.
- MCL-6: (9) All very supportive - but many said to stay home and rest. For me that was not necessary.
- MCL-7: (5) -
- MCL-8: (8) Family helping me out at home; friends, teammates, coaches encouragement.
- MCL-9: (9) My wife and children were very supportive as were my other relatives. My teammates told me they wished I could play. Overall most people I knew were sympathetic.
- MCL-10: (8) Parents - shopping; Room-mate - laundry, meals.
- MCL-11: (10) Family and friends telling me to take it easy and relax.
- MCL-12: (10) Moral support from friends and family; support from family (husband and two children) in chores around the house.

- AS-1: (8) Friends asking to help me; coach's concern.
- AS-2: (5) I was basically on my own. My parents felt it was stupid that I got hurt. It was my own fault. My teammates were supportive because they felt I was the team. And I hated that (school team). My city team was supportive some what. They all wanted me back.
- AS-3: (10) Family - they did things for me, reassured me that I would be better soon. Friends - my friends included me in things even though I was a 'cripple'.
- AS-4: (7) Many friends called to see how I was doing and wished me well in my recovery.
- AS-5: (10) Well my teammates, coaches friends encouraged me to get better soon; told me to do my physio, etc.
- AS-6: (10) Support from my husband and daughter.
- AS-7: (2) Friends helping with things that might be hard.
- AS-8: (6) I got some help from my physiotherapist, my family and my friends.
- AS-9: (6) Mostly from parents and friends!
- AS-10: (8) Good support form family and friends.
- AS-11: (5) People were conscious of my injury and allowed for the fact that I was less than completely mobile.
- AS-12: (8) The girls I played tennis with kept in touch. They assured me that there would be a place for me when I returned. My husband encouraged me to do my exercises.
- AS-13: (10) Family and friends were very helpful and accommodating. Teammates were all hoping for a rapid recovery.
- AS-14: (10) They were my slaves.
- AS-15: (8) Basically allowing me to use vehicle (husband), and take time off (work colleagues/boss). Only a few calls of concern from teammates (co-ed), and expressions of sympathy from friends otherwise.
- AS-16: (10) Coach said I made the team and didn't make me do more than I could. Normal encouragement from friends and family.
- AS-17: (10) From friends (roommates).
- AS-18: (4) Had very little support emotionally form co-workers. They acted as if I had make it all up (my being injured). Lots of family support, over the telephone (since they were too far away to see or help me in person. Friends gave some support and words of encouragement.

- AS-19: (4) My brother and some relatives came to visit me at home, or called to see how I was.
- AS-20: (8) Extra time to do rehab workouts, interest from peers in rehab exercises, understanding from students.

Appendix J

TALK

13. How often did you talk or did people ask you about your injury? Please describe how you responded. (% , -/+)

- MCL-1: (60/40) I would inform my friends upon request about my condition (pain, mobility), and mostly about how I felt and what I was discovering about myself through this injury.
- MCL-2: (50/50) Just told how it happened.
- MCL-3: (40/60) Bad Luck! It happens to the best of us! I'll be back skiing in the spring; Always positive.
- MCL-4: (50/50) Not too bad thanks.
- MCL-5: (90/10 initially, as recovery progressed - 10/90) I tried to describe the humorous side of the accident; I usually responded positively about the rehabilitation.
- MCL-6: (-) Dumb mistake. I fell the wrong way on knees that were getting older, conditions were poor, but look at the attention!
- MCL-7: (80/20) Hurt my ligament while playing football; getting better.
- MCL-8: (75/25) Sympathy.
- MCL-9: (60/40) I told them how I injured it and when I thought it would be better. I also stated that I wished it hadn't happened.
- MCL-10: (80/20) I just explained what happened.
- MCL-11: (90/10) Stupid mistake.
- MCL-12: (50/50) Explained injury; Described therapy and progress.
- AS-1: (40/60) Optimistic.
- AS-2: (35/65) With a time period, e.g. "I'll be out of my cast in 2-3 weeks. It did bother me when they asked, but I did not show it."

- AS-3: (70/30) People asked if it hurt and what I did to it. I said that at times it hurt, and at times it didn't. I told them I had torn the ligaments very badly and I would be out of my cast in 6 weeks.
- AS-4: (-) I said I strained the ligaments in my ankle.
- AS-5: (50/50) I told them how it happened; how long I would be with a cast, and what were the damages.
- AS-6: (50/50) People like to know how it happened. Most of the time I responded with a positive attitude.
- AS-7: (This page was lost)
- AS-8: (70/30) I gave them the briefest description possible.
- AS-9: (-) Usually, I can hardly wait to get back to sports!
- AS-10: (40/60) Simple description with mention of therapy.
- AS-11: (50/50) I was usually negative in response, because recovery was slow and it did get me down at times.
- AS-12: (60/40) Unusual circumstances - it happened in Greece; told how accident happened.
- AS-13: (70/30) Describe how injury happened, and how the healing was going. Explain physio.
- AS-14: (60/40) Every hour on the hour: Positively.
- AS-15: (10/90) Nonchalantly (and secretly satisfied and glad that they expressed sympathy and concern).
- AS-16: (90/10) While I had the cast, I said it was broken. Then afterward I said it was stretched tendons.
- AS-17: (60/40) Didn't really want to keep harping on it.
- AS-18: (60/40) Responded that it was still hurting.
- AS-19: (30/70) It is getting better every day!
- AS-20: (30/70) Positive and detailing the type of exercises.

Appendix K

SELFTALK

14. Did you ever find yourself "talking" to yourself about your injury? If so, how often? (0-10) What did you usually say to yourself? (% , +/-)

- MCL-1: (10; 40/60) I would have a conversation with my other self, and ask myself why I had created this situation, where it stemmed from in me, what it made me realize about myself and how to go about it to make the most of what could be done . . . it was a hot discussion.
- MCL-2: (0; -) -
- MCL-3: (7; 90/10) I want to go spring skiing; I had to work to get my injured leg as strong (or almost) as strong as the other one. I don't want to sit at home on a bright sunny day.
- MCL-4: (2; 80/20) Next year I will be skiing like an old man. It's feeling pretty good.
- MCL-5: (0; -) -
- MCL-6: (1; Nil) Dumb mistake; I wish it hadn't happened.
- MCL-7: (2; 50/50) What a stupid thing to do.
- MCL-8: (9; 40/60) I wish it did not happen; my knee looks like shit; hope I can play like usual soon. Why me?
- MCL-9: (5; 50/50) I would think of how I should have avoided the check that hurt my knee. Also, I would think out loud about recovering.
- MCL-10: (0; -) -
- MCL-11: (0; -) -
- MCL-12: (0; -) -

- AS-1: (7; 60/40) Why didn't I do something different to avoid the injury?
- AS-2: (9; 60/40) Tell myself I did not hurt (my ankle). Tell myself I can do anything. When I had my velcro cast, I took it off and tried to walk (that's a 'no

no'). I told myself I can do it. And that I was to beat the odds and recover sooner than normal.

- AS-3: (0; 40/60) -
- AS-4: (3; 70/30) More of how I could make sure it doesn't happen again.
- AS-5: (0; -) -
- AS-6: (4; 40/60) It will be alright! Hang in there! Things like that.
- AS-7: lost page
- AS-8: (0; -) I didn't. It happened, so I couldn't do anything about it.
- AS-9: (7; 60/40) Why did this happen to me? Will it happen again?
- AS-10: (0; -) -
- AS-11: (2; 30/70) Why did it have to be me!
- AS-12: (3; 40/60) (I am lucky I wasn't hurt more.) I also sprained my wrist, skinned my knee, and hit my head on a cement trench around tennis court.
- AS-13: (0; -) -
- AS-14: (5; 7) Stupid fool.
- AS-15: (1; 90/10) Stop thinking how it happened and concentrate on NOW.
- AS-16: (0; -) -
- AS-17: (6; 30/70) How frustrated I was, and that it probably would take forever to get better.
- AS-18: (0; -) -
- AS-19: (1; -) At times, the injury got in my way obviously. I would say "Stupid injury".
- AS-20: (2; 40/60) Stupid play.

Appendix L
FEAR OF REINJURY

15. Did you have any thoughts, imaginings, or worries about reinjury? Please explain.
- MCL-1: I imagined doing a movement and hurting myself the same way, but this time really ripping everything apart (the PAIN!). (authors note: there is, however, no indication as to how often this subject had such thoughts)
 - MCL-2: I have some anxiety about skiing again, but my plan is to have an instructor with me at first.
 - MCL-3: I now think twice before doing something crazy.
 - MCL-4: I had worries that my leg may give out during a run. Still have worries about skiing this winter (87/88).
 - MCL-5: Squash is my main sport. I was worried I would reinjure my knee because of the nature of the game. I found this distracting during the first few games I played. I have doubts about skiing again.
 - MCL-6: I'm thinking now that I may do the same thing again.
 - MCL-7: Worried about reinjuring knee.
 - MCL-8: Yes, when recalling how original injury felt and hoping I won't have that feeling again; hoping I won't get set back anymore.
 - MCL-9: Yes, I wondered that if I started to do things it might get worse, because I have seen it happen to friends.
 - MCL-10: Yes, I wondered about how weak the knee was going to be.
 - MCL-11: Yes. Just that it is very easy to injure yourself.
 - MCL-12: Yes. Still do. The injury occurred while skiing - have not had snow since recovery.
 - AS-1: No, not really.
 - AS-2: In a way, but mainly I focused on not hurting it again.

- AS-3: I thought I would never be able to perform at a 100% level, and I still can't. I'd say I can perform at a 90%. (authors note: not really having anything to do with fears of reinjury, just fear of not regaining 100% of performance capability.)
- AS-4: Yes, even now I am very careful to make sure I don't get hurt again.
- AS-5: Yes, I was scared to reinjure my ankle, because I thought it would be weaker.
- AS-6: Yes, now that my ankle is more susceptible to injury, I'll always wonder if it will happen again.
- AS-7: Lost page.
- AS-8: I worry because I was told that my ankles were weak.
- AS-9: Yes, all the time because it can happen so easily!
- AS-10: -
- AS-11: I was told by many that once it happened, it would recur, so I was conscious of the possibility.
- AS-12: I have thoughts of spraining my ankle when boating or playing tennis.
- AS-13: Mostly worry about reinjury before playing. Never worry about it while playing.
- AS-14: Yes, I was afraid to play sports.
- AS-15: In the 10% (or less) of my time thinking about re-injury; could see myself doing it again, but I immediately shut it out of my mind (by thinking of something else related to game or unrelated.)
- AS-16: Yes, that I wouldn't be able to perform as well as I used to.
- AS-17: Many worries about reinjury.
- AS-18: Had and still have worries about reinjury.
- AS-19: Yes, I have visions of hurting my ankle again. I am more conscious of my feet now when I exercise.
- AS-20: Yes, because I'm involved in activity at least 8 hours/day, the possibility of reinjury was high!

Appendix M

IMAGERY

19. Did you ever do any mental imagery about your sport before your injury? (0-10)
Examples:

- MCL-1: (10) I always rehearse this way.
- MCL-2: (3) Imagining skiing well down a slope - imagining the enjoyment.
- MCL-3: (10) E.g. You aim the ski according to an image of how you should look like; before weight lifting; I have to get mentally ready.
- MCL-4: (8) Before a triathlon I would go through course in my head the night before.
- MCL-5: (0)
- MCL-6: (10) I would see and feel the movements of cross country skiing - using eyes, body . . .
- MCL-7: (10) Forever imagining the perfect take-off and flight.
- MCL-8: (5) Think of moves to perform.
- MCL-9: (8) I would see situations in my head and then plan how I would react in the situation.
- MCL-10: (2) Catching, throwing, sliding, diving for a ball, . . . and hitting home run of course.
- MCL-11: (0)
- MCL-12: (-)

- AS-1: (10) Mental imagery.
- AS-2:(9) I watch myself do wonderful post plays; scoring; foul shooting - scoring.
- AS-3: (0)
- AS-4: (6) Sometimes you imagine that you will score a big goal or make a big play.

- AS-5: (7) Before soccer practices I would visualize some moves.
- AS-6: (0)
- AS-7: (8) I often replay a game in mu mind or pre-play a certain system or move or strategy.
- AS-8: (1) I was relaxed, and myself until I stepped onto the ice.
- AS-9: (7) Dream about playing pro anything.
- AS-10: (-)
- AS-11: (3) If I knew who I was playing, I'd imagine in my mind what I'd have to do to beat this person.
- AS-12: (0)
- AS-13: (6) Go over plays while on way to game. Imagine skiing techniques from magazine articles.
- AS-14: (10) Pro football players.
- AS-15: (10) This was learned while I competed in track & field at a provincial and national level, . . . bringing it into volleyball is natural . . . thinking positively about my moves on court, that is: the technically correct skills which when done physically are more fluid because a mental picture prior to game enables physical to correspond.
- AS-16: (5) That I would hopefully make the team.
- AS-17: (8) Used to go through the plays in my head.
- AS-18: (3) Mentally rehearsed the movements required in the sport.
- AS-19: (5) I saw what I was going to-do and feel during and after doing it.
- AS-20: (8) AS a setter, I used to rehearse the rotations so I would know which hitter was in power and therefore what plays to run.

20. Did you ever do mental imagery, or visualize about your recovery? (0-10) If yes, (a) Did you do any healing imagery, where you tried to see or feel the body parts heal? (0-10) Please describe your imagery.

- MCL-1: (9; 10) The work of the blood flowing soothing the tissues, the fibres relaxing, expanding; my breath inhaling health, exhaling pain.
- MCL-2: (0; 0) Not in the sense of actually picturing it, but I could anticipate it.
- MCL-3: (8; 8) I associated pain at the ligament with the healing process; wishing no atrophy of the leg muscles; imagined myself doing my sport activities.

- MCL-4: (3; *) I would look at the knee, and imagine that the rip would piece itself together and tighten up.
- MCL-5: (5; 0)
- MCL-6: (1; 1) No, but it sounds like a great idea.
- MCL-7: (0)
- MCL-8: (6; 0)
- MCL-9: (7; 7) I would sometimes put my hands on my knee and rub it and think it would be good if I could heal it by rubbing.
- MCL-10: (2; 2) Glue setting (i.e. ligament attaching to the bone again)
- MCL-11: (0; 0)
- MCL-12: (-; -)

- AS-1: (10; 0)
- AS-2: (9; 10) I actually feel myself walking without pain; felt that I really could do anything.
- AS-3: (5; 5) At times I tried to make myself see my injury healing.
- AS-4: (0; -)
- AS-5: (1; 6) I thought of myself running and the ankle was fine.
- AS-6: (0; 0)
- AS-7: (0; -)
- AS-8: (0; -)
- AS-9: (0; 0)
- AS-10: (-)
- AS-11: (0; -)
- AS-12: (0; 2)
- AS-13: (8; 8) Mostly tried to 'view' what the ankle would be like when it was healed, in terms of performances.
- AS-14: (0; -)
- AS-15: (7; 0)
- AS-16: (7; 0)

- AS-17: (6; 3)
- AS-18: (5; 2) Imagining the tears in ligaments coming together whenever i massaged or put ice on the area.
- AS-19: (8; 7) I tried to visualize the torn ligaments healing, meaning getting together again and bonding.
- AS-20: (2; -)

(b) Did you do any imagery during physio., of physio. promoting recovery, seeing and feeling recovery? (0-10) Please describe your imagery.

- MCL-1: (10) I would feel the ligament getting stronger, firmer.
- MCL-2: (1) I anticipated - could visualize full movement in my leg.
- MCL-3: (10) Imagine the ligament getting stronger.
- MCL-4: (0)
- MCL-5: (3) When hooked up to machine felt that 'pulses' of electrical stimulation were promoting healing.
- MCL-6: (-) Please inform me about this!
- MCL-7: (0)
- MCL-8: (-)
- MCL-9: (7) I was thinking that as I was taking physio. my knee was healing and my leg was getting stronger.
- MCL-10: (2) same as in (a) (i.e. "Glue setting, ligament attaching to the bone again")
- MCL-11: (0)
- MCL-12: (-)
- AS-1: (0)
- AS-2: (8) That I could actually feel no pain when walking.
- AS-3: (0)
- AS-4: (3)
- AS-5: (0)
- AS-6: (0)
- AS-7: (-)

- AS-8: (-)
- AS-9: (0)
- AS-10: (-)
- AS-11: (0)
- AS-12: (0)
- AS-13: (9) Tried to visualize how the exercises were helping the healing take place.
- AS-14: (0)
- AS-15: (0)
- AS-16: (0)
- AS-17: (3)
- AS-18: (5) Visualizing the ligaments elongating and coming together during ultrasound treatment, and imagining the scar tissue breaking up.
- AS-19: (7) I 'saw' my foot being exercised making the muscles strengthen and mobile again.
- AS-20: (0)

(c) Did you do any imagery trying to imagine yourself totally recovered and performing your sport well again? (0-10) Please describe your imagery.

- MCL-1: (9) I would do the show (material) in my head on a stage.
- MCL-2: (4) I can imagine trying to ski again - wondering if I can be relaxed about it initially.
- MCL-3: (10) You can see yourself doing the 'sport' and enjoying it.
- MCL-4: (10) See myself moving quickly during run stage of triathlon.
- MCL-5: (5) Mental picture of running around on tennis court on summer day.
- MCL-6: (-) Please inform me about this!
- MCL-7: (10) - (author's note: from #19 "Forever imagining the perfect take-off and flight")
- MCL-8: (10) Seeing myself playing with the knee brace just as if it weren't there.
- MCL-9: (8) I could see myself playing as good as before and performing as if nothing had happened.

- MCL-10: (8) Catching, throwing, sliding, diving for a ball, . . . and hitting a home run of course.
 - MCL-11: (0)
 - MCL-12: (-)
 - AS-1: (8) Just imagine playing at 100% again.
 - AS-2: (10) Playing in a game. That I was the best. (from #19: I watch myself do wonderful post plays; scoring; foul shooting-scoring.
 - AS-3: (0)
 - AS-4: (0)
 - AS-5: (5) (from (a): I thought of myself running, and the ankle was fine.)
 - AS-6: (0)
 - AS-7: (-)
 - AS-8: (-)
 - AS-9: (0)
 - AS-10: (-)
 - AS-11: (0)
 - AS-12: (3) I looked forward to playing 3 mornings a week with my regular group.
 - AS-13: (10) Especially dealt with what functions the ankle has to perform in soccer, volleyball and skiing.
 - AS-14: (10) I took off my ankle and played football like never before.
 - AS-15: (10) Mental imagery about sport. Just imagined myself playing with full capacity.
 - AS-16: (7) To make my new team and play as well or better than before.
 - AS-17: (6) Saw myself playing as well again, like it never happened.
 - AS-18: (5) Imagining what activities and sports I would do again. Visualizing doing the sports.
 - AS-19: (5) I saw myself going back to usual.
 - AS-20: (4) I used to visualize myself blocking our best hitter.
21. Did you ever replay your injury? If yes, how often?

- MCL-1: Not the injury in itself, just the pain, and often it kept creeping back on me . . .
- MCL-2: Yes, I tried to 'replay' it when asked to describe it to the doctors/physiotherapists.
- MCL-3: About 10 times.
- MCL-4: Yes, 10-15 times.
- ✓ • MCL-5: I replayed it when describing it, but didn't dwell on it otherwise.
- MCL-6: -
- MCL-7: 2 or 3 times.
- MCL-8: Yes, almost every day.
- MCL-9: Yes, not very often. Once a week or less.
- MCL-10: Yes, 3 or 4 times/week.
- MCL-11: At first, for about two weeks - every day.
- MCL-12: -

- AS-1: Yes, not often.
- AS-2: Yes, I tried not to. When I did, I always tried to change it.
- AS-3: Yes, almost every day.
- AS-4: First week, probably 3 times a day.
- AS-5: No.
- AS-6: Yes, when it happened and after, or during recovery almost every day.
- AS-7: Several times for the next few days after (injury).
- AS-8: Whenever I told the story of how it happened.
- AS-9: 5 times.
- AS-10: -
- AS-11: Not really.
- AS-12: Yes, once a month.
- AS-13: Yes, dozens of times.
- AS-14: Every day.

- AS-15: Possibly 3 times.
- AS-16: No.
- AS-17: Yes, many times at the beginning.
- AS-18: Yes, many times; at the beginning, several times a day.
- AS-19: Practically every day.
- AS-20: Immediately after injury, and for next few days, I replayed the injury.

Appendix N

LESSONS AND/OR BENEFITS

22. Some athletes find that the 'time out' that an injury provides actually serves a positive function in their sport and life. That is, valuable lessons are learned, or a new perspective is attained which contribute towards future achievement. Although noone would wish to have an injury, it is sometimes viewed as a beneficial experience, an opportunity that my otherwise not have been taken. Did you find this to be the case for you? If so, please explain.

- MCL-1: Yes, I had time to reflect on injuries and the fear of success, the relationship I have with my body and where I was going with this attitude. It also made me realize how important confidence and trust was to my health, and how much control I could have on my life. . . . In a sense, my performance is better because I learned about myself (mind, heart, body) through this injury.
- MCL-2: What I learned was to really prepare - for me to take lessons - to get back into the sport. I was so ready and could imagine so well enjoying skiing with my family that I skipped the warm-up (lessons for me) and dove right into the sport and didn't handle a tense stretch very well.
- MCL-3: It reinforced the fact that I share a 'good' family and friends, and that I can't just do nothing - I have to move.
- MCL-4: Yes, taught me to appreciate my mobility and physical well-being much more. I enjoyed many triathlons mych more this year than last.
- MCL-5: No.
- MCL-6: -
- MCL-7: No. It's better to be active. It's not good to be depressed.
- MCL-8: No.
- MCL-9: No, it is not beneficial in the least.
- MCL-10: Yes, I agree. It reminded me of how fragile, the human body is, how easy it is to ge: injured, how not to take youth and health for granted.
- MCL-11: No, not at all.
- MCL-12: -

- AS-1: It gives you a chance to rest and take a break from your sport.
- AS-2: Yes, in a way I finally realized that I can now visualize my game and have better basketball performances.
- AS-3: -
- AS-4: -
- AS-5: Yes, it gave me time to think about the sport a lot, therefore increasing my ability through visualization.
- AS-6: No.
- AS-7: No!
- AS-8: It gave me a break to think of other things than hockey.
- AS-9: Yes, because it makes you realize that it can happen anytime, anyplace even to yourself! Always a valuable lesson learned when you have an injury!
- AS-10: -
- AS-11: Yes & No: I got some much needed rest, but I also found my stamina was not what it had been two months ago.
- AS-12: No.
- AS-13: Yes, it was. It gave me a chance to realize the importance of sports in my life. It also allowed me to increase my flexibility during rehabilitation.
- AS-14: -
- AS-15: No.
- AS-16: (secondary gain/benefit from #10: had already made the team)
- AS-17: No.
- AS-18: -
- AS-19: No.
- AS-20: As a coach I am very much interested in injury, injury recovery, and athlete's attitude on return to participation. As a recreational athlete this was the first 'serious' injury that interfered with my participation. I now can relate better to my athletes.

Appendix O
RECOMMENDATIONS

23. What sort of advice would you give another athlete with the same injury as you had to enhance their recovery?

- MCL-1: Creative visualization; support of friends; confidence in themselves, 'talking' to the injury.
- MCL-2: Go to physiotherapy as soon as possible; Stick with the regimen faithfully.
- MCL-3: Physio twice per day; gradually increase weights and time; lots of positive reinforcement.
- MCL-4: Do every exercise the doctor tells you; continue to do it for the entire recovery time; walk every where you can; push yourself (no pain, no gain).
- MCL-5: Concentrate on short term gains, and build on gradual recovery. Follow regimen and advice prescribed by the physiotherapist. I was given a choice of plastic cast or a removable cast. I chose the latter which speeded up rehabilitation considerably.
- MCL-6: Stay as active as possible, but within the limits that your physician advises.
- MCL-7: Work harder at correcting it.
- MCL-8: Stick with physio; wait patiently for recovery; don't resume sport too soon.
- MCL-9: Think positive, try not to get down. Try to find other activities to pass the time.
- MCL-10: Lots of physio.
- MCL-11: Patience; don't rush it.
- MCL-12: Healing is a slow process and don't expect miracles, but keep at it. It's worth the effort.
- AS-1: Don't push your injury; make sure it's healed.

- AS-2: That they never feel as if this injury is the last draw. That they find it in their heart what is really important to them - which is to recover as quickly as possible and return back to the sport. The way to do that is to have a positive attitude and set goals for yourself. Not too too high.
- AS-3: Think positive; don't put too much pressure on it at once. Take things slowly.
- AS-4: Have a positive attitude and work hard for a quick recovery.
- AS-5: Try not to walk on it; have a positive attitude about your recovery and exercise the parts of your body that are not injured. It will help you get back to 100% faster. Don't worry about the future. Take your time in recovering; don't rush anything.
- AS-6: Think positive.
- AS-7: Go to physio, and don't push it too soon.
- AS-8: Be careful, don't reinjure yourself during recovery.
- AS-9: Go to therapy and don't stop the exercises because th ligaments take a long time to heal properly always wear a brace!
- AS-10: Go to {physio}therapy right away.
- AS-11: Take it easy, do your physio exercises and be patient about getting back into it.
- AS-12: TAKE physiotherapy and be sure to do all exercises daily as prescribed.
- AS-13: Positive attitude; return to 'environment' as quickly as possible, i.e. go the gym to watch team play.
- AS-14: Tell them to go to physiotherapy.
- AS-15: Give injury time to heal; don't enter activity too soon. Start slowly and allow surrounding tissue/muscles/etc. to compensate for injured parts, while injured parts develop to equal strength (if that's possible).
- AS-16: Make sure they do their exercises, and do whatever the doctor says, but do it for twice as long. Be as active as possible.
- AS-17: Just keep plugging and convince yourself you're going to get better. *Make sure* you continue with home therapy.
- AS-18: Think positively; be optimistic about recovery; be realistic about length of recovery, and don't get discouraged.
- AS-19: To be patient and realize it is temporary. To have a positive outlook. To use all that extra time in a benefitting way.
- AS-20: Seek physio as soon as possible.

24. What would you recommend others do to help an injured athlete during rehabilitation?

- MCL-1: Be supportive and caring.
- MCL-2: While encouraging the exercises from physio, also speak positively about the recovery and the future in the sport.
- MCL-3: Be positive; give constructive help/advice/support.
- MCL-4: Inquire about his/her progress; but don't baby him or her.
- MCL-5: Offer sympathy; show interest in recovery. Both these boosted my morale, especially when sports friends displayed them.
- MCL-6: Be supportive in all needs: physically, socially, mentally, etc.
- MCL-7: Lot's of mental encouragement.
- MCL-8: Encouraging words.
- MCL-9: Try to be understanding since someone who is injured feels more fallible and may need some reassurances.
- MCL-10: One area that your survey does not cover, is the effect on an injured person's mental state by what is said, and how it is said by the doctors and physiotherapists etc, during the diagnosis. They made me very depressed. Initially the doctors/physiotherapist were indicating surgery etc., when it was much too early to say anything intelligent. As it turned out they were wrong.
- MCL-11: Do not, I repeat, do not take for granted the athlete is doing the exercises properly as first described. I noticed that the therapist would spend at most no time with most new patients including myself after the second or third visit to the clinic.
- MCL-12: Keep in touch with the injured person. Even though he/she may not be able to participate in the sport, he/she probably needs the social contact and company of those friends. Don't lose touch!
- AS-1: Support them.
- AS-2: That they never feel discouraged and when they begin to feel discouraged, to think of the goals that they set and realize that they are close at hand. And that they should not provoke any setbacks. If they do, they must realize that they must get back into the right frame of mind.
- AS-3: Do as told; don't try to rush your recovery; do things at a slow pace.
- AS-4: The same as above (i.e. in #25), and also listen to your doctor.
- AS-5: Tell them to do their physio.
- AS-6: Encouragement.

- AS-7: Encouragement.
- AS-8: To do as the physiotherapist tells you.
- AS-9: Keep up his confidence and don't be negative about the situation!
- AS-10: Keep up with the exercises.
- AS-11: Don't keep reminding them that they are injured, but at the same time, be supportive.
- AS-12: Others should be positive and encourage their recovery. They should not replace and forget the person. I was only replaced until I was ready to start again.
- AS-13: Avoid 'over concern' which may actually slow down an athlete's recovery. Encourage the athlete to return to sport.
- AS-14: Work the injury.
- AS-15: Encourage them to complete physio (under doctor care and advice) and allow them time to recuperate (don't push them into activity too soon - unlike professional athletes). Watch for signs of injured part possibly becoming tired, weakened and reinjured.
- AS-16: Make sure he or she does what she is supposed to do.
- AS-17: Give lots of support, but also push them to rehabilitate themselves.
- AS-18: Give emotional support when needed; be positive about recovery; and don't pass off the injury as insignificant or over-exaggerated.
- AS-19: Just be supportive and encouraging. Also, being patient. Being there for the athlete.
- AS-20: Allow him/her the time for physio, show interest in progress, and put very little performance pressure on the athlete. Make him/her understand their recovery is more important than returning to the team.

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