DISCUSSION

Active lifestyle is full of healthy consequences, but sometimes it lead to injuries. Sport is full of opportunities to excel as well as hurt the individuals’ involved in it (Mohan, 2011). Thus, sport is associated with an inherent risk of getting injured which is a consequence, not only of physical or environmental factors, but also of psychosocial or personality constellations within the person. Although, injury as an event is definite and determinable, there is no certainty and no clearness regarding the extent of injury risk and the character of injury situations. Therefore, a high degree of ambiguity remains regarding the injury situation and the injury itself. Moreover, injury-related concerns are not purely fundamental or biological, but also result from complex network among numerous factors including previous experiences and other developmental factors (Kleinert, 2002).

Sport injury seems to be a predictable part of an athletes’ life, which often occurs in athletes of all levels of expertise, and involves musculoskeletal and soft tissue injuries (Conn et al., 2003; Schneider et al., 2006). Most of the times, these injuries not only lead to time-out from sport but also increases the likelihood of re-injury. Hence, proper rehabilitation is crucial to enhance recovery and prevent further episode of injury. The problem arises when, not all sport participants, with injuries completely adhere to prescribed treatment protocols by rehabilitation specialists such as physiotherapists and sport injury experts. The massive measure of research reports poor treatment adherence as well as dropout from treatment protocols among sport participants who require clinic-based or home-based physical therapy (Bassett & Prapavessis, 2007; Sluijs et al., 1993).

The effective management of sport injury requires complete understanding of the psychological processes involved and the knowledge of strategies that can affect healing. It is understood that injured athletes’ should take responsibility of their own rehabilitation and as long as their recovery is not problematic, they will achieve successful rehabilitation outcomes, but this kind of idealistic outcome does not occur always. The available evidence implies that the injured athletes who are motivated to undertake their rehabilitation, and show willingness to learn, exhibited more
Discussion

persistence with the treatment protocol and are the ones who are most successful in their rehabilitation (Crossman, 1997).

Thus the literature shows that in the past, many psychosocial variables have been investigated with a variety of tools to measure demographics, injury-related information, adherence, and rehabilitation outcomes. But inconsistent findings were observed regarding the relationship between various psychosocial factors and rehabilitation. The researches which were conducted in the field of sport injury rehabilitation have paid less attention to the use of counseling as a psychological intervention along with physical rehabilitation, which provided impetus for conducting the present research work.

The primary aim of the study was to investigate the comparative efficacy of physical therapy and a combination of physical therapy and psychological counseling in rehabilitation of injured sportspersons. The sample of the study comprised of 200 injured sportspersons (upper limb, lower limb and back injuries) allocated at random to two groups in equal numbers, i.e., Experimental group (n=100) in which subjects were given physical therapy as well as counseling as psychological intervention and Control group (n=100) in which only physical therapy was administered. In addition, gender differences were also investigated.

Two hundred injured sportspersons (N=200), both males (n=112) and females (n=88) between the age group of 18-28 years, who fulfilled the inclusion criteria, were included in the present study. The injured sportspersons were from various sport disciplines, and with a wide range of sport injuries. The sample consisted of sportspersons with upper limb injuries (n=54) with males (n=34) and females (n=20); sportspersons with lower limb injuries (n=86) with males (n=50) and females (n=36); and sportspersons with back injuries (n=60) with males (n=28) and females (n=32). Further, the selected subjects had played at different levels, i.e., University (n=54), District (n=5), State (n=15), National (n=106) and International (n=20).

The following physiological and psychosocial variables were assessed viz:

The physiological variables of Heart Rate and Blood Pressure (Systolic and Diastolic) were measured. Measurements were also taken for age, height and weight; and BMI of the sample was calculated.
To measure pain, Visual Analogue Scale (VAS: Huskisson, 1983) was used and pain related disability was assessed by Pain Disability Questionnaire (PDQ: Anagnostis et al., 2004).

The disability associated with different types of injuries involving upper extremity, lower extremity and back was assessed through specific questionnaires. The upper limb disability was assessed by Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH: Hudak et al., 1996). It further has two modules: Work Module and Sports Module. Lower limb disability was assessed by Lower Extremity Functional Scale (LEFS: Binkley et al., 1999). The back disability was assessed by Modified Oswestry Low Back Pain Disability Questionnaire (Modified OSW: Fritz & Irrgang, 2001).

For measuring dimensions of state and trait anxiety, State-Trait Anxiety Inventory (STAI: Spielberger et al., 1970) was used. The State-Trait Anxiety Inventory (STAI) is comprised of separate self-report scales for measuring two distinct anxiety concepts: State Anxiety and Trait Anxiety.

The fear avoidance beliefs were measured by Fear Avoidance Beliefs Questionnaire (FABQ: Waddell et al., 1993). The FABQ consists of two subscales, viz. Physical Activity subscale (FABQPA) and Work subscale (FABQW). The fear of movement/kinesiophobia was measured by Tampa Scale for Kinesiophobia (TSK: Vlaeyen et al., 1995).

The Self-esteem was measured by Rosenberg Self-Esteem Scale (RSES: Rosenberg, 1965); Optimism was assessed by Life Orientation Test-Revised (LOT-R: Scheier et al., 1994); Self-efficacy was measured by Generalized Self-Efficacy Scale (GSE: Schwarzer & Jerusalem, 1995); and Social support was measured by Social Support Questionnaire (SSQ-6: Sarason et al., 1987) which has two subscales, viz. SSQ-N (Network size) and SSQ-S (Satisfaction).

The perceived success while adhering to the exercise program was assessed through a single item measure adapted from Shields et al. (2005).

The construct of Aggression was measured by Buss–Perry Aggression Questionnaire (BPAQ: Buss & Perry, 1992). The scale contains four subscales, viz. Physical Aggression, Verbal Aggression, Anger, and Hostility.
Discussion

To measure stress, two tests were used: Perceived Stress Scale (PSS: Cohen et al., 1983) and Stress Symptoms Rating Scale (Heilbrun & Pepe, 1985).

The sport injury rehabilitation beliefs were measured by Sports Injury Rehabilitation Beliefs Survey (SIRBS: Taylor & May, 1996). It consists of the following components, viz. Susceptibility, Treatment Efficacy, Self-efficacy, Rehabilitation Value, and Severity.

All the subjects were informed about the nature and aim of the investigation and their informed consent was obtained before they were enlisted as subjects.

The raw scores consisted of scores on all the above mentioned variables, viz. Heart Rate, Systolic Blood Pressure, Diastolic Blood Pressure, Pain (VAS), Disabilities of the Arm, Shoulder and Hand and its modules, viz. Work Module and Sports Module, Lower Limb Disability, Modified Oswestry Low Back Pain Disability, State Anxiety, Trait Anxiety, Pain Disability, Fear Avoidance Beliefs-Physical Activity, Fear Avoidance Beliefs-Work, Self-esteem, Optimism, Self-efficacy, Kinesiophobia, Social Support-Network, Social Support-Satisfaction, Perceived Success, Aggression (total) and its subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility, Perceived Stress, Stress Symptoms, Sports Injury Rehabilitation Beliefs (total) and its components, viz. Susceptibility, Treatment Efficacy, Self-efficacy, Rehabilitation Value and Severity.

The raw scores were analyzed using appropriate statistical analyses, viz. Descriptive Statistics and t-tests. t-ratios were calculated to find out the significant differences between means of all the measured variables for both Experimental and Control groups. t-tests were conducted to find out both Intragroup and Intergroup comparisons. An independent-samples t-test was conducted to find the intergroup differences. A paired-samples t-test was conducted to find the intragroup differences.

The results are being discussed below:

1. Intergroup Comparisons: Upper Limb Injuries, Lower Limb Injuries and Back Injuries at post-test intervention phase

Based on the review of literature following hypotheses were proposed:

1.1 The Experimental group was expected to show lower scores on Disabilities of the Arm, Shoulder and Hand, Modified Oswestry Low Back Pain Disability, and
Discussion

higher scores on Lower Limb Disability in comparison to Control group sportspersons with upper limb injuries, back injuries and lower limb injuries at post-test phase.

1.2 The Experimental group was expected to show lower scores on Heart Rate, Blood Pressure, Pain, and Pain Disability in comparison to Control group sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase.

1.3 The Experimental group was expected to show lower scores on State Anxiety, Trait Anxiety, Perceived Stress, and Stress Symptoms in comparison to Control group sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase.

1.4 The Experimental group was expected to show lower scores on Fear Avoidance Beliefs for both its dimensions, viz. Physical Activity and Work, and Kinesiophobia in comparison to Control group sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase.

1.5 The Experimental group was expected to show higher scores on Self-esteem, Self-efficacy, and Optimism in comparison to Control group sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase.

1.6 The Experimental group was expected to show higher scores on Social Support for both its dimensions, viz. Social Support-Network and Social Support-Satisfaction in comparison to Control group sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase.

1.7 The Experimental group was expected to show higher scores on Perceived Success and Sports Injury Rehabilitation Beliefs (total) and its components, viz. Susceptibility, Treatment Efficacy, Self-efficacy, Rehabilitation Value and Severity in comparison to Control group sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase.

1.8 The Experimental group was expected to show lower scores on Aggression (total) and its subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility in comparison to Control group sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase.

Tables (Table 1.13, Table 1.14, Table 1.15) show means, standard deviations and t-ratios comparing pre-test differences between Control group and
Discussion

Experimental group with upper limb injuries, lower limb injuries and back injuries. t-ratios revealed that no significant differences emerged between Control and Experimental groups with upper limb injuries, lower limb injuries and back injuries at pre-test on Heart Rate, Systolic Blood Pressure, Diastolic Blood Pressure, Pain (VAS), Disabilities of the Arm, Shoulder and Hand and its modules, viz. Work Module and Sports Module, Lower Limb Disability, Modified Oswestry Low Back Pain Disability, State Anxiety, Trait Anxiety, Pain Disability, Fear Avoidance Beliefs-Physical Activity, Fear Avoidance Beliefs-Work, Self-esteem, Optimism, Self-efficacy, Kinesiophobia, Social Support-Network, Social Support-Satisfaction, Perceived Success, Aggression (total) and its subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility, Perceived Stress, Stress Symptoms, Sports Injury Rehabilitation Beliefs (total) and its components, viz. Susceptibility, Treatment Efficacy, Self-efficacy, Rehabilitation Value and Severity.

Results confirmed that no significant differences emerged between Control and Experimental groups at pre-test for upper limb injuries, lower limb injuries and back injuries.

Table 1.16 shows means, standard deviations and t-ratios comparing post-test differences between Control group and Experimental group with upper limb injuries. t-ratios revealed that Experimental group scored higher than Control group on Self-esteem (t=3.41, p<.01), Optimism (t=4.85, p<.01), Self-efficacy (t=6.31, p<.01), Social Support-Network (t=16.97, p<.01), and Perceived Success (t=2.83, p<.01). t-ratios also revealed that Experimental group scored higher than Control group on Sports Injury Rehabilitation Beliefs (total) (t=2.82, p<.01) and its components, viz. Susceptibility (t=23.78, p<.01), Treatment Efficacy (t=15.29, p<.01), Self-efficacy (t=11.87, p<.01), Rehabilitation Value (t=11.81, p<.01) and Severity (t=16.97, p<.01).

The calculations of t-ratios revealed that Control group scored higher than Experimental group on Pain Disability (t=5.57, p<.01), Disabilities of the Arm, Shoulder and Hand (t=2.42, p<.05) and its modules, viz. Work Module (t=4.63, p<.01) and Sports Module (t=3.95, p<.01), State Anxiety (t=3.93, p<.01), Trait Anxiety (t=7.86, p<.01), Fear Avoidance Beliefs-Physical Activity (t=3.09, p<.01), Fear Avoidance Beliefs-Work (t=3.72, p<.01), Kinesiophobia (t=5.61, p<.01), Perceived Stress (t=9.43, p<.01), and Stress Symptoms (t=3.93, p<.01). t-ratios also
Discussion showed that Control group scored higher than Experimental group on Aggression (total) \( (t=11.24, p<.01) \) and its subscales, viz. Physical Aggression \( (t=9.18, p<.01) \), Verbal Aggression \( (t=9.43, p<.01) \), Anger \( (t=7.98, p<.01) \) and Hostility \( (t=10.13, p<.01) \).

No significant differences emerged between Control group and Experimental group with upper limb injuries at post-test on Heart Rate, Systolic Blood Pressure, Diastolic Blood Pressure, Pain (VAS), and Social Support-Satisfaction.

Table 1.17 shows means, standard deviations and t-ratios comparing post-test differences between Control group and Experimental group with lower limb injuries. t-ratios revealed that Experimental group scored higher than Control group on Lower Limb Disability \( (t=2.37, p<.05) \), Self-esteem \( (t=6.83, p<.01) \), Optimism \( (t=5.75, p<.01) \), Self-efficacy \( (t=5.45, p<.01) \), Social Support-Satisfaction \( (t=5.30, p<.01) \), and Perceived Success \( (t=21.28, p<.01) \). t-ratios also showed that Experimental group scored higher than Control group on Sports Injury Rehabilitation Beliefs (total) \( (t=30.93, p<.01) \) and its components, viz. Susceptibility \( (t=21.64, p<.01) \), Treatment Efficacy \( (t=24.47, p<.01) \), Self-efficacy \( (t=20.57, p<.01) \), Rehabilitation Value \( (t=18.66, p<.01) \) and Severity \( (t=12.38, p<.01) \).

The calculations of t-ratios revealed that Control group scored higher than Experimental group on Pain (VAS) \( (t=2.51, p<.05) \), Pain Disability \( (t=2.59, p<.01) \), State Anxiety \( (t=7.73, p<.01) \), Trait Anxiety \( (t=7.58, p<.01) \), Fear Avoidance Beliefs-Physical Activity \( (t=6.73, p<.01) \), Fear Avoidance Beliefs-Work \( (t=5.14, p<.01) \), Kinesiophobia \( (t=7.20, p<.01) \), Perceived Stress \( (t=13.23, p<.01) \), and Stress Symptoms \( (t=5.27, p<.01) \). t-ratios also showed that Control group scored higher than Experimental group on Aggression (total) \( (t=15.72, p<.01) \) and its subscales, viz. Physical Aggression \( (t=15.77, p<.01) \), Verbal Aggression \( (t=9.96, p<.01) \), Anger \( (t=12.45, p<.01) \) and Hostility \( (t=11.71, p<.01) \).

No significant differences emerged between Control group and Experimental group with lower limb injuries at post-test on Heart Rate, Systolic Blood Pressure, Diastolic Blood Pressure, and Social Support-Network.

Table 1.18 shows means, standard deviations and t-ratios comparing post-test differences between Control group and Experimental group with back injuries. t-ratios revealed that Experimental group scored higher than Control group on Diastolic
Discussion

Blood Pressure ($t=2.59, \ p<.01$), Self-esteem ($t=7.44, \ p<.01$), Optimism ($t=5.81, \ p<.01$), Self-efficacy ($t=4.49, \ p<.01$), Social Support-Satisfaction ($t=4.83, \ p<.01$), Social Support-Network ($t=2.45, \ p<.05$), and Perceived Success ($t=12.90, \ p<.01$). t-ratios also showed that Experimental group scored higher than Control group on Sports Injury Rehabilitation Beliefs (total) ($t=11.03, \ p<.01$) and its components, viz. Susceptibility ($t=9.33, \ p<.01$), Treatment Efficacy ($t=8.63, \ p<.01$), Self-efficacy ($t=7.14, \ p<.01$), Rehabilitation Value ($t=6.82, \ p<.01$) and Severity ($t=2.80, \ p<.01$).

The calculations of t-ratios revealed that Control group scored higher than Experimental group on Pain (VAS) ($t=5.11, \ p<.01$), Pain Disability ($t=3.27, \ p<.01$), Modified Oswestry Low Back Pain Disability ($t=3.06, \ p<.01$), State Anxiety ($t=12.66, \ p<.01$), Trait Anxiety ($t=10.31, \ p<.01$), Fear Avoidance Beliefs-Physical Activity ($t=5.65, \ p<.01$), Fear Avoidance Beliefs-Work ($t=6.17, \ p<.01$), Kinesiophobia ($t=5.87, \ p<.01$), Perceived Stress ($t=11.12, \ p<.01$), and Stress Symptoms ($t=7.39, \ p<.01$). t-ratios also showed that Control group scored higher than Experimental group on Aggression (total) ($t=8.11, \ p<.01$) and its subscales, viz. Physical Aggression ($t=9.16, \ p<.01$), Verbal Aggression ($t=4.74, \ p<.01$), Anger ($t=6.00, \ p<.01$) and Hostility ($t=6.63, \ p<.01$).

No significant differences emerged between Control group and Experimental group with back injuries at post-test on Heart Rate and Systolic Blood Pressure.

The findings revealed statistically significant differences at post-test between Control and Experimental groups for upper limb injuries, lower limb injuries and back injuries respectively. Experimental group showed marked improvement on physical functional status/disability scales, i.e., Disabilities of the Arm, Shoulder and Hand and its modules, viz. Work Module and Sports Module, Lower Limb Disability, and Modified Oswestry Low Back Pain Disability than Control group sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase.

Experimental group scored higher on Diastolic Blood Pressure than Control group sportspersons with back injuries at post-test phase. Experimental group scored lower on Pain (VAS) than Control group sportspersons with lower limb injuries and back injuries at post-test phase. Experimental group scored lower on Pain Disability, State Anxiety, Trait Anxiety, Perceived Stress, Stress Symptoms, Fear Avoidance...
Beliefs-Physical Activity, Fear Avoidance Beliefs-Work, and Kinesiophobia than Control group sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase.

Results revealed that Experimental group scored higher on Self-esteem, Optimism, and Self-efficacy than Control group sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase. Experimental group scored higher on both Social Support-Satisfaction and Social Support-Network in sportspersons with back injuries; whereas Experimental group scored higher on Social Support-Network in sportspersons with upper limb injuries; and Social Support-Satisfaction in lower limb injuries as compared to Control group sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase. Experimental group scored higher on Perceived Success and Sports Injury Rehabilitation Beliefs (total) and for all its components, viz. Susceptibility, Treatment Efficacy, Self-efficacy, Rehabilitation Value and Severity than Control group sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase.

Results revealed that Experimental group scored lower on Aggression (total) and its subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility than Control group sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase.

Results revealed that insignificant differences emerged between Control and Experimental groups on Heart Rate and Systolic Blood Pressure in sportspersons with upper limb injuries, lower limb injuries and back injuries at post-test phase. Insignificant differences also emerged between Control and Experimental groups on Diastolic Blood Pressure in sportspersons with upper limb injuries and lower limb injuries at post-test phase. Insignificant differences emerged between Control and Experimental groups on Pain (VAS) and Social Support-Satisfaction in sportspersons with upper limb injuries at post-test phase. Insignificant differences also emerged between Control and Experimental groups on Social Support-Network in sportspersons with lower limb injuries at post-test phase.

Thus, it may be concluded that hypotheses related to the above mentioned variables were upheld in majority of cases. However, the overall hypotheses related to
Discussion

Heart Rate, Blood Pressure, Pain (VAS) and Social Support were not upheld in its entirety.

Earlier research lends support to the above mentioned findings of the present study.

According to Heil et al. (1998), it was imperative to amalgamate behavioural medicine and sport psychology to create a model that identifies psychological roles for all members of the treatment team and empower patients’ by a proactive approach to education and skill-building. They opined that development of the patient-athlete mind set was a common focus across all interventions. The patient-athlete mind set encompassed: personal responsibility and a strong goal orientation. The researchers conducted a case study on a 35 year old female with arm and back pain. She was referred by her orthopedic physician to the Pain Management Center where she underwent multidisciplinary evaluation by medicine, psychology, occupational therapy and physical therapy specialists. She completed a multidisciplinary rehabilitation program that included ongoing medical evaluation and medication management, physical therapy and occupational therapy, as well as individual and group psychotherapy. The direct psychological services included clarification of the patient’s understanding of the concepts underlying pain, injury, and rehabilitation; normalizing the sense of loss and feelings of anxiety that accompany injury and rehabilitation; and training in self-regulation and other cognitive behavioural skills to manage stress, pain, sleep, and other psychological sequelae. The results showed that at the conclusion of the intensive treatment phase, all range of motion and strength measures were improved. Regular compliance with the aerobic program had led to notable increase in endurance of patient. A specialized gait training program dramatically improved the walking of patient. Steady improvement was also noted in her psychological status. The study concluded that by cultivating personal responsibility, building a knowledge base regarding pain and rehabilitation, demonstrating effective goal setting, and challenging the patient to approach rehabilitation as an athlete, the patient was able to break the cycle of chronic pain. Gradually, the trauma of her injury was diminished and she was able to regain a satisfying quality of life. It was contended that a similar approach to intervention was broadly applicable to rehabilitation with appropriate modifications to accommodate the level of athleticism the patient brings to treatment.
It was reported by Bassett and Petrie (1999) that treatment goals as a motivational tool were commonly used by physiotherapists to improve patients’ compliance with exercise program. The study investigated their effectiveness in meeting this aim. The sample consisted of 66 participants, 55 of whom had previously had physiotherapy for some other problem. There were 32 males and 34 females, whose ages ranged from 13 to 72 years. Twenty-seven of the participants had upper limb injuries and 39 had lower limb injuries. These 66 patients started a new course of physiotherapy and had exercises as part of their treatment. These patients were randomly allocated to one of the three experimental goal groups: physiotherapist-participant collaborative, physiotherapist mandated, and no formally set goals. Collaborative patient-physiotherapist goals were those based on the daily activities the patients’ wished to achieve and modified by physiotherapists to ensure that they were realistic, whereas physiotherapist-mandated goals were set solely by a physiotherapist and based on the movement deficits of patients. Those who were in the no formally set goals group were just given the exercises, the reasons for doing them and instructions on how to perform them. It was hypothesized that the participants in the collaborative goal group would have a higher level of compliance with their home exercises than those in the physiotherapist-mandated and those in the no formally set goals groups. Results showed that there were no significant differences between the groups on overall compliance. However, analysis of range of movement and muscle strength data showed that the no formally set goals group to be significantly more compliant than the physiotherapist-mandated group. Further analysis revealed that participants in the collaborative group who had range of movement or both muscle strength and range of movement measurements were significantly more compliant with the recommended exercise repetitions than those in the physiotherapist mandated group. The results of this study indicated that treatment goals might not be a suitable motivational tool for all people, but if they are to be used in physiotherapy, collaboratively set goals appeared to lead to a higher level of treatment compliance than physiotherapist-mandated goals.

Sheedy et al. (2000) investigated the impact of behavioural interventions by physiotherapists to promote physical activity for primary prevention purposes. A quasi-experimental study was conducted with 204 subjects. In total, there were 115 subjects in the control group and 89 in the intervention group. Control subjects were
Discussion

recruited over an initial six week period and intervention subjects in the subsequent six week period. All new patients over the age of 18 years presented for treatment at outpatient physiotherapy departments were screened for study eligibility. This provided a representative sampling frame for clients who received outpatient physiotherapy. The intervention consisted of three components: brief counseling about physical activity (five minutes), an information brochure and a diary to record physical activity goals and weekly progress towards those goals. The educational intervention was delivered by the physiotherapist in the session following the initial appointment at which the baseline survey was carried out. The content of the intervention was based on the subject’s stage of change for physical activity. These intervention components were delivered in a single session with the client. Self-reported physical activity was measured at baseline and at six weeks follow-up. Therapists briefly reviewed clients’ progress and also provided further encouragement to client in up to two subsequent treatment sessions. The results showed that at follow-up, the improvements were substantial in both the control and intervention groups, but not significantly different. This might have been an effect of the physiotherapy treatment that both the control and intervention subjects received, which entailed discussion of various aspects of physical activity. The results did not indicate that the brief educational intervention was effective in improving the physical activity participation of outpatient physiotherapy clients. But, it was advised that physiotherapists are a capable and ready group to engage in physical activity promotion of this type.

Taimela et al. (2000) compared the efficacy of a multimodal treatment emphasizing proprioceptive training (Active) with activated home exercises (Home) and recommendation of exercise (Control) in 76 patients (22 males and 54 females) with chronic, nonspecific neck pain. The Active treatment consisted of 24 sessions of proprioceptive exercises, relaxation, and behavioural support. The Home regimen included a neck lecture and two sessions of practical training for home exercises and instructions for maintaining a diary of progress. The Control treatment included a lecture regarding care of the neck with a recommendation to exercise. The results showed that regarding self-experienced benefits, the multimodal treatment was more efficacious than activated home exercises that were clearly more efficacious than just advising. Minor differences were noted in objective measurements of cervical
function among the three groups. The self-experienced ability to work differed significantly among the groups, as well. Thus, the study concluded that application of active treatments (Active and Home) was related to pain reduction and self-experienced benefits. Home regimen and Control was insufficient in treating the condition as no change was observed in any of the outcome variables. The multimodal active treatment which included exercises reduced chronic neck trouble and improved self-experienced work ability.

It was investigated by Hutten et al. (2001), whether subgroups of patients with chronic low back pain showed differences in treatment outcome, measured with the Roland Disability Questionnaire (RDQ). Eighty-four patients with chronic low back pain participated in this study. Patients followed a multidisciplinary treatment program that primarily targeted physical aspects. It was comprised of 0.5 hours of conditional training, 0.5 hours of swimming, 0.5 hours of sport, 1.5 hours of occupational therapy, and 3 hours of physiotherapy each week for 7 weeks. Based on pre-treatment lumbar dynamometry results and Symptom Checklist (SCL-90) scores, patients were divided into subgroups. The dynamometry subgroups were: performances lower than healthy subjects (expected performance), performances comparable with those of healthy subjects (normal performance) and inconsistent performances (submaximal performance). The SCL-90 subgroups were: a total score of ‘average’ or lower compared with a population of chronic pain patients (low psychological score) and a total score of ‘above average’ or higher compared with this population (high psychological score). Patients answered the Roland Disability Questionnaire (RDQ) in the week before (RDQ1; n=84) and after treatment (RDQ2; n=78) to investigate whether the subgroups showed differences in outcome expressed as the percentage change between RDQ2 and RDQ1 (%RDQ2−1). A %RDQ2–1 of 20% was classified as an improvement. Improvement of 20% on disability level was observed in 64% and 55% of the patients with ‘normal’ and ‘expected’ lumbar dynamometry performances, 33% of those with low psychological scores and 25% of those with high psychological scores. Patients with submaximal performances showed hardly any change in disability level and there were no differences between those with low psychological scores (14%) and those who reported high scores (0%). The results of the study showed that significantly fewer patients with high initial levels of psychological distress reported changes in disability level after a multidisciplinary
**Discussion**

Discussion of treatment program compared with patients with low initial levels. The results indicated that a high level of psychological distress was related to poorer treatment outcome. The study concluded that subgroups of patients with different changes could be defined based on lumbar dynamometry results and psychological aspects, indicating that a screening with these methods might contribute to more effective treatment allocation. It was advocated that the interventions primarily focusing on physical aspects have a tendency towards improved outcome provided that the patients do not have a substantial psychosocial component or that poor responders and patients who do not complete treatment were less capable cognitively, not so well balanced emotionally or had greater psychopathology. The findings of this study supported the multidimensional model for back pain which is generally accepted by clinicians and researchers and it was suggested that both psychological and physical impairments are important considerations to assess the patient with back pain. It was also put forth that work-related parameters and social interactions might also be related to the outcome of treatment and useful for treatment allocation (Hutten et al., 2001).

It was stated by Spetch and Kolt (2001) that the success of rehabilitation program was contingent on following or adhering to prescribed regimens. Adherence to sport injury rehabilitation programs may encompass a range of behaviours that varied across different injuries and rehabilitation protocols. The authors critically reviewed the adherence literature related to sport injury rehabilitation. It was put forth that the practitioner had to deal with significant challenges in the management of sport injuries, and adherence to rehabilitation appeared to be one of these challenges. The results of this review indicated that a large number of variables have been linked to aspects of adherence including both personal and situational factors. The personal factor which was most consistently associated with adherence appeared to be self-motivation while several situational factors which have also been linked included social support, perceived exertion, convenience of rehabilitation scheduling, and belief in the effectiveness of treatment. It was suggested that all of these links were correlational in nature and imply an association only. Thus, one consistent finding that emerged from the results was that athletes’ with high levels of self-motivation tend to adhere better than their poorly self-motivated counterparts. Several strategies such as education, treatment efficacy, and social support have obtained preliminary empirical
support for their role in facilitating rehabilitation adherence. It was ascribed by the authors that the three most common indices of adherence were attendance at rehabilitation, clinic-based practitioner observations, and reporting of home-based rehabilitation program completion. Further, it was suggested that key aspects of a multitreatment approach included education, communication and rapport, social support, goal setting, treatment efficacy and tailoring, threats and scare tactics, and athlete responsibility.

Evans and Hardy (2002) conducted a qualitative study for investigating 5 week goal-setting intervention till follow-up. The intervention study explored the effects of goal setting on injured athletes’ rehabilitation adherence, perceptions of self-efficacy and treatment efficacy, and the psychological response variables of reorganization and dispirited. The findings of the study provided some support for the hypothesized effects of goal setting on adherence, perceptions of self-efficacy, reorganization, and dispirited but failed to provide support for all the proposed effects of the goal-setting intervention. The study concluded that importance of individual difference variables and the interaction of personal and situational variables emerged as salient to participants’ injury experiences. Such variables should be accounted for the intensity of emotional and psychological responses, rehabilitation adherence, and the use of goal-setting.

Junge et al. (2002) evaluated the effects of a prevention program on the incidence of soccer injuries in male youth amateur players. Seven soccer teams took part in a prevention program that focused on education and supervision of coaches and players, while seven other teams were instructed to train and play soccer as usual. Over a period of one year, all injuries were documented weekly by physicians. The intervention group participated in an injury prevention program, while the control group was instructed to train and play soccer as usual. The prevention program included general interventions such as improvement of warm-up, regular cool down, taping of unstable ankles, adequate rehabilitation, and promotion of the spirit of fair play as well as specially designed “F-MARC Bricks.” F-MARC Bricks consisted of 10 sets of exercises designed to improve the stability of ankle and knee joints, the flexibility and strength of the trunk, hip, and leg muscles, as well as to improve coordination, reaction time, and endurance. The incidence of injury per 1000 hours of training and playing soccer was 6.7 in the intervention group and 8.5 in the control
Discussion

group, which equated to 21% fewer injuries in the intervention group. The greatest effects were observed for mild injuries, overuse injuries, and injuries incurred during training. The prevention program had greater effects in low-skill than in high-skill teams. The researchers stated that this might be caused by different initial conditions in the high and low-skill teams. In the control group of the study, the incidence of injuries, especially of overuse injuries and injuries during training was higher in low-skill than in high-skill teams. A possible explanation for the higher incidence of soccer injuries in low-skill teams might be that these players had a poorer physical performance capacity than high-skill players. The prevention program was effective in reducing soccer injuries, especially in low-skill teams. Thus, it was advocated that coaches and players need better education regarding injury prevention strategies and should include such interventions as a part of their regular training program.

De Heredia et al. (2004) analyzed how psychological responses influenced the physical and sporting recovery of an injured person. The sample comprised of 20 amateur football players aged between 18-35 years, with moderately serious or serious injuries. The psychological variables, i.e., mood states, subjective estimation of the injury and adherence, and the psychological response was assessed continuously, from the beginning of the treatment until its completion. The results indicated that as the subjects recovered from their injuries, they gradually adopted the ICEBERG profile, which was characteristic of good performance. Subjective estimation of the injury was inversely related to the time required for physical and sporting recovery. Similarly, statistically significant relationships were found between mood states, physical recovery and adherence to the rehabilitation program, and sporting recovery. The results of this research suggested that the psychological response of sportsmen regarding coping with their injury was significantly related to the achievement of an optimum recovery. It was also found that physical and sporting recovery were positively interrelated, although the variables that were found to be statistically significant in establishing differences between athletes with a longer and shorter recovery period were different for each. The study concluded that athletes with a shorter physical recovery time had a lower level of tension, fatigue, and general mood state than those who took longer to recover, and they also scored lower in subjective estimation of their injury, seeing it as less serious and less likely to interrupt their short-term expectations. In case of sporting recovery, the athletes who
were less fearful of future relapse and who showed a greater adherence to the rehabilitation programs were those who recovered more quickly. It was purported that after the injury, general mood state becomes gradually more negative until approximately halfway through the recovery period. At this moment until the date on which the injured person was declared medically fit, the exact opposite occurs, with the injured person showing an increasingly positive mood state.

Sullivan et al. (2006) investigated whether the addition of a psychosocial intervention improved return to work rates beyond those associated with participation in a functional restoration physical therapy intervention. Subjects who had sustained whiplash injuries participated in the Progressive Goal Attainment Program (PGAP), which was a 10-week psychosocial intervention program aimed to increase activity involvement and minimize psychological barriers to rehabilitation progress. A sample of 60 subjects enrolled in a functional restoration physical therapy intervention was used as a historical cohort comparison group. Subjects who received the functional restoration physical therapy intervention were compared with a sample of 70 subjects who received PGAP in addition to physical therapy. Participation in PGAP plus physical therapy resulted in a higher return-to-work rate (75%) than participation in physical therapy alone (50%). Differences between treatment conditions were most pronounced for the subgroup of subjects who had the largest number of psychosocial risk factors. The findings of the study suggested that a psychosocial risk reduction intervention could be an effective means of improving function and facilitating return to work in individuals who are at risk for prolonged pain-related disability. The findings also suggested that a psychosocial risk factor-targeted intervention in combination with physical therapy could lead to significant increase in the probability of return to work following whiplash injuries. Further, the findings suggested that front-line rehabilitation professionals could develop the skills necessary to effect significant reductions in psychosocial risk factors for prolonged pain and disability. The study concluded that a combination of psychosocial intervention with physical therapy may emerge as a viable and cost effective approach for the prevention of prolonged pain and disability following musculoskeletal injury.

vander Ploeg et al. (2006) determined the effect of “rehabilitation and sports” (R&S) and R&S combined with the daily physical activity promotion program “active after rehabilitation” (AaR) on sport participation and daily physical activity behaviour...
Discussion

nine week;; after inpatient or outpatient rehabilitation in comparison to control group which received the usual care. Two sport and two daily physical activity outcomes were assessed with questionnaires seven weeks before and nine weeks after the end of rehabilitation. The main findings of this study were that the R&S program did not have a significant effect on any of the four outcomes, whereas the combination of the R&S and AaR programs improved both sport participation outcomes and one physical activity outcome, compared with the control group. The study concluded that the combination of the R&S and AaR program improved sport and daily physical activity in the short term in this population of rehabilitation patients. It was suggested that it is possible to increase short term physical activity behaviour by using personalized tailored counseling in physical activity promotion programs, consisting of several sessions during and after rehabilitation.

Christakou and Zervas (2007) examined the effectiveness of imagery on pain, edema, and range of motion in athletes who sustained a grade II ankle sprain. The sample consisted of 18 active male athletes, aged from 18 to 30 years, with a grade II ankle sprain, confirmed by ultrasound testing. The participants were randomly divided into two conditions: a relaxation and imagery condition and a control condition. The participants in the relaxation and imagery condition received 12 individual sessions of imagery rehearsal in addition to a normal course of physiotherapy, while the participants in the control condition followed only the physiotherapy treatment. Participants were administered a Visual Analogue Scale (VAS) in order to measure acute pain intensity. Edema was evaluated with the water volumetric displacement method. Ankle range of motion (ROM) was assessed using a goniometer. The results showed that imagery intervention did not achieve its purpose. Descriptive statistics, however, indicated a reduction on edema and an increase on total ROM in the relaxation and imagery condition. It was concluded that further research is required to examine the relationship between different types of imagery and rehabilitation from sport injury using standardized imagery instruments.

The interface between sport psychology and physiotherapy was investigated by Horvath et al. (2007), who offered an indication of the stability of psychological variables in the course of rehabilitation. The study was intended to clarify whether the values for adherence, anxiety, locus of control, intention, and social support changed over the course of rehabilitation. With distribution-free tests, it was analyzed whether
the rank, mean ranking values, or the rank orders changed within the group of 15 patients. The psychotherapist was advised to positively influence the formation of opinion in relation to his own locus of control as well as the anxiety of the patient in an early stage of rehabilitation. It was purported that physiotherapeutic rehabilitation aimed at sufficiently restoring the injured part of the body in order to withstand everyday stresses and pursue sport without hesitation could extend over several months, depending on the severity of the injury. For this reason, the time component should also be considered in the investigation of rehabilitation. The findings of this study suggested that individual variables underwent pronounced changes over the course of rehabilitation. It was found that the degree of adherence showed no significant change either over the first 12 weeks or the entire rehabilitation period, so a single measurement of this variable was altogether sufficient. It was also found that both the assessment of the physiotherapist and the patients’ assessment of satisfaction varied over the course of rehabilitation. The results indicated that during the first phase of rehabilitation, the physiotherapist should take into account patients’ anxiety, especially in case of severe injury and efforts should be directed towards reducing it. However, there was a continuous decrease in anxiety as the rehabilitation progressed.

Results also showed that patients perceived low levels of social support throughout the rehabilitation period which pointed out towards discrepancies between patients’ expected social support and available social support. Thus, the study concluded that physiotherapist should take into consideration anxiety and social support levels while rehabilitating the patients.

Hamson-Utley and Vazquez (2008) examined the attitudes of athletic trainers (ATs) and physical therapists (PTs) on the effectiveness of mental imagery, goal setting, and positive self-talk to improve rehabilitation adherence and recovery speed of injured athletes. The ATs and PTs completed a single administration survey that measured their beliefs about the effectiveness of psychological skills for increasing adherence and recovery speed of injured athletes undergoing rehabilitation. The results indicated that ATs reported more positive attitudes than PTs on survey items that paired a psychological skill with a behavioural outcome; it could be that ATs face injured athletes’ inability to adhere to rehabilitation more often and felt more pressure to speed up the recovery process in college and university settings than PTs does in outpatient clinical settings. It was recommended that the practitioners who lead the
Discussion

rehabilitation programs of injured athletes and the educators who teach future ATs should be educated on the up-to-date methods and tools associated with a successful recovery to increase the preparedness of the ATs and PTs in taking care of the injured athlete. According to Milne et al. (2005), injury is a frequent consequence of being an athlete or participating in recreational sport. Thus, when athletes’ become injured, physical limitations were much more obvious than mental limitations. An adequate rehabilitation program, including both physical and psychological intervention, is essential for athletes to reach full recovery. Due to a high percentage of non-adherence (30–91%) to sport injury rehabilitation programs, psychological skills may be used to increase adherence and subsequently decrease recovery time. Hamson-Utley and Vazquez (2008) emphasized that goal setting and mental imagery (with relaxation) could be used to improve adherence, which was considered to be the most common behavioural problem following sport injury. Along with improvements in adherence to integrating mental skills into the rehabilitation program, athletes’ may experience an increase in self-confidence and motivation as well as a reduction in anxiety and pain associated with rehabilitation.

Lafferty et al. (2008) explored whether there were any differences in the psychological content of practice between club contracted and non-club contracted physiotherapists when treating sport injuries. Eighty seven certified physiotherapists with 42 non-club contracted and 45 club contracted from the United Kingdom completed a modified version of the Athletic Training and Sport Psychology Questionnaire (ATSPQ). Results revealed significant between-group differences in the use of and the importance of knowledge of psychological skills. Non-club contracted physiotherapists reported a higher use of improving social support and higher-order psychological skills (e.g., reducing depression, stress, and anxiety) and rated knowledge of these psychological skills to be more important whilst club contracted physiotherapists reported a higher use of short-term goal settings. Thus, the results of this study suggested that athletes treated outside of their club system may experience a different recovery process.

Return from athletic injury could be a lengthy and difficult process. Kraemer et al. (2009) studied recovery process from injury and the effect of different care providers over the rate of recovery. The injured athlete receives care from different health care providers, including physicians, athletic trainers, physical therapists, and
Discussion

strength and conditioning specialists during the course of rehabilitation. The study postulated that a thorough examination of the injured athlete and a careful evaluation of all findings were essential to an accurate diagnosis, from a structural and biomechanical perspective. Each provider must make clear the purpose of each treatment and the restrictions from specific activities during the rehabilitation process while providing supervision at points of progression and when new activities were initiated. It was purported that during early stages of rehabilitation, resistance training should typically be of lower intensity and supervised by a physical therapist or athletic trainer in a clinical setting or in close tandem with strength and conditioning specialists. During the later stages of rehabilitation treatment, goals shifted from the resolution of impairment to functional recovery. Further, it was mentioned that re-injury, regaining status on a team, and failing to perform at pre-injury levels were the common factors that could affect the rate of recovery through overuse, avoidance, and other compliance issues. Educating athletes during the process of recovery and implication of psychological care from clinical or sport psychologists may help to offset such natural responses. According to Coris et al. (2007), the factor which was of critical importance is the mutual agreement between all involved parties over the athletes’ readiness to rejoin highly demanding sport and conditioning activities. Ultimately, successful rehabilitation depends on trust. The athlete must trust all those who participated in the treatment and rehabilitation process and places the welfare of the athlete first. An understanding of and commitment to the plan of care for each athlete, as well as communication among health care providers, strength and conditioning specialists, coaches, and the athletes were essential to the safest and most efficient recovery from injury. Kraemer et al. (2009) highlighted that an injured athlete should remain a patient regardless of who is developing and supervising each component of the recovery process until full medical clearance is provided to return to sport and the athlete is psychologically ready to return to play.

In another study, Jack et al. (2010) expressed similar concerns over significant positive relation between adherence and psychological factors. The aim of their systematic review was to identify barriers to treatment adherence in patients typically managed in musculoskeletal physiotherapy outpatient settings and suggested strategies for reducing their impact. The review included twenty high quality studies investigating barriers to treatment adherence in musculoskeletal populations. The
Discussion

results showed that strong evidence was found for low levels of physical activity at baseline or in previous weeks, low in-treatment adherence with exercise, low self-efficacy, depression, anxiety, helplessness, poor social support or activity, greater perceived number of barriers to exercise and increased pain levels during exercise as barriers to treatment adherence. Patient should be encouraged to start exercise gently and advised to progress to moderate or even high intensity levels of exercise over a period of time. This could counter the concern related to fear of re-injury. It was espoused that physiotherapists’ need to recognize and mitigate the barriers for initiating and adhering to exercise programs. The barriers included poor program organization and leadership, poor education, poor history of exercise, perceived physical frailty, perceived poor health and readiness to change. Physiotherapists should be sensitive to the presence of anxiety, depression and helplessness and should ensure that the patients suffering from these are referred to relevant healthcare services for appropriate management as required. Along with this, pain should be effectively managed so that it may be helpful in reducing anxiety or depression which was pain related. Further, the other barriers to exercise included transportation problems, child care needs, work schedules, lack of time, family dependents, financial constraints, convenience and forgetting. The authors suggested that the need for identification of these barriers during patient assessment may be an important step in order to adopt appropriate management strategies which help to counteract their effects and improve treatment outcomes. This review concluded that physiotherapists should be concerned about the attitudes, beliefs and barriers facing their patients and act collaboratively with their patients to design realistic treatment plans which are customized to the patients’ life circumstances.

It was examined by Kauppila et al. (2010), whether a multidisciplinary rehabilitation program could improve functional recovery and quality of life and reduce the use of rehabilitation services compared with conventional care one year after total knee arthroplasty. Eighty-six patients who were scheduled for primary total knee arthroplasty due to osteoarthritis of the knee were included in the study and were divided into two groups: control group receiving conventional orthopaedic care and multidisciplinary program group. A ten-day multidisciplinary rehabilitation program, which was focused on enhancing functional capacity, was organized 2–4 months after surgery. In both groups, a standard amount of physiotherapy was included in
The program aimed to improve the patients’ quality of life and functional capacity by improving lower limb strength, increasing lower limb joint mobility, improving endurance, and motivating the patients to carry out a regular exercise program and weight control. Finally, the aim of the program was to offer psychosocial support, especially through peer support. The results indicated that for unselected knee osteoarthritis patients treated with primary total knee arthroplasty, a 10-day multidisciplinary rehabilitation program 2–4 months after surgery did not achieve any faster attainment of functional recovery and did not improve quality of life more than conventional orthopaedic care, which included a standard amount of physiotherapy. Furthermore, it did not reduce the use of postoperative rehabilitation services. In both groups, self-reported disability and pain declined health-related quality of life, but objectively measured physical performance improved significantly. The multidisciplinary rehabilitation program that was used in this study was biopsychosocial in nature and it was contended that such programs based on the similar approach could prove useful in optimizing recovery post-injury.

Research has shown that some of the common psychological responses to injury (i.e., depression, anger, anxiety) were amplified in cases of traumatic injury. No physical injury can occur without psychological consequences, and these were largely contingent on personal and situational factors. McArdle (2010) reviewed a retrospective case study of an 18 year-old male soccer player who sought psychological support approximately three months after MCL (medial collateral ligament) and ACL (anterior cruciate ligament) reconstructive surgery on his right knee. It was found that athlete encountered a number of extreme responses including post-traumatic stress, depression, and fear of re-injury. After reconstruction surgery and along with ongoing physical therapy, cognitive-behavioural therapy was administered to treat negative mood, anger, fear of injury, and symptoms of post-traumatic stress disorder. The purpose of the therapy was to break the cycle of maladaptive thoughts, behaviours, and emotions exhibited by the player. To address the player’s anger and desire for revenge, time projection was employed. According to Green (1992), in rehabilitation, time projection is used to motivate the player to see himself or herself at a future stage in rehabilitation or to retrospectively reflect on progress made over the course of rehabilitation (both physical and psychological). The player indicated that his day-to-day mood had improved and he no longer wished to
injure his opponent. The player also said that his fear of re-injury had diminished but
was not completely gone. He was reassured that in many cases of ACL
reconstruction, fear of re-injury persists a little longer, even when the athlete is given
permission to return to sport. The player demonstrated good self-awareness and
positive coping skills. The player was in a position to return to competitive sport after
a thorough check by sports medicine practitioner and a psychologist. In this
retrospective case study, McArdle (2010) concluded that a number of novel cognitive
and affective factors contributed to successful rehabilitation following ACL
reconstructive surgery and various personal and situational factors could compound
negative psychological response to injury. It was concluded that knee function, pain,
and sociopsychological factors such as fear of re-injury played a role in the athlete’s
successful return to sport and practitioners should be aware of and monitor to reduce
their impact for successful rehabilitation in ACL patients.

Roi (2010) described that injury has a multifactorial nature and produces
tissue damage, resulting in clinical symptoms and different degrees of immobilization
and rest that affects the performance capacity of the athlete as a whole person.
Therefore, each injury needs to be viewed in the setting of the entire athlete, so
functional recovery after injury should be considered a multivariate psycho-biological
phenomenon involving the whole injured athlete. The safety of the rehabilitation
program was assured by a goal oriented pathway with protocols based on recovery of
a full range of motion (ROM), strength, and sport specific skills without pain,
swelling or effusion. These clinical signs indicated that the delicate balance required
to promote tissue healing without overstressing the repaired tissue, and together with
functional criteria must always be considered for load progression. The injured athlete
should start the rehabilitation program as early as possible with gym and pool
sessions, with specific interventions addressing pain, swelling, ROM, proprioception,
strength and aerobic fitness according to well known protocols. Sport-specific
patterns were introduced early, mainly in the pool (i.e., heading drills for soccer
players), but also in the gym, when possible. During the initial phases of the
rehabilitation performed in pool and gym, the attention of the rehabilitation team
should usually be high, and must remain high till the patient returns to his or her first
runs on the field. At this time the risk of complications and relapses is very high and
athlete may return to his team with an incomplete neuromuscular recovery. Therefore,
the final phases of the rehabilitation preceding the return to sport must be performed
Discussion

on a specialized rehabilitation field (on-field rehabilitation: OFR), under control of OFR specialists. During OFR, the injured athlete is considered as a whole person with a multi-disciplinary approach including the psychological component to obtain the best possible functional recovery. Thus, it was concluded that the safe return to competition after injury is a process that must include the injured athlete as a complete individual, where in the athletic rehabilitation team personnel must work collectively for optimal recovery.

Sullivan and Adams (2010) examined the profile of physical and psychosocial changes that occurred in physiotherapy intervention when patients also participated in a psychosocial intervention. The psychosocial intervention, delivered by physiotherapists, was designed to target catastrophic thinking, fear of pain, perceived disability, and depression. The study sample consisted of 48 individuals with disabling back pain. Half the sample was enrolled in a physiotherapy intervention which was characterized by a functional restoration orientation and the other half of sample was enrolled in Progressive Goal Attainment Program (PGAP) in addition to physiotherapy intervention. The goals of PGAP were achieved through targeted treatment of psychosocial risk factors, structured activity scheduling, involvement in graded activity, exposure to feared activities, goal setting, problem solving, and motivational enhancement. The results showed that at post-treatment, the two treatment groups did not differ significantly on measures of pain severity, physical function, or self-reported disability. Patients who participated in the psychosocial intervention in addition to physiotherapy showed significantly greater reductions in pain catastrophizing, fear of movement, and depression than patients who received only the physiotherapy intervention. Reductions in psychosocial risk factors contributed to reduced use of the health care system, reduced use of pain medication, and improved return-to-work outcomes. The findings of the study suggested that a psychosocial intervention provided by physiotherapists could lead to meaningful reductions in psychosocial risk factors for pain and disability and could contribute towards more positive rehabilitation outcomes.

The decision to return-to-play following an injury is a multifactorial process involving both physical and psychological parameters. Clanton et al. (2012) reviewed literature to identify and assess safe return to play in athletes following ankle injuries. This study documented four tests that have been used to assess range of motion,
balance and proprioception, agility and strength. Review was done for following four functional tests: dorsiflexion lunge test, star excursion balance test (SEBT), agility T-test, and sargent/vertical jump test. The importance of various psychological factors was also highlighted. The results of the study showed that 5% to 19% of athletes experienced psychological distress following an injury to levels comparable with patients receiving treatment for mental health illness. Rehabilitation following injury could be adversely affected by loss of confidence, fear, and anxiety. Most of these reactions were transient and improved during the rehabilitation process. Athletes’ who demonstrated apprehension, fear, or anxiety were at a much greater risk of re-injury, and there was a deleterious effect on athletic performance. Thus, the study concluded that testing balance and proprioception, strength, range of motion (ROM), and agility coupled with psychological assessment evaluates readiness for return to play.

Coppack et al. (2012) examined the effects of a goal setting intervention on self-efficacy, treatment efficacy, adherence and treatment outcome in patients undergoing low back pain rehabilitation. Forty-eight UK military personnel volunteers with mean age of 32.9 years (SD=7.9), with a diagnosis of non-specific low back pain were randomly assigned to either a goal setting Experimental group with 16 subjects (Exp), therapist-led exercise therapy group with 16 subjects (Control 1) or non-therapist-led exercise therapy group with 16 subjects (Control 2). Experimental group subjects completed the standard exercise program and a goal setting performance profile assessment. This personal goal profile formed a basis for goal setting and the subjects’ exercise rehabilitation. Control 1 subjects completed the standard exercise program. There was a strong emphasis on therapist directed exercise completion and the supervising therapist provided verbal encouragement and support, as well as individual coaching on correct exercise techniques. Control 2 subjects also completed the standard exercise program. The Control 2 supervising therapist did not provide verbal encouragement to motivate subjects, but did monitor exercise technique to ensure their safety. Results showed that adherence scores were significantly higher in the Experimental group compared with Control 2. There was no significant difference for adherence between the Experimental group and Control 1. Self-efficacy was significantly higher in the Experimental group compared to both Control 1 and Control 2, whereas no significant difference was found for treatment efficacy. Treatment outcome did not differ significantly between the Experimental
and two Control groups. The authors suggested that encouragement, supervision and 
explanation of treatment benefits might increase adherence to a rehabilitation 
program. Thus, the results of the study partially supported the use of goal setting in 
lower back pain rehabilitation.

Podlog et al. (2013) examined adolescent athletes’ injury recovery and return-
to-sport experiences and also the extent to which basic psychological needs theory 
(BPNT) could be used as a framework for interpreting the research findings. Eleven 
Australian athletes who had incurred a range of severe injuries (e.g., anterior cruciate 
ligament tears, shoulder dislocations) were interviewed on 2-3 occasions (n=27 
interviews) spanning an 11-month period. Analysis of the data revealed the following 
four key themes: (i) injury stress, (ii) coping strategies, (iii) experiences with social 
support, and (iv) recovery outcomes. Injury stress provided insight into a range of 
stressors and strain responses reported by the adolescents across the recovery phases, 
while the theme on coping highlighted the specific strategies used to maintain 
motivation, reduce uncertainties associated with the injury experience, and to keep 
focused on future athletic attainment. The third theme, experiences with social 
support, considered the transactions the adolescents held with members of their social 
network throughout their recovery. The final theme, recovery outcomes, described 
participant perceptions of a successful/unsuccessful recovery and stress-related 
growth. Results suggested that competence and relatedness issues highlighted in 
BPNT might be relevant in exploring adolescent athletes’ injury experiences.

In a study conducted by Richards et al. (2013), the effectiveness of 
physiotherapy functional restoration (PFR) treatment for post-acute (>6 weeks) low 
back pain (LBP) was determined. Randomised controlled trials of physiotherapy 
treatment for post-acute LBP combining exercise and cognitive-behavioural 
treatment compared with other intervention, no intervention or placebo were 
conducted. The results of the review suggested that PFR when applied to subjects’ 
with post-acute LBP may be more effective in improving pain and function than 
evidence-based advice. The results also suggested that physiotherapists are taught 
skills that give them the potential to apply cognitive-behavioural principles necessary 
for PFR. It was reported that high intensity of a multidisciplinary approach is a 
necessary requirement for effective functional restoration. It was further advocated
Discussion

that physiotherapy services are more easily accessible and hence have the potential to be more cost effective than multidisciplinary programs.

2. Intragroup Comparisons: Experimental group with Upper Limb Injuries, Lower Limb Injuries and Back Injuries at pre-post test intervention phase

Based on the review of literature following hypotheses were proposed:

2.1 The Experimental group sportspersons with upper limb injuries, back injuries and lower limb injuries were expected to show lower scores on Disabilities of the Arm, Shoulder and Hand, Modified Oswestry Low Back Pain Disability, and higher scores on Lower Limb Disability from pre to post-test phase.

2.2 The Experimental group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show lower scores on Heart Rate, Blood Pressure, Pain, and Pain Disability from pre to post-test phase.

2.3 The Experimental group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show lower scores on State Anxiety, Trait Anxiety, Perceived Stress, and Stress Symptoms from pre to post-test phase.

2.4 The Experimental group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show lower scores on Fear Avoidance Beliefs for both its dimensions, viz. Physical Activity and Work, and Kinesiophobia from pre to post-test phase.

2.5 The Experimental group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show higher scores on Self-esteem, Self-efficacy, and Optimism from pre to post-test phase.

2.6 The Experimental group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show higher scores on Social Support for both its dimensions, viz. Social Support-Network and Social Support-Satisfaction from pre to post-test phase.

2.7 The Experimental group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show higher scores on Perceived Success and Sports Injury Rehabilitation Beliefs (total) and its components, viz. Susceptibility, Treatment Efficacy, Self-efficacy, Rehabilitation Value and Severity from pre to post-test phase.
2.8 The Experimental group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show lower scores on Aggression (total) and its subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility from pre to post-test phase.

Table 1.19 shows means, standard deviations and t-ratios comparing pre and post-test differences of Experimental group with upper limb injuries. A glance at the t-ratios revealed that Experimental group showed a decrease in scores on Heart Rate (t=11.77, p<.01), Systolic Blood Pressure (t=2.13, p<.05), Pain (VAS) (t=18.00, p<.01), Pain Disability (t=11.54, p<.01), Disabilities of the Arm, Shoulder and Hand (t=11.02, p<.01) and its modules, viz. Work Module (t=10.41, p<.01) and Sports Module (t=13.96, p<.01), State Anxiety (t=13.67, p<.01), Trait Anxiety (t=8.58, p<.01), Fear Avoidance Beliefs-Physical Activity (t=12.54, p<.01), Fear Avoidance Beliefs-Work (t=9.42, p<.01), Kinesiophobia (t=10.36, p<.01), Perceived Stress (t=13.57, p<.01), and Stress Symptoms (t=9.15, p<.01). t-ratios also revealed that Experimental group showed a decrease in scores on Aggression (total) (t=14.74, p<.01) and its subscales, viz. Physical Aggression (t=10.52, p<.01), Verbal Aggression (t=13.84, p<.01), Anger (t=12.45, p<.01) and Hostility (t=12.23, p<.01).

The calculations of t-ratios revealed that Experimental group showed an increase in scores on Self-esteem (t=11.60, p<.01), Optimism (t=14.10, p<.01), Self-efficacy (t=10.77, p<.01), Social Support-Satisfaction (t=2.51, p<.05), and Perceived Success (t=21.91, p<.01). t-ratios also revealed that Experimental group showed an increase in scores on Sports Injury Rehabilitation Beliefs (total) (t=30.88, p<.01) and its components, viz. Susceptibility (t=20.07, p<.01), Treatment Efficacy (t=14.10, p<.01), Self-efficacy (t=12.65, p<.01), Rehabilitation Value (t=9.32, p<.01) and Severity (t=18.30, p<.01).

No significant differences emerged on Diastolic Blood Pressure and Social Support-Network in Experimental group with upper limb injuries from pre to post-test phase.

Table 1.21 shows means, standard deviations and t-ratios comparing pre and post-test differences of Experimental group with lower limb injuries. A glance at the t-ratios revealed that Experimental group showed a decrease in scores on Heart Rate (t=5.72, p<.01), Systolic Blood Pressure (t=2.03, p<.05), Pain (VAS) (t=21.90,
Discussion

p<.01), Pain Disability (t=12.61, p<.01), State Anxiety (t=16.67, p<.01), Trait Anxiety (t=15.23, p<.01), Fear Avoidance Beliefs-Physical Activity (t=14.18, p<.01), Fear Avoidance Beliefs-Work (t=10.57, p<.01), Kinesiophobia (t=15.61, p<.01), Perceived Stress (t=17.80, p<.01), and Stress Symptoms (t=12.15, p<.01). t-ratios also revealed that Experimental group showed a decrease in scores on Aggression (total) (t=21.38, p<.01) and its subscales, viz. Physical Aggression (t=16.62, p<.01), Verbal Aggression (t=17.33, p<.01), Anger (t=18.02, p<.01) and Hostility (t=20.55, p<.01).

The calculations of t-ratios revealed that Experimental group showed an increase in scores on Lower Limb Disability (t=13.13, p<.01), Self-esteem (t=9.53, p<.01), Optimism (t=10.51, p<.01), Self-efficacy (t=13.07, p<.01), Social Support-Satisfaction (t=6.68, p<.01), Social Support-Network (t=2.74, p<.01), and Perceived Success (t=28.02, p<.01). t-ratios also revealed that Experimental group showed an increase in scores on Sports Injury Rehabilitation Beliefs (total) (t=32.80, p<.01) and its components, viz. Susceptibility (t=23.90, p<.01), Treatment Efficacy (t=29.30, p<.01), Self-efficacy (t=25.99, p<.01), Rehabilitation Value (t=20.27, p<.01) and Severity (t=14.79, p<.01).

No significant differences emerged on Diastolic Blood Pressure in Experimental group with lower limb injuries from pre to post-test phase.

Table 1.23 shows means, standard deviations and t-ratios comparing pre and post-test differences of Experimental group with back injuries. A glance at the t-ratios revealed that Experimental group showed a decrease in scores on Heart Rate (t=5.81, p<.01), Systolic Blood Pressure (t=5.27, p<.01), Diastolic Blood Pressure (t=3.69, p<.01), Pain (VAS) (t=20.35, p<.01), Pain Disability (t=23.54, p<.01), Modified Oswestry Low Back Pain Disability (t=9.61, p<.01), State Anxiety (t=14.53, p<.01), Trait Anxiety (t=14.10, p<.01), Fear Avoidance Beliefs-Physical Activity (t=10.65, p<.01), Fear Avoidance Beliefs-Work (t=10.96, p<.01), Kinesiophobia (t=9.46, p<.01), Perceived Stress (t=11.05, p<.01), and Stress Symptoms (t=11.99, p<.01). t-ratios also revealed that Experimental group showed a decrease in scores on Aggression (total) (t=10.02, p<.01) and its subscales, viz. Physical Aggression (t=4.02, p<.01), Verbal Aggression (t=7.98, p<.01), Anger (t=11.58, p<.01) and Hostility (t=8.98, p<.01).
Discussion

The calculations of t-ratios revealed that Experimental group showed an increase in scores on Self-esteem ($t=7.48$, $p<.01$), Optimism ($t=9.43$, $p<.01$), Self-efficacy ($t=7.18$, $p<.01$), Social Support-Satisfaction ($t=5.49$, $p<.01$), Social Support-Network ($t=2.18$, $p<.05$), and Perceived Success ($t=25.18$, $p<.01$). t-ratios also revealed that Experimental group showed an increase in scores on Sports Injury Rehabilitation Beliefs (total) ($t=24.95$, $p<.01$) and its components, viz. Susceptibility ($t=13.39$, $p<.01$), Treatment Efficacy ($t=12.83$, $p<.01$), Self-efficacy ($t=13.50$, $p<.01$), Rehabilitation Value ($t=8.96$, $p<.01$) and Severity ($t=8.95$, $p<.01$).

Results revealed that the Experimental group showed statistically significant differences from pre to post-test in sportspersons with upper limb injuries, lower limb injuries and back injuries. Experimental group showed marked improvement on physical functional status/disability scales, i.e., Disabilities of the Arm, Shoulder and Hand and its modules, viz. Work Module and Sports Module, Lower Limb Disability, and Modified Oswestry Low Back Pain Disability in sportspersons with upper limb injuries, lower limb injuries and back injuries from pre to post-test phase.

Experimental group showed statistically significant decrease in scores on Heart Rate, Systolic Blood Pressure in sportspersons with upper limb injuries, lower limb injuries and back injuries from pre to post-test phase. Experimental group also showed statistically significant decrease in scores on Diastolic Blood Pressure in sportspersons with back injuries from pre to post-test phase. Experimental group showed statistically significant decrease in scores on Pain (VAS), Pain Disability, State Anxiety, Trait Anxiety, Perceived Stress, Stress Symptoms, Fear Avoidance Beliefs-Physical Activity, Fear Avoidance Beliefs-Work, and Kinesiophobia in sportspersons with upper limb injuries, lower limb injuries and back injuries from pre to post-test phase.

Experimental group showed statistically significant increase in scores on Self-esteem, Optimism, and Self-efficacy in sportspersons with upper limb injuries, lower limb injuries and back injuries from pre to post-test phase. Experimental group also showed statistically significant improvement on Social Support-Satisfaction in sportspersons with upper limb injuries, lower limb injuries and back injuries from pre to post-test phase. Experimental group showed statistically significant improvement


Discussion

on Social Support-Network in sportspersons with lower limb injuries and back injuries from pre to post-test phase.

Experimental group showed statistically significant increase in scores on Perceived Success and Sports Injury Rehabilitation Beliefs (total) and for all its components, viz. Susceptibility, Treatment Efficacy, Self-efficacy, Rehabilitation Value and Severity in sportspersons with upper limb injuries, lower limb injuries and back injuries from pre to post-test phase.

Results also revealed that the Experimental group showed statistically significant decrease in scores on Aggression (total) and its subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility in sportspersons with upper limb injuries, lower limb injuries and back injuries from pre to post-test phase.

Results revealed that insignificant differences emerged on Diastolic Blood Pressure in Experimental group sportspersons with upper limb injuries and lower limb injuries from pre to post-test phase. Insignificant differences also emerged on Social Support-Network in Experimental group sportspersons with upper limb injuries from pre to post-test phase.

Thus, it may be concluded that hypotheses related to the above mentioned variables were upheld in majority of cases. However, the overall hypotheses related to Blood Pressure and Social Support were not upheld in its entirety.

Earlier research lends support to the above mentioned findings of the present study.

Ievleva and Orlick (1991) conducted a study to determine the relationship between various psychological factors and recovery time post injury. The sample of the study involved 32 former patients who had sustained knee or ankle injuries. Participants completed a survey designed to measure positive attitude, outlook, stress and stress control, social support, goal setting, positive self-talk, and mental imagery. The results of the study indicated that individuals who healed more rapidly scored higher on all variables than slow healers. It was put forth that the main variables associated with speed of recovery were goal setting, positive self-talk, and imagery. Self-talk of “fast healers” was highly positive (e.g., “I can do anything”), whereas “slow healers” demonstrated negative and unforgiving self-talk (e.g., “Why me?” “What a stupid thing to do”). “Fast healers” also used goal setting more and their
daily goals were related to recovery time rather than to long-term or return-to-sport goals. With respect to imagery, the use of healing imagery showed the greatest relationship to recovery time. The study concluded that psychological skills could play an important role in promoting healing, because goal setting, positive self-talk, and imagery are within the control of the injured athlete.

Granito et al. (1995) devised a Performance Enhancement Group program in an effort to improve the psychological health of the athlete who has sustained an injury. The Performance Enhancement Group program was designed to: (i) support the athlete, both mentally and physically; (ii) deal with the demands of rehabilitation; and (iii) facilitate the adjustments the athlete has to make while being out of the competitive arena. The program consisted of responsibilities for professionals in sport psychology (i.e., assessment/orientation, support, education, individual counseling, and evaluation) and athletic training (i.e., organization/administration, recruitment and screening, support, application of techniques, and program compliance). It was emphasized that the success of the program was dependent on collaboration between professionals at all levels. The value of the program was dependent on the participants’ ability to apply the performance enhancement techniques and it was essential for the student athletic trainer to remind the athlete to practice those skills. The results of the study suggested that using imagery to correct improper techniques or focus on pain-free range of motion during pool therapy were few of the ways to improve confidence in the use of an injured limb. Informal feedback from athletes suggested a difference in the way athletes who participated in the Performance Enhancement Group approached their rehabilitation and return to sport. The strongest indication for the effectiveness of the Performance Enhancement Group program came from the number of referrals of friends/teammates by former Performance Enhancement Group participants. The study concluded that the collaboration between professionals must be emphasized at all stages of the rehabilitation program. By taking a team approach to the Performance Enhancement Group program, the welfare of the individual athlete could be enhanced and prioritized.

Harding and Williams (1995) discussed the cognitive-behavioural approach to chronic pain management and the role played by the physiotherapists. It was put forth that the physiotherapist is mainly responsible for providing information to patients on subjects associated with the neuro-musculoskeletal system, such as the effects and
Discussion

dangers of disuse, the process of healing, and the health needs of different joint structures. Acute physiotherapy has been found to be effective for the ‘curable’ patient, but in case of chronic pain, different emphasis is needed. The physiotherapist may take responsibility for measuring the patients’ physical function for the purpose of outcome assessment. The authors suggested that physiotherapist is in the ideal position to deliver cognitive behavioural therapy for the management of pain. The cognitive component of a chronic pain management program involved teaching patients to identify thoughts and beliefs which underpin maladaptive behaviours and which adversely affect mood. Once the patient identified the disabling cognitions, then the patient may try to use cognitive restructuring to identify and challenge longstanding beliefs with resultant improvement in mood and in practical coping with the pain. Thus, the study concluded that cognitive restructuring is a task that varies cognitive and behavioural principles helpful in chronic pain management.

It was reported by Wagman and Khelifa (1996) that factors which contributed towards adherence to the rehabilitation regimen included high level of motivation, task involvement, pain tolerance, and perceived exertion. If cognitive, emotional, and behavioural manifestations were associated with the injury, then psychological intervention becomes a must. One should focus on replacement of any unproductive thinking patterns that might contribute to psychological distress. Once injured, athletes often get engaged in negative thoughts and self-defeating internal dialogue. The ultimate goal is to replace the negative thought patterns with positive affirmations. Motivation might be fostered if the athlete realizes that performance is facilitated by mental rehearsal during a time when he/she is unable to rehearse physically. It was put forth that in the event of injury delaying return to the sport, the individual or group counseling sessions dealing with the issues of leaving the competitive arena, received by the athletes could prove to be useful. This process may involve coping strategies, self-esteem development, and other techniques aimed at avoiding an identity crisis. The study concluded that athletes should be rehabilitated both physically and psychologically for the ultimate goal of recovery and return to competition.

Gordon et al. (1998) addressed significant gaps in the training programs of sport-injury rehabilitation personnel (SIRPs) in the area of psychology. The study aimed to offer for consideration a psychoeducational curriculum that was specifically
designed for the training of professionals who worked with injured athletes. The ultimate aim was to produce specialists’ with a highly developed sense of self-awareness and understanding of their impact upon others, including those from different cultures or social classes. It was suggested that specialists’ must acquire the ability to use empathy and active listening skills to facilitate the engagement of clients in collaborative rehabilitation that met the clients’ needs and provided meaning for their unique lives. Consequently, specialists’ were encouraged to explore issues in relation to “the self” using reflective journals, role plays, interviews, analyses of audio transcripts and videos, and peer reviews. The study concluded that rehabilitation specialists’ must be able to demonstrate effective work experience with a sport team for a full season. In particular, specialists’ must endorse mental skills for assessment which would facilitate a better understanding of the theory and application of these techniques as well as increases the likelihood that these would be adopted as a normal part of practice.

Francis et al. (2000) assessed the opinions of physiotherapists’ and male professional athletes’ on the use of psychological skills in sport injury rehabilitation. The sample consisted of physiotherapists (36 males and 21 females, aged 26-54 years) and professional athletes (28 males, aged 18-38 years). The professional athletes had suffered a self-reported average of 4.79 (SD=4.37) injuries each requiring physiotherapy over the past two years. The survey consisted of three sections, each required item ratings according to a 5-point likert scale. In first section, physiotherapists and athletes were asked to “Rate the importance of the following characteristics or factors in distinguishing athletes who coped most successfully from those who coped least successfully with their injuries” (12 items; e.g., willingness to listen to physiotherapist, high self-esteem). The second section asked, “Rate the effectiveness of the following techniques or strategies for facilitating athletes’ ability to psychologically cope with injury rehabilitation” (11 items; e.g., coach support of athletes, positive reinforcement by physiotherapist). The third section required physiotherapists and athletes to decide, “How important is knowledge about the following strategies for physiotherapists in dealing with injured athletes?” (12 items; e.g., teaching the use of mental imagery, encouraging positive thoughts). The results showed that physiotherapists graded, willingness to listen to physiotherapist, as the most important characteristic possessed by athletes’ who coped successfully with their
Discussion

injuries. Again, in the second section, communication received high priority. In the third section, knowledge about using a positive and sincere communication style was ranked as the most important item. Motivation and encouragement also seemed to be significant issues for physiotherapists when treating injured athletes because positive attitude, intrinsic motivation, determination/mental toughness, and use of goal setting were thought to be adaptive characteristics for athletes coping with injury. Furthermore, focusing on short-term goals and positive reinforcement by the physiotherapists’ were rated as effective techniques. The responses of athletes indicated their desire to take an active part in the rehabilitation process. The athletes stressed upon the need for being given realistic time frames by physiotherapists’ which would help in healing but were not in favor of establishing short term goals. Thus, bot1 these groups emphasized upon the need for establishing good communication and motivation for successful rehabilitation. Strikingly, both the groups considered relaxation and visualization techniques to be least effective in rehabilitation.

Jevon and O’Donovan (2000) explored the use of psychological intervention in the British Championship motorcycle racer (male, age 22.4 years) who had internal fixations to a 3 week old transverse fracture of left tibia and fibula. The patient initially appeared to be uncommitted to the treatment and rehabilitation protocol and spoke negative about returning to racing. To overcome these difficulties, both the athlete and primary care provider determined those areas that the racer felt needed the most attention from a psychological standpoint. The intervention strategies consisted of a combination of relaxation techniques, imagery, positive self talk and affirmations, goal setting, negative thought stopping and cognitive restructuring which were gradually introduced to the racer by the athletic trainer. The results showed significant changes in the constructs that related primarily to confidence, both in return to competition and during the treatment and rehabilitation of the injury, and an overall impression of positive progress was noted. There was increased compliance to treatment and rehabilitation prescription, particularly during the later stages of rehabilitation where over compliance to rehabilitation programs could become a significant issue. The study concluded that after psychological intervention, a clear focus and purpose to each treatment session was observed.
It was ascribed by Roh and Perna (2000) that psychological factors were significant predictors of athletic injury. It was accentuated that athletic injury is accompanied by significant psychological distress, which has been shown to impair rehabilitation compliance and possibly physical recovery. Evidence suggested that (i) psychological distress is prospectively associated with the incidence of athletic injury, and prolonged psychological distress, specifically depression, may occur after athletic injury; (ii) psychological factors may also either hinder or facilitate rehabilitation adherence compliance, and recovery; (iii) psychological distress may persist even after physical recovery has been completed; (iv) psychosocial factors related to injury occurrence and injury recovery may be overlooked by athletic trainers, but knowledge of these factors and appropriate use of referral sources may enhance the effectiveness of athletic trainers; and (v) athletic trainers may benefit from structured educational experiences specific to the National Athletic Trainers’ Association psychology/counseling competency. It was suggested that many counseling skills, such as active listening and provision of emotional support, could be offered to the injured athletes and the effects could be therapeutic. Also, the application of psychological principles (e.g., goal setting and self-monitoring, relaxation training) might also enhance rehabilitation compliance, quality of sleep, and pain tolerance.

In order to gain insight into the social support needs and provider preferences of injured athletes, Bianco (2001) conducted open-ended interviews with high-performance skiers who had recovered from serious sport injuries. Ten Canadian national team alpine skiers were interviewed for the study. The interview guide was pilot-tested and subsequently refined to elicit information regarding the participants’:
(i) interactions with various individuals throughout the injury period, (ii) perceptions of what individuals did that were helpful or not helpful, and (iii) social support preferences. The phase of injury marked the period from the occurrence of injury to the beginning of treatment (excluding first aid administered at the time of injury). Skiers who had experienced marked psychological disruption during the injury phase indicated a strong need for listening support and emotional comfort to assuage the impact of the injury and help them come to terms with the event. Similarly, those skiers who had encountered motivational difficulties in rehabilitation showed a high need for informational support aimed at helping them initiate and sustain active coping strategies (e.g., adhering to prescribed treatment) for return to full activity.
Discussion

phase. Results showed that depending on factors such as injury severity, diagnoses and prognoses, and prior experience with injury, being injured was more devastating for some skiers than others. Individual differences were also noted in coping style, with some skiers preferring to keep their thoughts and feelings to themselves and others favoring open discussion with others. Skiers in the study reported that family and close friends were constant sources of emotional support throughout the injury experience. The findings from the study also indicated that coaches and allied health professionals could play an important role in allaying injured athletes’ concerns about their future and keeping them focused and motivated throughout recovery and the return to full activity. The study concluded that by recognizing the issues and challenges particular to specific phase of the injury process, those involved in developing and administering social support interventions would be in a better position to assist injured athletes.

Hemmings and Povey (2002) investigated the perceptions of English chartered physiotherapists on the psychological content of their practice. The sample consisted of 67 females and 23 males with a mean (SD) age of 40.1 (5.4) years and 9.2 (3.1) years of experience as chartered physiotherapists. A survey package which comprised of the Physiotherapist and Sport Psychology Questionnaire (PSPQ), introductory letter, and self addressed envelope was mailed to 179 chartered physiotherapists. The results showed that in total, 90 (50% response rate) questionnaires were returned. Descriptive statistical and qualitative analysis showed that physiotherapists believed athletes were often psychologically affected by injury. The physiotherapists also reported using psychological techniques when treating injured athletes, but only few reported having access to a sport psychologist for referral. It was concluded that chartered physiotherapists clearly indicated the importance of psychological processes in recovering from sport injury. The physiotherapists cited stress and anxiety as the most commonly encountered response to injury. Thus, it was contended that psychological difficulties were common amongst injured athletes to an extent, that it becomes imperative for physiotherapists to provide psychological support to the injured athletes.

Heaney (2006) investigated the attitudes and perceptions of physiotherapists working in professional soccer towards sport psychology intervention in injury rehabilitation. The physiotherapists’ attitude towards sport psychology within injury...
rehabilitation was assessed using the Physiotherapist and Sport Psychology Questionnaire which was distributed to all professional soccer clubs in England and Wales. Thirty-nine of the questionnaires were returned fully completed. In addition to this, 10 of the 39 respondents participated in semi-structured interviews designed to further examine attitudes and perceptions in this area. It was found that the physiotherapists believed that negative psychological reactions to sport injury were fairly common, with stress/anxiety being the most commonly cited reaction amongst professional soccer players. Fifty-one percent of the physiotherapists reported having referred an athlete to a sport psychologist. The stigma associated with consulting a psychologist was found to be a barrier to referral. It was suggested that more education as to the role of sport psychology in injury rehabilitation is required, along with the development of a sport psychology referral network. The physiotherapists surveyed displayed a positive attitude towards the role of sport psychology in injury rehabilitation by indicating a high level of belief that soccer players were affected psychologically by injury and also by reporting the use of sport psychology interventions. The physiotherapists reported a high level of referral of injured players for counseling for reasons related to their injury. This suggested that the participant group had a greater appreciation of the assistance a sport psychologist could provide to an injured performer, and/or had a higher degree of access to sport psychology support than did the participants in previous studies. The study concluded that more education as to the role of sport psychology is required in order to discourage negative attitudes towards players who consult a sport psychologist.

Vergeer (2006) explored an athlete’s injury-related thoughts, sensations and images throughout the recovery process. The study included a 28-year old male participant, rugby player, who had sustained a severely dislocated shoulder. Eight unstructured interviews were conducted over a period of 20 weeks, while a follow-up interview took place 3 years post-injury. The interviews were audio-taped, transcribed, and analysed using qualitative analyses procedures. Four interdependent themes emerged from the interviews: (i) awareness, (ii) mental imagery, (iii) mental model of the injury, and (iv) mental ‘itinerary’ of the recovery process. The results revealed that the temporal dynamics of the recovery process were evident in the flux of attention-demanding properties of the injury, (dis)appearance of images over time, increased complexity of the mental model, and construction and concretisation of the
Discussion

mental itinerary. The role of the athletes’ desired self-concept in shaping his inferences, actions and emotions, emerged as a fifth theme. The findings were synthesized into a ‘multi-track’ conceptualization of the athletes’ covert and overt injury-related activities over time. In conclusion, through examining the injury mental representation of one athlete, in-depth and over time, the study enabled the identification and tentative integration of several dimensions of injury relevant information processing and their longitudinal manifestations. By pointing out the role of different types of awareness, the structure and importance of a mental itinerary, the increasing complexity of a mental model, and the motivational role of an athletes’ desired physical self, the identified dimensions offered a more comprehensive understanding of injury-relevant information processing and emotional and behavioural reactions, as well as frameworks for future research. The study also highlighted the occurrence of spontaneous, in addition to purposefully conjure up, mental images, and it was suggested that these images might be understood by placing them within different tracks.

Mann et al. (2007) explored the extent to which sports medicine physicians’ encounter and discussed psychological issues among athletes they treated. The physicians’ perceptions of availability and efficacy of sport psychologists and other mental health resources were also evaluated. A survey was sent via e-mail to all physician members of four prominent sports medicine professional associations: American Orthopaedic Society for Sports Medicine, American College of Sports Medicine, American Medical Society for Sports Medicine, and American Osteopathic Academy of Sports Medicine. The extent to which respondents discussed psychological issues with athletes varied with respect to different subspecialties’ and by specific issues. It was found that fear about re-injury, fear related to surgery, and lack of patience with recovery/rehabilitation were the three most common injury related topics discussed by the sports medicine physicians’ with patient-athletes. The three most common non-injury related topics discussed were stress/pressure, anxiety, and burnout. Injury related psychological concerns were more prevalent and salient for most injured athletes than were non-injury psychological concerns. Only 19% of all respondents indicated there were adequate numbers of sport psychologists and other mental health professionals in their geographical area to treat the needs of athletes. Three quarters of respondents reported they rarely or never referred athletes
to sport psychologists for injury related issues, and two thirds indicated they rarely or never referred athletes to sport psychologists for non-injury related problems. It was postulated that family physicians, pediatricians, and internists more often see athletes with other types of somatic complaints, some of which included symptoms of psychological distress (e.g., headache, insomnia, fatigue, agitation, general malaise) which facilitated the discussion of injury as well as non-injury related concerns whereas the orthopaedic surgeons were less aware of how often athletes experienced non-injury related emotional problems and therefore may not be sensitive in detecting such problems. Thus, sports medicine physicians in general should talk with patient-athletes about both injury related and non-injury related emotional/behavioural issues and when such significant emotional or behavioural issues were detected, it was important that patient-athletes be directed to appropriate care providers. The study concluded that resources such as a brief patient report questionnaire, patient education materials, and online or written resources regarding assessment and referral might give sports medicine physicians’ additional tools to deal with psychological problems of their patient-athletes.

In a systematic review, Mendonza et al. (2007) investigated the relationship between psychosocial factors, adherence and outcomes of rehabilitation following anterior cruciate ligament (ACL) injury/reconstruction. The study reported that psychological factors, in particular motivation, self-efficacy and perceptions of personal control were positively associated with adherence behaviours and rehabilitation outcomes. Also, social support, and fear about re-injury had an impact on rehabilitation adherence. There were contradictory findings for the adherence-rehabilitation outcome relationship with regard to age, with it, being positive for young adults, but negative for older adults, which was suggestive of a dose-response effect. It was reported that older adults would benefit from a slower rehabilitation protocol in terms of their rehabilitation outcomes, but with the use of psychological readiness the older patients might fare better post-operatively. The review pointed towards some clear links between psychological factors and adherence. Thus, while prescribing a rehabilitation program following ACL reconstruction, physiotherapists should take into account the patients’ age, and psychological and physical status for optimal outcomes.
Discussion

Samulski and Lopes (2008) investigated the effect of counseling on athletes during the Athens Olympic Games in 2004. A sport psychologist was recruited by the Brazilian Olympic Committee (COB) to provide psychological counseling. The main purposes of this counseling were to develop mental and emotional control skills and to offer psychological support to both athletes and coaches. The Brazilian sport psychologists in the Olympic Village offered interventions to individuals and teams. The following issues were uncovered by psychological tests and structured interviews: competitive anxiety, symptoms of psychosomatic stress, psychological pressure for winning, concentration difficulties, emotional instability, and difficulties in controlling pain. One of the main objectives of the psychological support was to develop and optimize psychological routines to be applied by the athletes before and during competition. It was perpetuated that psychological routines were critical for maintaining mental concentration, emotional stability, and control during competition, especially in situations of decision making and high psychological pressure. A total of 50 sessions of psychological support and supervision took place throughout the entire event, among which relaxation, concentration techniques, anxiety and stress management, and psychological routines for competition were practiced. Most of the athletes and coaches gave positive feedback on the psychological support during the Games. It was noticed during the Games that some of the national coaches’ demonstrated problems related to effective leadership, team building, motivation, and communication. For this reason, it was espoused that the Olympic Committee should offer coaches’ education programs in the future in order to develop psychological and social skills. The study concluded that education programs for coaches’ should consider topics such as philosophy of coaching, human values, motivation, leadership, and communication skills. Finally, psychological preparation should be an integrated and long-term preparation process, orientated and supervised by an expert in coaching and counseling. It was further advocated that young athletes need more intensive mental preparation and emotional support.

Arvonen-Barrow et al. (2010) interviewed physiotherapists’ regarding the content of psychological component in their treatment of injured athletes. The authors reported that the physiotherapists believed it was necessary to use psychological skills in their work with injured athletes. It was espoused that physiotherapists’ felt that recognizing the importance of psychological rehabilitation was important and equally
Discussion

important was the clarity of role in relation to knowing one’s own competencies and being able to refer the patient when required. The role of physiotherapist as a facilitator for the athletes to seek social support from other sources (e.g., family, friends, team mates, and coach) depended on the individual athlete. The study concluded that if physiotherapist is receptive about athletes’ concerns then it has a positive impact on the recovery process. Also, it was equally important that the athletes should realize that the interventions they received were credible and useful which also positively influenced the recovery process.

Although physical factors have ascended to a position of primacy in explaining and guiding treatment towards attaining sport injury rehabilitation outcomes, psychological factors may also play an important role in the rehabilitation process. Brewer (2010) reviewed 26 correlational studies in which significant relationships between psychological factors have been found and 14 experimental studies in which the effects of psychological factors on sport injury rehabilitation outcomes have been assessed. A variety of personal, cognitive, affective, and behavioural factors associated with sport injury rehabilitation outcomes have been identified and several interventions have been found effective in enhancing sport injury rehabilitation outcomes. Causal links between psychological factors and sport injury rehabilitation outcomes were documented and despite of small sample sizes, interventions such as EMG biofeedback, imagery, goal setting, modeling, and multimodal treatment packages have been found generally effective in enhancing subjectively and objectively assessed rehabilitation outcomes primarily for conditions of the knee involving surgery. The need for considering sport injury rehabilitation outcome as multidimensional allowed for the generation of more detailed propositions than those offered by the integrated and biopsychosocial models. It was purported that the sport injury rehabilitation outcomes could be divided into two interrelated categories: cognitive/affective outcomes and functional/physical outcomes. Athletes who adhered to their prescribed rehabilitation regimens might experience greater confidence in their recovery and greater satisfaction with their rehabilitation than those who did not adhere to their rehabilitation programs. High levels of adherence to rehabilitation might have a positive impact on outcomes such as strength, range of motion, and endurance. Interventions designed to enhance the performance of rehabilitation behaviours (e.g., goal setting, reinforcement) would be expected to
Discussion

contribute to both cognitive/affective and functional/physical outcomes. The study concluded that data from correlational and experimental investigations indicated that a variety of psychological factors were associated with sport injury rehabilitation outcomes, and that several psychological interventions could exert a causal influence on sport injury rehabilitation outcomes.

Chan et al. (2011) applied the trans-contextual model (TCM) to understand the motivational dynamics of rehabilitation for physical injury among individuals who were injured in sport for various reasons. Two studies were employed to understand the relationships between sport motivation, treatment motivation, and autonomy support. Study 1 tested TCM among recreational athletes, while Study 2 examined the effects of causality orientations and autonomy support from coaches in the TCM among professional athletes. In Study 1, 115 recreational athletes with ruptured anterior cruciate ligaments completed questionnaires measuring sport motivation, autonomy support from physiotherapists, and treatment motivation for injury rehabilitation. In Study 2, 206 professional athletes with experiences of moderate to severe sport injury completed questionnaires which assessed sport motivation, general causality orientation, autonomy support from coaches and physiotherapists, and treatment motivation and treatment intention based on a hypothetical injury scenario. The results showed that in Study 1, autonomous sport motivation and controlled sport motivation formed positive associations with autonomous and controlled treatment motivation, when controlling for the effect of autonomy support from physiotherapists. In Study 2, the relationship between sport motivation and treatment motivation corroborated findings of Study 1. In addition, autonomy orientation formed positive associations with autonomous sport, treatment motivation, and autonomy support from coaches and physiotherapists. Autonomy support from physiotherapists, instead from coaches, positively predicted autonomous treatment motivation. The study concluded that TCM effectively explained the transfer of motivation between sport and treatment contexts. It was espoused that the responsibility should be on coaches and physiotherapists to promote self-determined or autonomous forms of motivation in their athletes. It was also advocated that numerous techniques exist which endorsed autonomous motivation like providing rationale, giving choice, promoting self-referenced goals, acknowledging conflict, and providing experiences of competence and mastery in practice and training. Thus,
these techniques should be incorporated in the rehabilitation of injured athletes’ for optimal recovery.

Stambulova (2011) presented the mobilization model for counseling athletes in crisis-transitions. The model was a six-step educationally oriented framework for a dialogue between a consultant and a client, supporting the client to analyze his/her crisis-transition, and finding the best possible solution based on the three coping alternatives (termed “rejection,” “acceptance,” and “fighting”) outlined in the mobilization model. The six steps suggested by the mobilization model in a dialogue between a consultant and an athlete were: (i) collecting and sorting out the client’s information; (ii) identifying, prioritizing and articulating the problem issues; (iii) analyzing the athlete’s current status of coping resources and barriers; (iv) discussing alternatives in coping (termed “rejection,” “acceptance,” and “fighting”) and stimulating the athlete to make a strategic decision; (v) goal setting and planning in regard to the strategic decision made; and (vi) concluding and providing follow ups. It was purported that empathetic listening to the client was of crucial importance. The consultant involved the client by talking about what issues were central and should be treated first, and what issues were peripheral and could be treated second, or even be eliminated when the central issues were solved. The consultant should keep in mind that health related issues (e.g., injury rehabilitation, depressed mood) as well as “reason-issues” (i.e., potential causes for frustration, anxiety or other symptoms experienced by the client) should be prioritized over other problem issues. Active listening, metaphoric language, giving examples, referring to the client’s previous experience, and telling stories were described as good strategies for the consultant. The consultant discussed alternative solutions for the crisis with the client and stimulated him/her to make a strategic decision. When the strategic decision was made, the consultant started to discuss goal setting and action planning with the client, depending on the alternative taken (e.g., “rejection,” “acceptance,” or “fighting”). Finally, both the client and consultant should ensure that the counseling was useful, and whether the client has increased self-efficacy to cope with the crisis. The study concluded that counseling based on this model helped the athlete to perceive crisis not as a dead end, rather should take it as a crossroad situation in sport and life.

Benka et al. (2012) investigated the course of psychological distress in early rheumatoid arthritis (RA) patients and explored the strength of its association with
Discussion
disease-related variables over time. The study also investigated the association of psychological distress with joint tenderness, disease activity (ESR), pain, functional disability, and social support. The sample of the study comprised of 116 RA patients as participants. Four waves (T1–T4) of data collection were carried out. The results showed that the psychological distress remained fairly stable over time, and no significant differences were found at the group level when the four consecutive measurements were compared and also no significant differences were found for ESR, pain and functional disability. Joint tenderness showed a slight decreasing tendency whereas social support measures showed a gradual increasing tendency. The analysis showed that psychological distress experienced at the beginning of the study was the strongest predictor of psychological distress 4 years later. It was found that emotional support was directly associated with psychological distress and remained significant even after controlling for initial psychological distress. Time-lagged associations, initial psychological distress, pain and Emotional Support Satisfaction (ESS) were found to be significant in the final model, whereas gender and marital status were not significant. It was also found that emotional support from the social environment might serve as a protection against psychological distress, though these two variables were always interrelated. However, instrumental support was not found to be associated with psychological distress after controlling for the relevant variables. Significant cross-sectional associations were found among functional disability, joint tenderness, pain, emotional support, instrumental support and psychological distress. However, after controlling for the erratic pattern of the disease and the relevant variables, only initial psychological distress and emotional support retained a significant relationship with psychological distress. The study concluded that psychological distress showed the highest correlation with initial psychological distress. Pain and emotional support also demonstrated significant correlations with psychological distress in early RA and could serve as an indicator of patient’s vulnerability to psychological distress. It was suggested that it could be beneficial to take the social factors addressed in this study into consideration with regard to treatment of patients with RA. Early treatment of psychological distress via participation in support groups and other social activities might prevent an increase in feelings of depression and anxiety. The authors opined that such psychosocial
Discussion

preventive treatment could be a substantial source of emotional support that could enhance the overall quality of life of people with RA.

Podlog et al. (2012) examined the parental perspective on adolescents’ injury rehabilitation and return to sport experiences. The authors interviewed ten Australian parents (7 females and 3 males) between the age group of 39-51 years over eleven month period. Issues spanning the rehabilitation phase, pre-return to competition, and return to competition following injury were addressed in a semi-structured interview guide. Six key themes emerged from parent interviews: injury rehabilitation and return to competition stressors, coping strategies for psychological and physical pain, parental concerns regarding injury rehabilitation and return to sport, the provision of social support, perceptions of a successful return to sport, and benefits of the injury experience. Negative emotional responses to injury, physical mobility difficulties, motivational decrements and re-injury anxiety were the few stressors mentioned by parents. Similarly, engaging in non-sport related activities and socializing with friends were found as coping strategies for psychological and physical pain. The results showed that parents were aware and sensitive to the concerns and coping strategies used by their adolescents. Social and emotional support from family members, coaches and teammates were also highlighted by parents during interviews. It was put forth that a range of strategies including goal-setting, imagery, and the provision of progressive physical training might be effective in meeting athletes’ competence needs. Results of this investigation suggested that while utilizing these strategies, coaches and medical practitioners should direct adolescents’ attention to self-referent goals and standards of improvement. It was also suggested that the injury-coping processes could be facilitated by coaches and parents by encouraging adolescents’ to develop non-sport competencies such as scholastic endeavors and personal activities of interest. Similarly, the injured adolescent perceptions of autonomy could be enhanced by involvement in injury rehabilitation and return to sport decisions as well as non-pressuring behaviours. This perception of autonomy could also be enhanced by coaches and rehabilitation specialists by providing choices and options regarding rehabilitation exercises, a rationale for the benefit of performing particular exercises, and the use of non-controlling language to reinforce perceptions that one is returning to competition for autonomous reasons. Finally, it was suggested that employing
various social support and group involvement strategies might be beneficial in meeting athletes’ relatedness needs.

Reese et al. (2012) summarized the empirical findings of the effects of psychological interventions in reducing post-injury psychological consequences and improving psychological coping during the injury rehabilitation process among competitive and recreational athletes. The authors utilized a comprehensive search strategy and conducted electronic searches of multiple electronic databases for randomized and nonrandomized control trials that evaluated interventions targeting populations of injured competitive and recreational athletes aged 17 years and older. The study included interventions that directly intervened on injured athletes’ psychological outcomes (e.g., psychological consequences, psychological coping and re-injury anxiety) and utilized psychological strategies including imagery, goal-setting, relaxation, and other common techniques during the post-injury rehabilitation period. Six studies, described in seven peer-reviewed published articles, met study inclusion criteria and were included in this review. Of those studies, two included randomized control trials, two used before and after study designs and two were case study designs. Two interventions utilized guided imagery and relaxation, two interventions utilized goal-setting and one each utilized microcounseling, written disclosure, and acceptance and commitment therapy. The study illustrated that there was a significant lack of well-designed intervention studies targeting this population. Guided imagery/relaxation was shown to be associated with improved psychological coping and reduced re-injury anxiety. Goal setting was not directly associated with reduction of negative psychological consequences. Other psychological techniques such as microcounseling skills, acceptance and commitment therapy, and written disclosure have demonstrated effectiveness in reducing negative psychological consequences, improving psychological coping, and reducing re-injury anxiety. The findings suggested a significant need to develop and implement well-designed intervention studies that targeted improvement of post-injury psychological outcomes in order to assist injured athletes with successful recovery from sport injury.

It was stated by Ardern et al. (2013) that up to two-thirds of athletes might not return to their pre-injury level of sport by 12 months after anterior cruciate ligament (ACL) reconstruction surgery, despite being physically recovered. The authors determined whether psychological factors predicted return to pre-injury level of sport
Discussion

by 12 months after ACL reconstruction. The psychological factors evaluated were psychological readiness to return to sport, fear of re-injury, mood, emotions, sport locus of control, and recovery expectations. A total of 187 patients were recruited, and 182 (97%) were injured while playing sport. Psychological readiness to return to sport, the participants’ estimated number of months it would take to return to sport and locus of control predicted returning to sport by 12 months after surgery. The common link between the psychological factors and return to sport was that the psychological factors were found to be associated with the participant making a prospective appraisal of his or her ability to return to sport. Even before the participants underwent surgery, their psychological responses were associated with their chances of returning to the pre-injury level 12 months later. The results of this study suggested that other aspects of recovery, such as psychological factors, were also important for returning to sport which earlier might have been under recognized. It was found that factors influencing athletes’ prospective judgment of their ability to return to sport predicted returning to their pre-injury level. This implies that factors that informed the individuals’ appraisal of how long it would take to return to sport and how he or she would perform upon returning to sport might exert the strongest influence on the behaviour of returning to sport. Further, it was reported that self-efficacy of future knee function (i.e., how the patient thinks his or her knee would function after surgery), measured before surgery, has been shown to predict subjective and objective knee function and return to physical activity 12 months after ACL reconstruction surgery. Thus, participants who returned to sport had a significantly higher subjective rating of knee function than those who did not return to sport. Similarly, participants who returned to sport also estimated preoperatively that they would return to their pre-injury level significantly faster compared to those who did not return. It was purported that athletes’ psychological readiness to return to sport should be considered along with his or her physical readiness. This was relevant because returning to sport is of primary importance to most athletes. It was also put forth that preoperative psychological screening of injured athletes should complement the usual physical and functional testing completed throughout rehabilitation. Along with this, postoperative clinical screening of athletes’ maladaptive psychological responses in addition to routine evaluation of physical recovery might assist clinicians to identify athletes at risk of not returning to sport.
Discussion

In one of the most recent researches on sport trauma, Day et al. (2013) examined vicarious trauma in sport coaches by drawing on the experiences of two trampoline coaches who have witnessed a serious athletic injury. The authors described the term vicarious trauma as the negative effects that might be experienced after witnessing trauma (such as actual or threatened injury) in others. Both the participants were invited to recall the accident, their own responses to the accident, and the coping strategies employed. The results showed that three main themes emerged from the analysis. These included the need to make meaning following trauma, re-experiencing trauma, and acceptance and avoidance coping. It was demonstrated that individuals would respond to trauma in different ways and it might be of more value to attempt to understand the experiences of individual coaches than to make broad generalizations. The results from this study revealed that it was not only the injured athletes’ that might benefit from counseling but also all those who witnessed the accident may derive benefit from counseling. Thus, group counseling for athletes and coaches might be an effective intervention. This study has indicated that social support was perceived as an effective method of coping. It was emphasized that in order to promote positive changes following trauma, the individuals’ should not assimilate the trauma information into their pre-existing views, instead should be encouraged to accommodate this information by developing new perspectives. This accommodation would be reached when an individual wishes to understand the meaning of the event as well as accept the new information.

Snell et al. (2013) examined the associations between components of Leventhal’s common sense model (CSM) of health behaviour (injury beliefs, coping, distress) and outcome after mild traumatic brain injury (MTBI). Participants were recruited within three months following MTBI and assessed six months later, completing study questionnaires at both visits (Illness Perceptions Questionnaire Revised, Brief COPE, Hospital Anxiety and Depression Scale). Univariate and multivariate (logistic regression) analyses examined associations between injury beliefs, coping and distress at baseline, and later outcome. The results of this study revealed that participants endorsing stronger injury identity beliefs, expectations of lasting severe consequences, and distress at time one, had greater odds of poor outcome at time two. Consistent with Leventhal’s model, participants’ beliefs about their injury and recovery had significant associations with outcome over time. Coping also appeared to have important associations with outcome. The study suggested that
identity, timeline, and consequences beliefs as well as emotional representations of the injury were particularly salient and associated with outcomes over time. These might be important injury perceptions to target in the early stages of injury recovery because they may become fixed and less malleable with time. It was concluded that current reassurance-based interventions might be improved by targeting variables such as injury beliefs, coping and adjustment soon after injury.

Sturmberg et al. (2013) determined whether instructions and feedback provided to individuals with musculoskeletal dysfunction were more effective in improving function and decreasing pain when an external focus of attention (EFA) was induced rather than an internal focus of attention (IFA). The authors searched MEDLINE, Embase, CINAHL, AMED, Cochrane Library and five additional databases. Randomised, quasi-randomised and non-randomised controlled trials, cross over trials and observational studies involving participants with any form of musculoskeletal dysfunction, comparing IFA or EFA with a different attentional focus (AF), control, placebo or no focus condition were analyzed. Function and pain were the primary outcomes. The secondary measures included gait parameters, balance, coordination, proprioception, muscle weakness, muscle length, and range of motion, incidence of dysfunction reoccurrence, prevalence and nature of adverse events and other complications. Seven studies were included in this review with a total of 202 participants. Two studies compared an IFA with an EFA, two compared IFA with biofeedback with a different focus condition, and three compared IFA with biofeedback with a no focus condition. Statistically significant improvements in motor performance directly attributable to the focus of attention were only found in the EFA groups. There were no significant improvements in function or pain. The results of this review suggested that there was insufficient evidence to determine if an EFA or an IFA was more effective in improving function and decreasing pain in patients with musculoskeletal dysfunction. The results were confounded by the provision of biofeedback to the experimental group only, making it impossible to differentiate the effect of the feedback from the effect of the AF. The results also suggested that level of ability, or stage of learning, significantly impacted the strategies and conscious attention used to perform and improve the execution of a task. The instructions and feedback of benefit to novice learners differed from that of benefit to accomplished learners perfecting a skill. The study concluded that there was
Discussion

insufficient evidence to draw conclusions regarding the effects of attentional focus of instructions and feedback on outcomes in musculoskeletal dysfunction.

3. Intragroup Comparisons: Control group with Upper Limb Injuries, Lower Limb Injuries and Back Injuries at pre-post test intervention phase

Based on the review of literature following hypotheses were proposed:

3.1 The Control group sportspersons with upper limb injuries, back injuries and lower limb injuries were expected to show lower scores on Disabilities of the Arm, Shoulder and Hand, Modified Oswestry Low Back Pain Disability, and higher scores on Lower Limb Disability from pre to post-test phase.

3.2 The Control group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show lower scores on Heart Rate, Blood Pressure, Pain, and Pain Disability from pre to post-test phase.

3.3 The Control group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show lower scores on State Anxiety, Trait Anxiety, Perceived Stress, and Stress Symptoms from pre to post-test phase.

3.4 The Control group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show lower scores on Fear Avoidance Beliefs for both its dimensions, viz. Physical Activity and Work, and Kinesiophobia from pre to post-test phase.

3.5 The Control group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show higher scores on Self-esteem, Self-efficacy, and Optimism from pre to post-test phase.

3.6 The Control group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show higher scores on Social Support for both its dimensions, viz. Social Support-Network and Social Support-Satisfaction from pre to post-test phase.

3.7 The Control group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show higher scores on Perceived Success and Sports Injury Rehabilitation Beliefs (total) and its components, viz. Susceptibility, Treatment Efficacy, Self-efficacy, Rehabilitation Value and Severity from pre to post-test phase.

3.8 The Control group sportspersons with upper limb injuries, lower limb injuries and back injuries were expected to show lower scores on Aggression (total) and...
its subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility from pre to post-test phase.

Table 1.20 shows means, standard deviations and t-ratios comparing pre and post-test differences of **Control group** with **upper limb injuries**. A glance at the t-ratios revealed that Control group showed a decrease in scores on Heart Rate (t=7.49, p<.01), Pain (VAS) (t=13.54, p<.01), Pain Disability (t=6.52, p<.01), Disabilities of the Arm, Shoulder and Hand (t=9.19, p<.01) and its modules, viz. Work Module (t=6.50, p<.01) and Sports Module (t=6.97, p<.01), State Anxiety (t=2.60, p<.01), Trait Anxiety (t=2.56, p<.05), Fear Avoidance Beliefs-Physical Activity (t=6.94, p<.01), Fear Avoidance Beliefs-Work (t=6.75, p<.01), Kinesiophobia (t=5.48, p<.01), Aggression (total) (t=2.13, p<.05), Perceived Stress (t=2.13, p<.05), and Stress Symptoms (t=2.73, p<.01).

The calculations of t-ratios also revealed that Control group showed an increase in scores on Perceived Success (t=8.89, p<.01), Sports Injury Rehabilitation Beliefs (total) (t=6.60, p<.01) and its components, viz. Susceptibility (t=2.13, p<.05), Treatment Efficacy (t=2.84, p<.01), Self-efficacy (t=2.13, p<.05), Rehabilitation Value (t=2.28, p<.05) and Severity (t=2.13, p<.05).

No significant differences emerged on Systolic Blood Pressure, Diastolic Blood Pressure, Self-esteem, Optimism, Self-efficacy, Social Support-Satisfaction, Social Support-Network, and Aggression subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility in Control group with upper limb injuries from pre to post-test phase.

Table 1.22 shows means, standard deviations and t-ratios comparing pre and post-test differences of **Control group** with **lower limb injuries**. A glance at the table revealed that t-ratios for Control group showed a decrease in scores on Heart Rate (t=11.92, p<.01), Diastolic Blood Pressure (t=1.99, p<.05), Pain (VAS) (t=14.60, p<.01), Pain Disability (t=7.54, p<.01), State Anxiety (t=2.35, p<.05), Trait Anxiety (t=2.08, p<.05), Fear Avoidance Beliefs-Physical Activity (t=2.08, p<.05), Fear Avoidance Beliefs-Work (t=2.08, p<.05), Kinesiophobia (t=2.08, p<.05), Aggression (total) (t=2.08, p<.05), Perceived Stress (t=2.08, p<.05), and Stress Symptoms (t=2.61, p<.01).
Discussion

The calculations of t-ratios also revealed that Control group showed an increase in scores on Lower Limb Disability ($t=7.75$, $p<.01$), Perceived Success ($t=2.71$, $p<.01$), Sports Injury Rehabilitation Beliefs (total) ($t=6.22$, $p<.01$) and its components, viz. Susceptibility ($t=2.08$, $p<.05$), Self-efficacy ($t=2.08$, $p<.05$), Rehabilitation Value ($t=2.47$, $p<.05$) and Severity ($t=2.22$, $p<.05$).

No significant differences emerged on Systolic Blood Pressure, Self-esteem, Optimism, Self-efficacy, Social Support-Satisfaction, Social Support-Network, Aggression subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility, and Sports Injury Rehabilitation Beliefs component, viz. Treatment Efficacy in Control group with lower limb injuries from pre to post-test phase.

Table 1.24 shows means, standard deviations and t-ratios comparing pre and post-test differences of Control group with back injuries. A glance at the t-ratios revealed that Control group showed a decrease in scores on Heart Rate ($t=11.08$, $p<.01$), Systolic Blood Pressure ($t=2.09$, $p<.05$), Diastolic Blood Pressure ($t=2.74$, $p<.01$), Pain (VAS) ($t=17.86$, $p<.01$), Pain Disability ($t=7.93$, $p<.01$), Modified Oswestry Low Back Pain Disability ($t=7.33$, $p<.01$), State Anxiety ($t=2.11$, $p<.05$), Trait Anxiety ($t=2.28$, $p<.05$), Fear Avoidance Beliefs-Physical Activity ($t=2.22$, $p<.05$), Fear Avoidance Beliefs-Work ($t=2.07$, $p<.05$), Kinesiophobia ($t=2.25$, $p<.05$), Aggression (total) ($t=2.11$, $p<.05$), Perceived Stress ($t=2.11$, $p<.05$), and Stress Symptoms ($t=2.69$, $p<.01$).

The calculations of t-ratios also revealed that Control group showed an increase in scores on Perceived Success ($t=14.10$, $p<.01$), Sports Injury Rehabilitation Beliefs (total) ($t=6.50$, $p<.01$) and its components, viz. Susceptibility ($t=2.11$, $p<.05$), Treatment Efficacy ($t=2.69$, $p<.01$), Self-efficacy ($t=2.11$, $p<.05$), Rehabilitation Value ($t=2.50$, $p<.05$) and Severity ($t=2.11$, $p<.05$).

No significant differences emerged on Self-esteem, Optimism, Self-efficacy, Social Support-Satisfaction, Social Support-Network, and Aggression subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility in Control group with back injuries from pre to post-test phase.

Results revealed that the Control group showed statistically significant differences from pre to post-test in sportspersons with upper limb injuries, lower limb injuries and back injuries. Control group showed improvement on physical functional status/disability scales, i.e., Disabilities of the Arm, Shoulder and Hand and...
its modules, viz. Work Module and Sports Module, Lower Limb Disability, and Modified Oswestry Low Back Pain Disability in sportspersons with upper limb injuries, lower limb injuries and back injuries from pre to post-test phase.

Control group showed statistically significant decrease in scores of Heart Rate in sportspersons with upper limb injuries, lower limb injuries and back injuries from pre to post-test phase. Control group also showed statistically significant decrease in scores of Systolic Blood Pressure in sportspersons with back injuries from pre to post-test phase. Control group showed statistically significant decrease in scores of Diastolic Blood Pressure in sportspersons with lower limb injuries and back injuries from pre to post-test phase. Control group showed statistically significant decrease in scores of Pain (VAS), Pain Disability, State Anxiety, Trait Anxiety, Perceived Stress, Stress Symptoms, Fear Avoidance Beliefs-Physical Activity, Fear Avoidance Beliefs-Work, and Kinesiophobia in sportspersons with upper limb injuries, lower limb injuries and back injuries from pre to post-test phase.

Control group showed statistically significant decrease in scores of Perceived Success in sportspersons with upper limb injuries, lower limb injuries and back injuries from pre to post-test phase. Control group also showed statistically significant increase in scores of Sports Injury Rehabilitation Beliefs (total) and for all its components, viz. Susceptibility, Treatment Efficacy, Self-efficacy, Rehabilitation Value and Severity in sportspersons with upper limb injuries and back injuries from pre to post-test phase. Control group showed statistically significant increase in scores of Sports Injury Rehabilitation Beliefs (total) and for its components, viz. Susceptibility, Self-efficacy, Rehabilitation Value and Severity in sportspersons with lower limb injuries from pre to post-test phase.

Control group showed statistically significant decrease in scores of Aggression (total) in sportspersons with upper limb injuries, lower limb injuries and back injuries from pre to post-test phase.

Results revealed that insignificant differences emerged on Systolic Blood Pressure in Control group sportspersons with upper limb injuries and lower limb injuries from pre to post-test phase. Insignificant differences also emerged on Diastolic Blood Pressure in Control group sportspersons with upper limb injuries.
Discussion

from pre to post-test phase. Insignificant differences emerged on Self-esteem, Optimism, Self-efficacy, Social Support-Satisfaction, Social Support-Network, and Aggression subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility in Control group sportspersons with upper limb injuries, lower limb injuries and back injuries from pre to post-test phase. Insignificant differences also emerged on Sports Injury Rehabilitation Beliefs component, viz. Treatment Efficacy in Control group sportspersons with lower limb injuries from pre to post-test phase.

Thus, it may be concluded that hypotheses related to the above mentioned variables were upheld in majority of cases. However, the overall hypotheses related to Blood Pressure, Self-esteem, Optimism, Self-efficacy, Social Support, Sports Injury Rehabilitation Beliefs component, viz. Treatment Efficacy and Aggression subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility were not upheld in its entirety.

The above mentioned findings of the present investigation stand supported by many earlier studies.

It was stated by Watson (1996) that rehabilitation was a problem-solving and educational process aimed at restoring a state of health or well being. Self-responsibility and self-management has been described as the foundations of rehabilitation. It was put forth that pain was the single biggest factor with which neuromusculoskeletal physiotherapy dealt. Subject would compensate for associated stiffness or instability, particularly of gradual onset, over a long period. With appropriate education, the recurrence of nociceptive pain also provided a stimulus to begin prophylactic procedures as an integral aspect of long-term self-management. The involvement of patients in co-ordinating the aspects of treatment planning, goal setting, and monitoring their condition were the cornerstones of this philosophy. Fundamental to this approach was the concept of therapists and patients as equal and active partners. It was suggested that self-responsibility has the potential to increase patients’ compliance, hasten recovery, and contribute to prevention of recurrence. Encouraging self-responsibility was efficient, cost-effective, and easy to implement procedures. Self-directed intervention strategies when appropriate must be based on substantiated research. Thus, it was suggested that it is the collective responsibility of all members of sports medicine team to promote this type of research.
Dawes and Roach (1997) identified athletes’ emotional responses to injuries measured before physiotherapy appointments. The subjects were 52 patients who had sustained a sport injury. The only significant differences observed were for responses such as encouraged, frightened, anger, pain, frustrated, excited, relieved, inconvenienced, depressed and discouraged. The emotional responses measured before physiotherapy appointments showed a trend of decreasing negative and increasing positive emotions. The study showed that the initial emotions were generally negative. Following diagnosis and treatment, the emotional responses became less negative. This relatively large alteration in emotional response was probably due to a number of factors, including relief at gaining a professional opinion and the greater improvement likely after initial treatment. Following this, the interactions associated with injury rehabilitation, decrease in pain and impending return to training and competition resulted in the continuation of initial trend towards a more positive outlook. Thus, physiotherapy appeared to have a significant effect on patients’ emotions.

In a study conducted by Bardin (2003) on a 38 year old elite level athlete who underwent L4-S1 surgical stabilization for predominantly L5-S1 instability which caused unilateral L5 neuropathy, the recovery post-surgery was examined. Pre-operative management included patient education and training in specific stabilizing exercises. It has been suggested that physiotherapists’ should, at the initial examination, identify the patients’ goals and objectives in order to maximize outcomes. Further, it was suggested that the core aspects of physiotherapy management in case of low back pain were reduction in pain, improvement in function and prevention of disability. All three of these aspects were very favorably resolved in this patient. Post-operative rehabilitation stressed upon specifically guided and progressive rehabilitation utilizing recent research evidence for segmental and global stabilization. Other aspects of rehabilitation included re-education of posture, proprioception, balance, trunk muscle endurance, leg strengthening and preparation for a return to road running. The patient made an exceptional recovery, returned to competitive running at a level that compared favorably with pre-injury performances and was 100% satisfied with the outcome. The application of exercise therapy, considered as a complex part of clinical physiotherapy, assisted the recovery of patients undergoing lumbar spinal surgery, accelerated rehabilitation and facilitated a
return to full sporting participation. The authors suggested that exercise therapy was a key tool in the restoration of patients’ well-being and the application of exercise therapy to individual situations remained a complex challenge in the field of sports physiotherapy. It was concluded that the athletes’ rapid recovery, return to full sporting participation and complete satisfaction with the outcome suggested that a personalized exercise program, that incorporated principles of spinal stability training, is important in the management of lumbar surgical patients who aspired for similar levels of recovery.

In a study conducted on golf by Kim et al. (2004), it was explained that golf is a demanding sport, which could result in injury, usually from overuse and poor technique. In golf, shoulder is a commonly affected site, with the lead shoulder, or the left shoulder in the right-handed golfer, particularly vulnerable to injury. Common shoulder problems affecting golfers included subacromial impingement, acromioclavicular arthrosis, rotator cuff tear, glenohumeral instability, and glenohumeral arthrosis. A comprehensive approach was essential in the management of these injuries which included a detailed initial evaluation by a physician and physical therapist as well as a detailed swing analysis by a certified Professional Golf Association (PGA) teaching professional. The authors described that after an initial period of rest, a program of flexibility, strength, and endurance training was emphasized. Ultrasound treatment was the most commonly used modality treatment. After injury treatment, swing modifications were essential for preventing further recurrence. It was important for the golfer to maintain a structured therapy program as well as to periodically monitor the golf swing mechanics to minimize the risk of future injury to the shoulder. Experience from the PGA Tour and Senior PGA Tour has shown that golfers have benefited from a comprehensive, golf-specific exercise program. Specifically, a regimen consisting of (i) a daily flexibility and strengthening program, including not only shoulder exercises but also focusing on trunk, core, and lower extremity training; (ii) a cardiovascular and aerobic conditioning program; and (iii) a consistent, pre-round stretching and warm-up routine was useful. Only when symptoms improved and rehabilitation goals have been met, the golfer should progress to the full swing and gradually resume a normal practice routine. The study concluded that many professional golfers have attributed their increased driving distance, better endurance, and overall more consistent play to this improved fitness
program. It was perpetuated that with focused rehabilitation program, the majority of golfers would see improvement.

Smith et al. (2006) reviewed the literature pertaining to the physiotherapeutic management of muscle haematomas. Seventeen (of 7794) papers met the inclusion criteria and were reviewed. It was purported that the combined treatment program appeared to be effective and included three phases. Phase I consisted of rest, ice, elevation, compression and isometric exercises over the first 48 hour. Phase II introduced active knee range of movement exercises, heat, ultrasound, whirlpool treatment and increased weight bearing. Phase III included resisted exercises and a progressive exercise program towards full function and normal sporting activity. According to Prentice (2004), the principles of ice were to limit haematoma formation by inciting vasoconstriction to decrease blood flow, edema, muscle spasm and metabolism into the treated area, and promote active range of movement to encourage healing. The principles behind the rest period were to prevent further haemorrhage, disruption of the injury, and to allow a stronger scar to form between the damaged muscle fibres and connective tissue. Further, elevation might aid haematoma resolution. The main aim behind elevation is to reduce arterial pressure and increased venous return. The objective of compression was to evacuate blood from the haematoma area and limit further bleeding. It was suggested that compression should be applied until swelling has decreased and ceased to fluctuate, potentially 2–7 days post-injury. Heat was advocated during the resolution phase (day three onwards) to accelerate the rate of haematoma absorption, on the principle that heat increases blood circulation. Therapeutic ultrasound assisted tissue healing and haematoma absorption by enhancing cell proliferation and protein synthesis. Gentle active and isometric exercises from day 2 post-injury were advocated to regain range of movement and encourage blood evacuation. These should be performed within the limits of pain to prevent the formation of poorly formed scar tissue, calcification and/or ossification. Also, the use of contrast cold and heat treatments 24 hour post-injury was encouraged. The principles of cold were to decrease edema, pain and inflammation, whilst heat encouraged haematoma absorption by increasing circulation and promoting tissue elasticity. Massage was not advocated due to the dangers of exacerbating haemorrhages. It was also suggested that electronic stimulation for treating muscle haematomas could be immediately applied to decrease swelling, and promote muscle

313
strength counteracting atrophy. Thus, the clinical trials reviewed in this study by Smith et al. (2006) suggested that ice, heat, compression and combined physiotherapy treatment programs may be indicated in the management of muscle haematomas. These findings were particularly significant considering that physiotherapy is one of the mainstay treatments for muscle haematomas.

According to Stracciolini et al. (2007), rehabilitation was a sequential and progressive multi-phased approach after injury. The initial phase was described as an acute management phase that entailed treating the acute inflammation and pain, and reversing the decreased range of motion (ROM) and strength caused by immobilization. It was followed by an intermediate phase, which focused on restoring strength and ROM to pre-injury status. The final phase concentrated on functional/sports-specific exercises and strived to return the athlete to sport so that the athlete could play effectively, painlessly, and safely. Maintenance of strength and ROM was a crucial component of each phase. The type of pain experienced by the athlete also helped guide the practitioner during rehabilitation. The therapeutic exercises were essential for both physical and mental well being so that the athlete remained active during the rehabilitative period. Pool running, cycling, elliptical machine, and light weight training were examples of commonly used cross training activities to maintain aerobic fitness and promote healing. The use of therapeutic modalities during the rehabilitative process was an important component in the effort to return the athlete to full function. Modalities could be used to reduce pain and edema, increase mobility, and effectively deliver medications across the skin. Cryotherapy and thermotherapy were the two commonly used modalities. Electrical agents were also used in the management of pain during rehabilitation. The effects of electrical agents included modulation of pain, promotion of strengthening, reduction of edema, increase of ROM, and promotion of fracture healing. The study concluded that the decision to allow the athlete to return to sport is critical and difficult. Returning to full activity/sport was considered once the patient has regained full functional ROM and once pain and swelling has subsided.

Blake and Batson (2009) examined the effects of a brief Tai Chi Chuan Qigong (‘Qigong’) exercise intervention on individuals with traumatic brain injury. Twenty individuals with traumatic brain injury participated in the study. Intervention participants attended a Qigong exercise session for one hour per week over eight
weeks. Control participants engaged in non-exercise based social and leisure activities for the same intervention period. There were no significant differences in physical functioning between groups. This study provided preliminary evidence that a brief Qigong exercise intervention program might improve mood and self-esteem of individuals with traumatic brain injury. The study concluded that improvements in psychological outcomes were unlikely to be simply as a result of the social contacts participants received in Qigong classes, since both exercise and control groups engaged in social activities.

Guillodo and Saraux (2009) described that muscle trauma resulting from sporting activities accounted for 10 to 55% of sport injuries. The study assessed the initial treatment of muscle injury in sportspeople, evaluated rehabilitation programs and observed the impact on healing. The patients were classified into two groups: those who were able to resume full sporting activity within 40 days (minor muscle injuries: Group 1) and those who were also able to resume full sporting activity but only after more than 40 days (major muscle injuries: Group 2). The two groups were then compared in order to identify factors potentially related to recovery. The study examined the circumstances of the injury, possible antecedents and the initial treatment (with the RICE protocol). After clinical and ultrasound examinations, each patient was referred to the physiotherapist of his/her choice with an identical recovery program (muscle strengthening exercises, cycling on an exercise bike, and guidance on resuming sport). The patient was subsequently interviewed by phone at two time points: four months after the injury, to ascertain the date of resumption of gentle sporting activity (e.g., jogging), or return to the pre-injury sporting level (i.e., full recovery), and to establish whether the patient and the physiotherapist had respectively complied with the prescribed treatment and 15 months after the injury, to investigate any re-injury and/or any other muscle injuries. The results revealed that ninety-five cases were included in the study; this corresponded to 93 patients, two of whom had two different injuries each. In the RICE protocol: sport was immediately discontinued in 90 cases and shortly afterwards in five cases. Ice was applied in 57 cases (60%) and compression was applied in 17 cases (17.8%). There were 34 patients (35.8%) in Group 1, with an average return to gentle sporting activity (jogging) on day 11 post-injury and full resumption of their sport on day 23. There were 61 cases (64.2%) in Group 2, with an average return to jogging on day 39 and
Discussion

full resumption of their sport on day 69. In compliance with the prescription: rehabilitation was performed in only 62 cases (64.5%), with no major difference between the two groups. In terms of the physiotherapist’s compliance with the prescription, 40 of the 62 patients did some weight training, 29 performed cycling and 58 were given advice on the resumption of sporting activity. In terms of sport: in both groups, the duration of incapacity did not depend on whether rehabilitation has been performed or not. The second phone interview yielded a total of 84 replies (88%): seven patients (8%) had suffered re-injury in the same muscle group (no difference between Groups 1 and 2) and 22 patients (26%) had incurred injuries in another muscle group. According to Levine et al. (2000), after trauma, both the muscle fibers and the connective tissue require healing and repair; the therapeutic sequence is mainly guided by the severity of the haematoma. Guillodo and Saraux (2009) suggested that the RICE protocol might give better results if compression were to be used more extensively. In terms of rehabilitation, therapeutic compliance appeared to be weak and for both minor and major injuries, rehabilitation (to the extent that it was implemented by the physiotherapists) did not lead to quicker recovery and no significant difference was observed between two groups.

The recreational participants’ experiences of adhering to sport injury rehabilitation program was investigated by Levy et al. (2009). Six participants undertaking a rehabilitation program for a tendonitis-related injury as a result of sport involvement took part in the study. Data were collected using semi-structured interviews and were thematically analyzed using interpretative phenomenological analysis. The subordinate themes that emerged centered around five key issues concerning motivation, confidence, coping, social support, and pain. The interview data revealed pertinent personal and situational factors relating to both clinic and home-based rehabilitation adherence that were specific to recreational athletes. Recreational athletes in the study revealed contrasting perceptions of motivation. Some participants reported being self-motivated for completing clinic-based rehabilitation while others expressed difficulty in motivating themselves to conduct home-based rehabilitation. The study suggested that recreational athletes were generally motivated to comply with clinic-based rehabilitation and had difficulty in motivating themselves for home-based rehabilitation. The findings revealed that absence of physiotherapists’ instruction and encouragement reduced motivation
Discussion during home rehabilitation and subsequent adherence. Recreational athletes in the study reported a higher degree of task self-efficacy in relation to performing clinic-based rather than home-based rehabilitation. Participants’ suggested that not having clear instruction, guidance, and support for completion of home-based exercises was a key reason that accounted for their lack of task self-efficacy. Further, the study suggested that sport psychologists might need to target the improvement task self-efficacious beliefs among recreational athletes in a home rehabilitation context. The results indicated that recreational athletes had difficulty performing rehabilitation modalities due to lifestyle changes, poor time management, and scheduling issues. The study also found that recreational athletes adopted a variety of coping responses in order to cope with the demands of rehabilitation which were problem, emotion, and avoidance focused in nature. The key functional dimensions of social support reported by recreational athletes in the study which facilitated adherence were task, material, emotional, and practical support. Notably, participants perceived social support to be most effective when aligned with certain support providers. For instance, task support was deemed effective when provided by the physiotherapist, whereas material, emotional, and practical support were perceived as effective when provided by friends and family. The authors (Levy et al., 2009) reported that recreational participants expressed apprehension regarding pain experienced during rehabilitation, which caused them to refrain from undertaking rehabilitation exercises. Therefore, physiotherapists’ should provide clear and precise instructions with regard to the performance of rehabilitation exercises. The use of ineffective coping strategies, over support from significant others, and hesitant perceptions of pain had a negative influence upon clinic rehabilitation adherence. Although task support from the physiotherapist and being task self-efficacious were perceived to aid clinic adherence, the use of effective coping strategies and varied types of social support were reported to aid rehabilitation adherence more generally. Thus, it was concluded that researchers should explore alternative adherence experiences from athletes who have different injuries and sport expertise.

Lopes et al. (2009) assessed the profile of the treatments performed at the physiotherapy department of the Brazilian Olympic Committee during the 2007 Pan-American Games. Participants in this study included 434 athletes from the Brazilian Olympic Committee who were referred by the Brazilian medical department to the
Discussion

Brazilian physiotherapy department. The results revealed that most athletes of the Brazilian delegation needed physiotherapeutic treatment and approximately one quarter of the athletes went to the Games with a previous injury. The main complaints observed during the treatments were spine-related pathologies (lumbar pain, thoracic and cervical pain), tendinopathy, and muscle strain, among others. There were 2523 physiotherapeutic treatments performed, and the most utilized procedures were kinesiotherapy, which represented 24.9% of all the procedures performed, ultrasound (19.4%) and cryotherapy (17.2%). It was concluded that a large number of athletes required physiotherapy services during the Games. The most frequent complaints at the physiotherapy department were spine-related pathologies, and the vast majority of the athletes complained of lumbar spine pain. The most frequently observed pathology was overload lumbar pain, known as Lumbar Strains or Lumbar Sprains. Tendinopathy appeared as a second most frequent group of pathologies among the athletes, followed by muscle strain. These three major groups of pathologies treated at the department represented approximately 60% of all injuries. The thigh and the knee were, respectively, the second and third most affected parts, which could be explained by the large number of tendonitis and muscle strain injuries that were treated. Therefore, the spine, thigh and knee were responsible for approximately 50% of all lesions presented by the athletes. The procedures other than kinesiotherapy and ultrasound, which were also constantly utilized during the working period, included cryotherapy, superficial heat and TENS, since most athletes previously presented with chronic pathologies and were seeking analgesia. Furthermore, a small number of athletes went to the physiotherapy department seeking taping. One of the main results found in the study, and at the same time a cause of great concern, was the fact that a large number of athletes (22.1% of all athletes) were previously injured prior to the competition. The researchers (Lopes et al., 2009) purported that existence of previous injuries was an important factor regarding the gravity of the injury and how serious it could become as a large number of patients who sought physiotherapy services (65.7% of all athletes) could be connected with the high number of athletes who came to the Games already complaining about an injury. This research work concluded that the vast majority of athletes in the Brazilian delegation looked for physiotherapeutic treatment. The spine, thigh and knee were the most affected parts of the body, and kinesiotherapy, ultrasound and cryotherapy were the most frequent procedures performed at the physiotherapy department.
Hamstring strain is a well-documented problem within both the amateur and professional sporting populations. Prior et al. (2009) described the current best evidence for hamstring strain injury risk factors and the management of hamstring strain injury. Previous strain, older age, and ethnicity were consistently reported as significant risks for injury, as was competing in higher levels of competition. Associations with strength and flexibility were conflicting. Lower limb strength imbalances might be of greater importance than muscle weakness as a risk for hamstring strain. Particularly, decreased hamstring strength relative to quadriceps strength appeared to increase the risk for injury. The risk of hamstring strain also increased with higher levels of competition. Higher levels were likely to be faster and more physically demanding, potentially explaining this finding. The notion of sport-specific risk was supported by the effectiveness of functional interventions to prevent injury. The study concluded that activities based on mimicking competition requirements (interval sprints, running while tapping ball), functional interventions, and incorporation of trunk stabilization exercises were effective in rehabilitation following hamstring strain injury.

It was ascribed by Atkinson et al. (2010) that rehabilitation protocols provided basic guidelines through which effective outcomes could be achieved. However, the rate and extent of recovery would depend on numerous patient and external factors. The complex neuromuscular motor patterning, strength and control which were affected by the injury and the surgery was very difficult to gauge, and difficult to recreate. Soft-tissue knee surgery was performed for a multitude of conditions and encompassed a large number of procedures. Isokinetic testing offered a validated, reliable and reproducible method of evaluating muscle strength, endurance and antagonist/agonist balance. It should be utilized at the earliest as a safe opportunity to establish the efficacy of any functional rehabilitation program so that it could allow adjustments to be made to optimize outcomes. The above review clearly established an evidence-based approach to the postoperative rehabilitation of the knee following anterior cruciate ligament reconstruction, arthroscopic meniscectomy, and meniscal repair surgery.

Iriuchishima et al. (2010) stated that rehabilitation was one of the most critical phases after anterior cruciate ligament (ACL) reconstruction. However, the recent trend of low-cost, short-term hospitalization made sufficient rehabilitation after ACL
Discussion

reconstruction difficult. A sample of 34 patients who underwent non-anatomical single bundle ACL reconstruction using a hamstring auto graft was evaluated. Twenty patients (12 males and 8 females) were transferred to a special rehabilitation hospital (RH hospital group) after operation and concentrated rehabilitation was performed up to 4 hours per day. Fourteen (9 males and 5 females) patients performed clinic-based rehabilitation at a university hospital three times per week (clinic group). Strength of quadriceps and knee flexion muscles was assessed at 3, 6 and 9 months after ACL reconstruction. Anterior tibial translation (ATT) and pivot shift test were also evaluated. All patients included in this study participated in the same post-operative rehabilitation program. Active range of motion exercises and partial weight bearing were started from 1 week after operation with a knee brace. Full weight bearing and full extension were allowed at 3 weeks after operation. In most cases, patients were hospitalized for 3 weeks at the institution where the operation was performed. Patients then began either clinic-based rehabilitation (clinic group) or special hospital rehabilitation (RH hospital group). In Clinic-based rehabilitation (clinic group), after 3 weeks of initial hospitalization, rehabilitation was performed three times a week at the clinic in the university hospital. For muscle and balance training, home exercise was guided by physical therapists. Proprioceptive training and sport specific movements were overseen at the clinic. In rehabilitation hospital (RH hospital group), after 3 weeks of initial hospitalization, patients who chose to undergo concentrated rehabilitation were transferred to the special rehabilitation hospital. At the hospital, in addition to indoor rehabilitation with physical therapists, patients participated in musculoskeletal system exercises in a hot spring pool, walking along a dry riverbed and hiking in the hills for balance training, and bicycle exercises for endurance recovery for up to 4 hours/day. The results showed no significant difference in muscle recovery in the lower extremity at any time point after ACL reconstruction between the clinic group and the RH hospital group. However, 3 months after operation, the average muscle strength of the RH hospital group tended to be higher than that of the clinic group. There was no significant difference in ATT or pivot shift (each group included 4 positive pivot shift subjects) in the patients who were tested between the clinic group and the RH hospital group. It was concluded that concentrated rehabilitation at a rehabilitation hospital after ACL reconstruction has the potential to improve muscle strength in the lower extremities more dramatically in the early stages.
of post operation. However, the initial benefits of intensive physiotherapy disappeared after 6 months.

Ardem et al. (2011) investigated the return-to-sport rate and participation level of injured athletes at 12 months after anterior cruciate ligament (ACL) reconstruction surgery. Data were analyzed for 503 (340 males and 163 females) patients who participated in competitive-level Australian football, basketball, netball, or soccer after ACL reconstruction surgery using a quadruple-strand hamstring autograft. A common protocol and guidelines were followed for post-operative rehabilitation. All the patients were reviewed at 12 months to establish their level of postoperative participation or plan to return to sport. The results of this large cohort study showed that by 12 months after ACL reconstruction surgery, only 33% of participants had attempted competitive sport at their pre-injury level and 67% of participants had returned to some form of sport participation. Males were more likely than females to return to pre-injury competitive sport at 12 months, and patients who participated in seasonal sport were more likely to return to competitive sport at 12 months than patients who participated in non-seasonal competition. Patients with normal postoperative knee function, versus those with nearly normal function, were no more likely to return, but patients with good hop test results were more likely to return than patients with poor results. It was concluded that seasonal sport players were more likely to return to sport than non-seasonal sport players. The relationship between postoperative knee function and the return-to-sport outcomes at 12 months after surgery was inconclusive. The study indicated that the factors that influenced the time taken to return to sport after ACL reconstruction surgery might be worthy of further investigation along with the reasons for a longer postoperative rehabilitation period required by many individuals than that typically advocated to achieve a successful return to sport.

In a research on low back injuries, Burns et al. (2011) purported that low back injuries were a common occurrence in athletes and often resulted in missed competition and practice time. The examination of athletes with low back pain commonly involved diagnostic imaging, which rarely guided the clinician in selecting the appropriate interventions. Review of studies was done in this area. A treatment-based classification approach was preferred for the management of the athlete with low back pain. The treatment-based classification approach involved three steps
Discussion

which included, (i) screening for emergent conditions not suitable for conservative management, (ii) staging the athlete based on disability and basic performance of activities of daily living, and (iii) providing matched interventions depending on the stage. The treatment-based classification scheme provided the clinician with a reliable algorithm for matching an athlete’s symptom presentation to the optimal intervention, potentially reducing participation loss. Managing individuals with low back pain using a treatment-based classification approach significantly reduced disability and pain compared with current clinical practice guideline standards. The study concluded that a comprehensive exercise program that targeted musculoskeletal impairments and incorporated sport-specific exercises was preferred in the management and reduction of recurrence of low back pain (LBP). Education regarding adherence, proper progression, and avoidance of overtraining was essential. Thus, with acute LBP, advice and education appeared to be beneficial, but there was conflicting evidence on the recurrence. LBP is a common condition in athletes, and appropriate management is critical to limiting missed game and practice participation. The treatment-based classification approach provided an evidence-based framework detailing the appropriate conservative management of individuals with LBP. Thus, the treatment-based classification approach was a reliable, valid, and cost-effective algorithm that yielded successful outcomes and rapid return to function, concluded the authors.

It was ascribed by Kilcoyne et al. (2011) that the goal of any hamstring rehabilitation was to return the athlete to sport at the previous level of performance while attempting to minimize the rate of injury recurrence. Hamstring muscle strains represented a common and disabling athletic injury with variable recurrence rates and prolonged recovery times. The primary objective of the study was to present the outcomes of a novel rehabilitation protocol for the treatment of proximal hamstring strains in an intercollegiate sporting population and to determine any significant differences in the rate of re-injury and time to return to sport based on patient and injury characteristics. A retrospective review was performed of 48 consecutive hamstring strains in intercollegiate athletes. The rehabilitation protocol consisted of early mobilization, with flexible progression through supervised drills. Athletes were allowed to return to sport after return of symmetrical strength and range of motion with no pain during sprinting. Primary outcomes included time to return to sport and re-injury rates. All patients returned to their sport, and 3 sustained repeat hamstring
strains (6.2% re-injury rate) after a minimum follow-up of 6 months. The study concluded that grade I and II hamstring strains might be aggressively treated with a protocol of brief immobilization followed by early initiation of running and isokinetic exercises; with an average expected return to sport of approximately 2 weeks and with a relatively low re-injury rate regardless of injury grade (I or II), injury characteristics (first-time and recurrent injuries), or athlete characteristics. This rehabilitation protocol allows for early mobilization after initial injury, with a combination of drills and stretches that were supervised to ensure that the athletes progressed but only while experiencing minimal pain. The timeline was flexible, and the criteria for return to play were multifactorial. The combination of strength and flexibility, in addition to completion of pain free rolling start sprints, was successful in this population. The combination of 24 hours of immobilization with early initiation of a sustained static elevated stretch technique, with progression to on-the-field drills for concentric, eccentric, and isometric loading of the injured muscle, allowed a faster rate of recovery and maintenance of muscle strength in this athletic cohort with grade I and II hamstring strains. Rolling sprints were critical in ensuring that the athlete met the functional criteria to return to play. Thus, the study advocated that this protocol might be an effective means to return athletes with primary or recurrent grade I and II biceps and semimembranosus strains to play in less than 2 weeks with a low risk for injury recurrence.

Akkaya et al. (2012) investigated the effectiveness of EMG biofeedback training and electrical stimulation therapy for rehabilitation following arthroscopic partial meniscectomy. A total of 45 patients (26 females and 19 males) participated in this study. They were randomly divided into three groups: first group received home exercise program with 15 subjects (home exercise group), second group received EMG biofeedback training to quadriceps muscle and home exercise program with 15 subjects (EMG biofeedback group), and third group received electrical stimulation to quadriceps muscle with home exercise program with 15 subjects (electrical stimulation group). Pain, gait velocity, time using a walking aid, functional evaluation, joint ROM, joint swelling and quadriceps muscle power were considered as outcome measures for this study. Results showed that EMG biofeedback training for strengthening of quadriceps muscle provided early recovery of knee extensor muscle power, and improved knee functional state in early postoperative period. It
Discussion

also improved the compliance of the patient to the exercise program. The better 
muscle strength was found in EMG biofeedback group as compared to home exercise 
and electrical stimulation groups. Active joint ROM was significantly improved in 
electric stimulation as well as EMG biofeedback groups compared to exercise group. 
In conclusion, authors suggested incorporating EMG biofeedback in conventional 
exercise program to achieve better outcomes. Postoperative rehabilitation protocols 
and quadriceps muscle strengthening exercises with conservative therapy were 
important in terms of providing normal walking pattern. It was determined that the 
patients in home exercise group had to use a walking aid for longer period of time as 
compared to the electromyographic biofeedback group. Thus, the span of use of 
walking aid was shortest in biofeedback group and longest in home exercise group. 
Although the addition of electrical stimulation therapy showed superiority over the 
home exercise group in terms of shorter time using a walking aid and better recovery 
in knee flexion, these differences were not statistically and clinically significant. 
Furthermore, the electrical stimulation group did not show superiority over home 
exercise and electromyographic biofeedback groups in terms of pain, gait velocity, the 
time using a walking aid, muscle power, and progress in functional status. Therefore, 
it could be concluded that the addition of electromyographic biofeedback training into 
a conventional exercise program after arthroscopic partial meniscectomy contributed 
to speeding up the rehabilitation process.

A 2-year retrospective audit was conducted by Smith and Hillman (2012) to 
evaluate injury diagnosis and treatment provision from a mobile physiotherapy unit 
serving the Professional Golf Association (PGA) European Tour. The service data 
was collected across two competitive seasons (2005/06), at 36 tournaments (18 in 
2005 and 18 in 2006). Service at each tournament was from Tuesday to Sunday, and 
equated to 216 days in total. Each approach made to the unit throughout this time was 
anonymously recorded as either (i) a contact where an injury diagnosis and/or 
treatment was provided, or (ii) a non-contact where no service was administered and 
players used the on-board fitness suite. Across the audit period a total of 7430 
approaches were made to the unit, equating to 206 per event or 34 per service day. 
From all approaches 6705 contacts were documented with 2328 injuries recorded. A 
total of 9933 separate treatments were administered equating to 276 per event or 46 
per day. Non-contacts equated to 725, representing only 9.8% of all approaches. Of
the 2328 reported injuries, 66.6% (1551) were back-related, with 16.6% (385) and 16.8% (392) were related to upper and lower limbs, respectively. Of the 9933 treatments, 71.3% (7087) related to massage (40.7%), manipulation (15.6%), and stretching therapies (15.0%). As an overall trend, the total number of injury diagnoses and treatments increased across the 2-year period. The number of reported injuries rose by 25.6% (2005 = 1032; 2006 = 1296), whilst treatments rose by 17.2% (2005 = 4575; 2006 = 5359). This retrospective audit provided a valuable insight into a servicing mobile physiotherapy unit on a professional sporting tour. Offering diagnostic and treatment related support, injury occurrence and treatment delivery were securely-recorded to provide a primacy account as to work undertaken by the unit. Findings revealed the specific type and location of injuries encountered by PGA European Tour players as well as the range of treatments administered. It was put forth that in developing effective support services to the professional players on tour, data presented would allow for a more structured injury management system based on typical injury occurrence and treatment provision. Such support services play a vital role in providing hand on advice, diagnosis and treatment to ensure that the player was able to perform without significant lowering of performance.

It was opined by Villa et al. (2012) that rehabilitation of soccer players after anterior cruciate ligament reconstruction was usually performed without sport-specific guidelines and the final phases were often left to the team coaches. It was hypothesized that a specific rehabilitation protocol for soccer players, with direct control of the last on-field rehabilitation phases, might lead to complete functional recovery. Fifty competitive soccer players who followed a sport-specific rehabilitation protocol for soccer were evaluated during the recovery period until their return to competition. The assessment of the functional outcomes was performed using the Knee Outcome Survey–Sports Activity Scale and Isokinetic and Aerobic Fitness tests. After the first clinical examination following surgery, the patients started the rehabilitation program with gym and pool sessions. These sessions included specific interventions addressing pain, swelling, range of motion (ROM), proprioception, strength, and aerobic fitness according to well-known protocols. Early sport-specific patterns designed for soccer players were also performed to recover sport-specific neuromuscular skills. The final phases of rehabilitation preceding the return to sport were performed by all patients on a soccer field (grass or synthetic field) under the
control of an athletic trainer specifically trained and experienced in rehabilitation and sport recovery; and this phase was referred as on-field rehabilitation (OFR). At every evaluation, ROM, pain, swelling, and functional status (e.g., partial weight-bearing with crutches, normal gait pattern, running) were assessed. The results showed that the average start of on-field rehabilitation was $90 \pm 26$ days after surgery; the average time to return to the competition was $185 \pm 52$ days. The improvement in the Knee Outcome Survey–Sports Activity Scale during on-field rehabilitation was significant. The Isokreric and Aerobic Fitness tests showed a significant improvement in muscle strength and aerobic threshold from the beginning to the end of on-field rehabilitation. Particular attention was paid to the details of the final phases of rehabilitation that involved specific sport “reeducation.” This study introduced the OFR concept and proposed criteria for beginning OFR. Medical and rehabilitation specialists’ supervision during OFR facilitated return to competition. OFR and its protocols help address the patients’ fear of relapse, which was a common cause of poor performance in sport after ACL reconstruction. Thus, it was concluded that adding on-field rehabilitation to the traditional protocols after anterior cruciate ligament reconstruction may safely lead to complete functional recovery in soccer players.

In a study conducted by Woods and Woods (2012), the athletes’ opinions, attitudes, and beliefs about the role of sports physiotherapy during their international sport career were explored along with the rowers’ information to the International Federation of Sports Physiotherapists (IFSP) competencies and standards recommended for sports physiotherapists (SP) were compared. The third aim was to use the information gathered to highlight issues regarding quality of physiotherapy services and make recommendations on how the role of physiotherapist could be enhanced. Purposeful sampling was used to recruit international level Irish rowers. Thirteen Irish rowers’ preparing for the 2008 world championships or the 2008 Olympic Games, with a minimum of nine years rowing experience and participation in international competitions within 12 months prior to the study beginning, participated in the study. Against the competencies and standards of the IFSP, this elite group of athletes had a clear understanding of the role of a sports physiotherapist. They identified nine of the eleven competencies recommended by the IFSP for auditing a sports physiotherapist, and advocated the use of sports physiotherapists in all areas that could improve their performance. The rowers expected the SP to be
highly competent in their own field. Also, the rowers expected the SP to be informed, and potentially involved, in all aspects of their athletic performance. The athletes in the study indicated that the involvement of the SP in all aspects of the athletes’ performance was particularly relevant to them when they have limited support services from other professionals available to them, for example, when abroad at training camps or competitions. Irish rowers competing at an elite level also identified the need for rapid and easy access to SP services. The rowers identified the need for continuity of care with sports physiotherapist, particularly in having a lead physiotherapist who would oversee the athletes’ management, drawing up a treatment plan and continuously monitored and evaluated the progress of this plan. The rowers missed IFSP’s fifth competency: promotion of a safe and active lifestyle. The study recommended that sports physiotherapists’ working with elite athletes should promote safe and healthy participation in sport as a way of also achieving sporting excellence. The Irish athletes interviewed also missed the role the sports physiotherapist could play in promotion of fair play and anti-doping practices. In conclusion, this study showed the extended role that the sports physiotherapist was expected to deliver while being involved with elite rowers.

Recently, Delos et al. (2013) ascribed that muscle injuries were extremely common in athletes and often produce pain, dysfunction, and the inability to return to practice or competition. Appropriate diagnosis and management could optimize recovery and minimize time to return to play. Muscle lesions were the most common category of injuries in athletes and comprised approximately 10% to 55% of all injuries. The majority of muscle injuries (>90%) were contusions or strains, while lacerations were much less common. The most severe types could produce chronic pain, dysfunction, recurrence, and even compartment syndrome. For acquisition of evidence, the authors reviewed contemporary papers, both basic science and clinical medicine, that investigated muscle healing. A Medline/PubMed search inclusive of years 1948 to 2012 was performed. The findings revealed that diagnosis could usually be made according to history and physical examination for most injuries. The initial conservative management emphasizing the RICE principles and immobilization of the extremity for several days for higher grade injuries was typically required. Rest, ice, compression, and elevation (RICE) was the initial line of therapy despite no randomized, controlled trial demonstrating its effectiveness to treat soft tissue injuries.
Discussion

Injection of corticosteroids might clinically enhance function after an acute muscle strain. Immobilization may prevent further retraction of the ruptured muscle stumps; thereby reducing gaps between the tissue and the size of the scar formed and may allow for the formation of a collagen scaffold through which satellite cells could migrate. But prolonged immobilization could lead to excessive scarring, resulting in decreased load to failure. Additional adjunctive treatments (nonsteroidal anti-inflammatory drugs, platelet-rich plasma, and others) to enhance muscle healing and limit scar formation showed promise but need additional data to better define their roles. Ultrasound has been promoted as a potential treatment modality for muscle injury, for both pain relief and muscle regeneration. Hyperbaric oxygen therapy has received a great deal of attention in recent years. Thus, it was concluded that conservative treatment recommendations would typically lead to successful outcomes after a muscle injury. Most muscle injuries would respond to conservative management. Although commonly recommended, there was little evidence to support the RICE principles. Early mobilization for lower grade injuries and brief (1-3 days) immobilization of the extremity for higher grade injuries appeared to be beneficial. A single corticosteroid injection might play a role in the recovery from acute muscle injuries. There was limited evidence to support most adjunctive treatments.

Low back injuries are the most common injuries in golf. Finn (2013) advocated that best practice guidelines for rehabilitation and prevention of these injuries were helpful for health care professionals and all golfers. The PubMed database and Google Scholar were searched from 1993 to 2012. All studies addressed in some manner the rehabilitation, prevention, or return to sport from low back injury, preferably in direct relation to golf, as well as muscle firing patterns used during the golf swing. Movement patterns, muscle imbalances, and type of swing utilized all have a direct effect on the forces applied to the spine during the golf swing and need to be assessed to prevent or rehabilitate injury. Understanding the golf swing and how the body works during the swing was necessary. The intense loads could strain muscles, injure facet joints and lumbar discs, and cause spondylolysis. Paraspinal muscle injury was common among golfers. It was put forth that the rehabilitation process for golfers with low back pain should include a multidisciplinary team that worked together to maximize return to golf safely. A team consisting of a physiatrist and physical therapist and a Professional Golf Association (PGA) teaching
professional working together produced a 98% return to sport rate, with 2 patients winning state amateur titles. Core stability training was an integral part of a rehabilitation program for a golfer with low back pain. To initiate core control correctly, diaphragmatic breathing, pelvic tilting (progressing from supine to quadruped to standing), pelvic floor exercises, and neurodevelopmental rolling techniques were recommended to activate and train the core. These were started after the acute pain phase of injury subsided. The activation of the diaphragm, pelvic floor, and abdominals was central to stabilization of the trunk during respiration and postural activity and should be incorporated into a golfer’s rehabilitation program early on. Incorporating diaphragmatic training early, including swing programs, allowed for functional transition from clinic to course. The training of transversus abdominis and multifidus was necessary in golf rehabilitation program. Hip abductors, erector spinae, and quadratus lumborum also contributed to core stability. Core strength was essential along with scapular and hip stabilization in preventing injuries in the golf swing. The gluteus medius muscle stabilizes the pelvis and provides a base trunk rotation. The study concluded that the most important aspect of any injury prevention or rehabilitation program included educating the target audience to ensure compliance. Golf educational programs should include information about injury prevention strategies. Thus, a multidisciplinary team was the best approach to prevention, rehabilitation, and performance training for golfers. Technical flaws and physical imbalances contributed to the development of back pain in golfers. Unless both were addressed, golfers might continuously cycle through periods of injury.

Folkl (2013) described the association between chronic climbing-related injuries and functional and quality-of-life impairments in chronically injured sport climbers and boulderers. A retrospective, cross-sectional, anonymous survey was developed to assess the association between chronic climbing-related injuries and severity of injury-related pain, impact on activities of daily living, and impact on continued pursuit of rock climbing and other athletic endeavors. This survey was administered to a convenience sample of chronically injured sport climbers and boulderers recruited from several highly trafficked rock climbing websites. Four hundred thirty-nine respondents submitted surveys adequate for analysis. These respondents reported 863 chronic injuries. Injuries experienced by the respondents were also broadly consistent with previous reports; most occurred in the upper
Discussion

extremity, with a minority occurring elsewhere. Although one recent report found a more equal distribution of upper and lower extremity injuries in rock climbers (approximately 43% and 41%, respectively), it explicitly focused on acute, not chronic, injuries. The results showed that approximately half of the respondents reported injury-related pain or functional limitation more than 10 days a month, one quarter reported that their pain caused moderate to severe interference with activities of daily living, most altered their climbing habits as a result of their injuries, and one third indicated that their pain moderately or severely affected their ability to pursue other sports. This study suggested that a subset of chronically injured climbers exist, whose injuries might cause significant pain, and activities-of-daily-living and sports-related functional limitation.

Shaarani et al. (2013) hypothesized that a preoperative exercise program would enhance postoperative outcomes after anterior cruciate ligament reconstruction (ACLR). Twenty volunteers awaiting ACLR were randomly assigned to a control or exercise intervention group. The exercise group completed a 6-week gym and home based exercise program. The control subjects were not discouraged to do exercise or any normal activity of daily living before the ACLR but were asked to keep a record of exercise activity performed during the weeks before surgery. The prehabilitation group was enrolled in a 6-week exercise program preceding surgery consisting of supervised resistance training and balancing exercises. The program consisted of 4 exercise periods per week: 2 supervised gym sessions interspersed with 2 supervised home sessions. The program concentrated mainly on lower limb strengthening with particular attention to the quadriceps and proprioception training. Assessments included single-legged hop test, quadriceps and hamstring peak torque and magnetic resonance imaging cross-sectional area (CSA), and Modified Cincinnati Knee Rating System score completed at baseline, preoperatively, and 12 weeks postoperatively. Following 6 weeks of exercise intervention, the single-legged hop test results improved significantly in the exercise injured limb compared with baseline. Quadriceps peak torque in the injured limb improved with similar gains in CSA compared with baseline. However, this was not significantly increased compared with the control group. Quadriceps and vastus medialis CSA were also larger in the exercise group than in controls (p=.0024 and p=.015, respectively). The Modified Cincinnati score was better in the exercise-injured limb compared with baseline. At
12 weeks postoperatively, the rate of decline in the single-legged hop test was reduced in the exercise group compared with controls. Similar trends were not seen for quadriceps peak torque and CSA. The vastus medialis CSA had regressed to similar levels as the control group. The Modified Cincinnati score continued to increase in the exercise group compared with controls. Sport-specific training was initiated at 4 months, which included 2 months of functional training adaptation and progression. A postoperative follow-up at 6 months by the primary surgeon further determined whether the patient was allowed to return to sport. The return to sport outcome was defined as time to return to pre-injury levels of sport activities. The study concluded that 6-week progressive prehabilitation program for subjects undergoing ACLR led to improved knee function based on the single-legged hop test and self-reported assessment using the Modified Cincinnati score. These effects were sustained at 12 weeks postoperatively. This study supported prehabilitation as a consideration for patients awaiting ACLR.

4. Gender Differences at post-test intervention phase

Based on the review of literature following hypothesis was proposed:

4.1 It was expected that there would be very few gender differences in improvement or reduction of scores at post-test phase in both Control and Experimental groups.

Table 2.1 shows means, standard deviations and t-ratios comparing post-test differences between males and females of Control group. A glance at the table of t-ratios revealed that males scored higher than females on Perceived Stress (t=2.46, p<.05). Females scored higher than males on Stress Symptoms (t=3.86, p<.01).

No significant differences emerged between males and females of Control group at post-test on Heart Rate, Systolic Blood Pressure, Diastolic Blood Pressure, Pain (VAS), State Anxiety, Trait Anxiety, Pain Disability, Fear Avoidance Beliefs-Physical Activity, Fear Avoidance Beliefs-Work, Self-esteem, Optimism, Self-efficacy, Kinesiophobia, Social Support-Network, Social Support-Satisfaction, Perceived Success, Aggression (total) and its subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility, and Sports Injury Rehabilitation Beliefs (total) and its components, viz. Susceptibility, Treatment Efficacy, Self-efficacy, Rehabilitation Value and Severity.
Discussion

Table 2.2 shows means, standard deviations and t-ratios comparing post-test differences between males and females of Experimental group. A glance at the table of t-ratios revealed that males scored higher than females on Sports Injury Rehabilitation Beliefs (total) \( t=1.98, p<.05 \) and its component, viz. Susceptibility \( t=2.21, p<.05 \).

No significant differences emerged between males and females of Experimental group at post-test on Heart Rate, Systolic Blood Pressure, Diastolic Blood Pressure, Pain (VAS), State Anxiety, Trait Anxiety, Pain Disability, Fear Avoidance Beliefs-Physical Activity, Fear Avoidance Beliefs-Work, Self-esteem, Optimism, Self-efficacy, Kinesiophobia, Social Support-Network, Social Support-Satisfaction, Perceived Success, Aggression (total) and its subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility, Perceived Stress, Stress Symptoms, and Sports Injury Rehabilitation Beliefs components, viz. Treatment Efficacy, Self-efficacy, Rehabilitation Value and Severity.

Results revealed that both males and females of Control and Experimental groups did not show statistically significant differences on most of the variables at post-test respectively.

The overall hypotheses related to Heart Rate, Systolic Blood Pressure, Diastolic Blood Pressure, Pain (VAS), State Anxiety, Trait Anxiety, Pain Disability, Fear Avoidance Beliefs-Physical Activity, Fear Avoidance Beliefs-Work, Self-esteem, Optimism, Self-efficacy, Kinesiophobia, Social Support-Network, Social Support-Satisfaction, Perceived Success, Aggression (total) and its subscales, viz. Physical Aggression, Verbal Aggression, Anger and Hostility, Perceived Stress, Stress Symptoms, and Sports Injury Rehabilitation Beliefs (total) and its components, viz. Susceptibility, Treatment Efficacy, Self-efficacy, Rehabilitation Value and Severity were not upheld in its entirety.

Previous research in the above mentioned areas with regard to gender differences also revealed inconclusive and mixed findings.

With respect to aggression, Holowchak (2003) reported that tendency to aggress was more evident in males than in females. This could be due to socialization and biological factors. It followed that, allowing for equality of opportunity in sport, men would tend to dominate those sport that reinforced aggressive behaviour. In
Discussion

addition, other physical differences such as greater size, muscle mass and less body fat in males (on average) ensured male superiority in sport emphasizing strength and speed (many of which are violent sports).

In line with the research on gender differences, Jose (2003) investigated psychocognitive processes used by athletes following an injury. Based on a differential perspective, the study evaluated the effects of the type of sport (individual vs. team), of gender on representations, beliefs, and causal attributional processes. Qualitative and quantitative analyses of athletes’ discourses confirmed the traumatic nature of the injuries resulting in major psychological disturbances. The findings of the study revealed that the discourse varied significantly as a function of the type of sport, but the representations, the attributional processes, and the coping strategies varied significantly as a function of gender. The sport variable was more discriminating than the gender variable. The differences connected with the sport were illustrated particularly by the athletes’ representations of injury, and especially by the consequences of their injury. When injury occurred, it disturbed their sense of time and was expressed differently by individual-sport athletes and team-sport athletes. Team-sport athletes were found to play down the harmful effects of injury and emphasized its positive aspects in conjunction with its negative ones. In this way injury became associated with the idea of progress and growth. On the other hand, injury more often had dramatic connotations for individual-sport athletes. Individual-sport athletes placed more emphasis on internal causes such as feeling low and anxiety. Team-sport athletes attributed external and unstable causes to their injuries, such as chance or bad luck. This study did not demonstrate a relationship between the type of representation of the injury (more or less negative) and the type of causal attribution (internal or external). Gender-related differences were most strongly expressed in how the injury was dealt with, and especially in the role of the coach. The need for care and support was much more significant for females than males. Female athletes stressed the affective nature of this care rather than the technical side that was highlighted by the males. Competition from ones’ peers was a source of worry that was deepened by injury and was more apparent in the females. It appeared that for most of the athletes, in either type of sport, the time when the injury occurred was described as “a bad time.” It was suggested that physiotherapist could take on the role of confidant or psychologist who reassured and strengthened the athlete physically and psychologically. The study described injury as a traumatic event.
causing major imbalance in the life of an elite athlete. Injury was described in this study as detrimental, painful, and as weakening the athlete. This was more apparent in individual-sport than in team-sport athletes. Injuries have not only negative consequences such as pain, but also positive consequences such as the discovery of new relations with the body, the psychological transformation, and under some circumstance, the progress.

The literature pertaining to stress and gender differences suggested that females showed a more increase in stress response than males, but females returned to baseline quickly than males. It was emphasized that the manifestation of stress was multifactorial as it affected the physiological, psychological, behavioural and coping responses (Staal, 2004). In a study conducted by Coulomb-Cabagno and Rasle (2006), aggression in team sport as a function of gender, competitive level, and sport type was examined. It was hypothesized that (i) male players displayed more aggressive behaviours than female players, (ii) aggressive behaviours increased when competitive level rises, and (iii) gender difference in observed aggression was depending on sport type. One hundred and eighty games, equally shared among males and females, soccer and handball, and departmental, regional, and national competitive levels were recorded on videotapes and observed using a grid to differ instrumental from hostile aggressive behaviours. The results showed that male players displayed instrumental and hostile aggressive behaviours more than female players did. The results also showed that male and female players displayed more aggressive behaviours in national competitive level. The findings revealed a significant effect of competitive level on instrumental and hostile aggressive behaviours, both in soccer and in handball. Instrumental aggressive behaviours increased when the competitive level rises, while hostile aggressive behaviours decreased. As indicated by the significant gender × competitive level interaction, the male players involved in departmental level displayed instrumental aggressive behaviours more than players involved in regional level, and the latter less than players involved in national level, this process occurred both in handball and soccer. For female players, on the contrary, instrumental aggressive behaviours increased linearly as the competitive level rose, both in handball and soccer. The authors found gender differences to be larger in handball than in soccer. The study concluded that male players exhibited more aggressive behaviours than female players irrespective of the sport. For the
Discussion

competitive level or the nature of the observed aggression, the instrumental aggressive behaviours increased and hostile aggressive behaviours decreased when competitive level increased.

Anshel and Sutarso (2007) determined athletes’ sources of acute stress (SAS) perceived as highly intense and experienced during the competitive event, their respective coping styles (CS) for two different (highly intense) stress sources (SAS), the relationship between the acute stressors and their CS (approach and avoidance coping in cognitive and behavioural forms), and the generalizability of the sources of acute stress (SAS) and the coping styles (CS) scales as a function of gender. The sample of study comprised of 332 athletes (176 males and 156 females) with mean age of 21.6 years, who were former or current sport competitors for their high school or college team, completed a two-part inventory generated for this study. The athletes were asked to indicate their perceived stress intensity for common SAS’s (part 1) and the manner in which they typically coped with two of the stressors perceived as the most intense (part 2). Theory-driven categories of acute stress sources were labelled “performance-related” and “coach-related,” and coping styles were grouped as “approach-behavioural,” “approach-cognitive,” and “avoidance-cognitive.” The results showed that general coping style was significantly related to general sources of acute stress. Structural equation models indicated that the athletes’ coping styles were positively related to their respective acute stressors category. The results of the analyses indicated valid and reliable relationships between coping style and sources of acute stress among the athletes. The results indicated that athletes who experienced intense coach-related acute stress were more likely to use primarily an approach-behaviour coping style followed by the other coping styles. Finally, the athletes’ gender was a mediating variable in determining coping style in response to selected sources of stress. With respect to gender differences, among female athletes’, performance-related stressors were associated with using an Approach-behaviour coping style (e.g., “I complained to a friend or another objective party,” “I discussed the problem with others”), however, not the other coping style. Male athletes experienced performance-related stressors, and used an Approach-behaviour coping style, followed by Approach-cognitive coping style, but not likely an Avoidance-cognitive coping style.
Abrahamsen et al. (2008) examined the roles of achievement orientation, perception of the motivational climate, and perceived ability on performance trait anxiety in a sample of national level elite athletes. Gender differences in these relationships were also examined. One hundred and ninety national elite athletes (101 males and 89 females) from individual sport completed Norwegian measures of goal orientation, perceived motivational climate, perceived ability, and multidimensional performance anxiety. The results showed that female and male national elite athletes were similar in achievement orientations and had similar perceptions of the motivational climate. Females reported higher levels of performance worry, concentration disruption and somatic anxiety than males. Orientations did not predict performance anxiety for either gender, however perceptions of a performance climate predicted performance worry for both genders, and concentration disruption for females. Perceived ability predicted less performance worry for females and males. Perceived ability did not moderate the effects of the perceived motivational climate on performance anxiety, and neither did the results meet the criteria for testing mediation.

It was hypothesized by Nicholls et al. (2009) that there would be significant differences in mental toughness (MT) among athletes of different: (i) achievement level, (ii) gender, (iii) age, (iv) sporting experience, and (v) sport type (team vs. individual and contact vs. non-contact sport). Participants were 677 athletes and consisted of sport performers competing at international (n=60), national (n=99), county (n=198), club/university (n=289), and beginner (n=31) levels. Results revealed a significant relationship between mental toughness and gender, age, and sporting experience. However, achievement level and the type of sport an athlete participated in were not significantly associated with mental toughness. The follow-up univariate analysis of variance showed that the males scored significantly higher on challenge, control emotions, control life, and confidence ability, but not on commitment or interpersonal confidence. The ANCOVA for total mental toughness score showed a significant effect for gender with the males scoring higher than the females. Increasing age and years of experience predicted higher scores in total mental toughness and the challenge, commitment, and life control subscales. These differences could be due to variations in the underlying expression of the attributes related to mental toughness in males and females or, alternatively, to different
socialization processes. The results also revealed that there were no significant differences among athletes who participated in team or individual sport and athletes who participated in contact or non-contact sport. The study concluded that males scored significantly higher than females on total mental toughness and the four subscales, i.e., challenge, control emotions, control life and confidence ability, the latter partially supporting previous research on confidence.

The psychosocial needs of injured athletes must be better defined, so that appropriate support could be provided to them. Yang et al. (2010) examined the pre-injury and post-injury social support patterns among male and female collegiate athletes. A total of 256 National Collegiate Athletic Association Division I male and female collegiate athletes aged 18 or older from 13 sports teams participated in the study. Injury incidence was identified using the Sports Injury Monitoring System and social support was measured using the 6-item Social Support Questionnaire. Data on pre-injury and post-injury social support patterns were compared. Male athletes reported more sources of social support than female athletes, whereas female athletes had greater satisfaction with the support they received. Athletes’ social support patterns changed after they became injured. Injured athletes reported relying more on coaches, athletic trainers, and physicians for social support after they became injured. Athletes also reported greater post-injury satisfaction with social support received from friends, coaches, athletic trainers and physicians. The findings identified an urgent need to better define the psychosocial needs of injured athletes and also strongly suggested that athletic trainers have a critical role in meeting these needs.

The concerns related to fear of re-injury were examined by Ardem et al. (2012) in athletes who had returned to regular sport participation following anterior cruciate ligament (ACL) reconstruction surgery. A self-report questionnaire was used to collect data 2–7 years following surgery. Key inclusion criteria were regular participation in sport prior to injury and participation in sport at the time of the study. A sample of 209 (88 females and 121 males) with a mean of 39.6 ±13.8 months post surgery participated in the study. The results showed that individuals participating in sport in the medium-term following their ACL reconstruction appeared to do so with low fear of re-injury. Athletes who had returned to their pre-injury level of participation demonstrated significantly less fear of re-injury than those who had not returned to their pre-injury level. This suggested that fear of re-injury was a
**Discussion**

significant barrier to maximize the opportunity to return to sport post-operatively. However, while there were between group differences in fear of re-injury, all groups scored on the positive side of the scale for all fear of re-injury questions. Athletes who had undergone surgery more than 3 months after injury had a greater fear of re-injury than those who had their surgery closer to the time of injury. This suggested that pre-operative experiences of instability might adversely affect post-operative emotional responses when returning to competition. Females in this study were significantly more concerned than males about environmental conditions such as playing surface, when playing sport. The gender comparisons also reflected differences in the types of sport typically played by males and females in this study. Males most commonly participated in Australian football, in comparison to females who most commonly participated in netball. The specific demands of netball contributed to a heightened sense regarding the importance of the playing surface. The study concluded that gender, the timing of surgery following injury and the level of sport the athletes returned to might be associated with fear of re-injury following surgery.

Recently, Rauch et al. (2013) identified (i) categories of functioning, the environment and personal factors that influenced participation in physical activity in persons with spinal cord injury (SCI), and (ii) gender differences within identified factors. Twenty-six persons (13 females and 13 males) participated in the study. An explorative qualitative study design using both focus groups and individual interviews based on a semi-structured interview guide was used. Statements were linked to categories or chapters of the four components of functioning (body structures, body functions, activities and participation) and of the environment included in the International Classification of Functioning, Disability and Health (ICF) and a recently developed list of personal factors. An in-depth analysis of the statements was performed to identify relevant associations and gender differences. The results showed that sixty-seven categories and four chapters from all components of functioning and environmental factors included in the ICF and 33 subdivisions of personal factors were found to be associated with physical activity in persons with SCI. This study found gender differences in participation in physical activity and reported that females with disabilities presented a vulnerable population with lower levels of physical activity. Some of the females in this study, in particular those living alone, reported a lack of social support as a barrier to engage in physical activity. Altogether, the responsibility for typical female roles, and a lack of social support at
the same time increased dependence on others, and these factors negatively influenced the engagement of females in physical activities. Gender differences were also found in the different interests for types of physical activity. Females were found to be more interested to engage in less competitive and more recreational and group oriented activities than males. These findings confirmed that athletic identity, which related to the identification with an athletic role and participation in competition, was typically male. The statements made by females confirmed the evidence that females were more task-oriented (defining success as improving one's own personal skills) while males were more ego-oriented (defining success as being better than competitors). For females, the reason not to engage in physical activity was not the athletic identity itself, but the lack of access to programs that met their needs. Finally, gender differences were also found for general behavior patterns. A history of being involved in competitive sport before the onset of SCI was mentioned more often by males than by females. However, it decreased after major events but still contributed to higher levels of physical activity in males. While females also mentioned laziness as a pattern that prevented them from being physically active, males did not. Differences were also found in statements regarding coping strategies. In persons with SCI, the coping strategy of social reliance contributed to better functional outcomes in both genders. The search for social support presented a successful coping strategy for females with SCI in general. These findings suggested that successful coping strategies contributed to physical activity in females. This study suggested a need for comprehensive understanding and identification of gender differences in physical activity in persons with SCI. Gender differences could be assigned to areas of gender roles, social support, athletic identity, interests, and general behavioral patterns.

Overall Findings of the Present Study

The findings of the present study concur that Experimental group which was administered Physical Therapy and Counseling as psychological intervention reported statistically significant more improvements on physical functional status and psychosocial variables than Control group which was given only Physical Therapy as an intervention. However, both the groups showed almost similar improvements on physiological variables. It is plausible to suggest that more improvements observed in Experimental group in comparison to Control group may be attributable to the administration of psychological intervention in the form of Counseling in the
**Discussion**

Experimental group. The findings of the present study provide thoughtful reflection on the intricate mechanisms which may operate among physical, physiological and psychosocial variables. Thus, it could be put forth on the basis of the results of the present study that a combination of Physical Therapy and Counseling administered to the Experimental group was more effective as compared to only Physical Therapy given to Control group.

A possible interpretation of the findings of the present study is that a combination of physical and psychological intervention is more effective in rehabilitation of injured sportspersons than only physical rehabilitation.

However, the limitations of the present study include unequal and small sample size with respect to gender which precludes making definitive findings. Further, the subjects were allocated at random to both Experimental and Control groups and not selected on who required counseling most (need based) from the sample.

Thus, it could stem from the findings of the present study that rehabilitation of sport injuries involves more than repairing the physical injury and regaining previous levels of fitness. It could be inferred from the findings that optimization of sport injury rehabilitation also includes understanding the psychological impact of the injury on the athlete and how psychological factors interact with the rehabilitation process.

This study of psycho-social aspects of evaluation of sports injury and rehabilitation aimed to scientifically establish the effectiveness of physical therapy and psychological counseling much more than only physical therapy. The above discussion based on the findings of this study and some of the earlier researches systematically upheld most of the hypotheses. In brief, this endeavor permits the researcher to conclude confidently that rehabilitation as well as recovery from sport injuries could be enhanced by combining interventions through traditional physical therapy along with the innovative psychological counseling techniques.