REVIEW OF LITERATURE

There are many psychological factors that influence the coping abilities of an injured athlete in general and how he responds to injury rehabilitation, in particular. The teaching of psychological skills may facilitate positive outcomes in injured athletes with concern to their rehabilitation and overall well being. The research devoted to the psychology of sport injury could be traced back to the late 1960s, but it’s most significant development has occurred in the last 20 years. The researchers in this field have made numerous important conceptual, theoretical, and methodological advances to add on to the existing knowledge and appreciation of athletes’ responses to recovery from injury (Wadey et al., 2013).

The need for theoretical approaches to study the complex networks of variables, to test hypotheses, and to seek possible explanatory mechanisms for adherent behaviour in sport rehabilitation, for thorough understanding is huge. The exploitation of an assortment of theoretical approaches could broaden the scope of any research inquiry (Epstein, 1998).

As primary aim of the present 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 need of review of literature pertinent to each approach is being attempted herewith. In the present study, the emphasis has been laid on the conceptual and theoretical framework of variables related to sport injury and role of psychological correlates under investigation for better understanding of facts in the process of sport injury rehabilitation.

A. CONCEPTUAL FRAMEWORK

SPORT INJURIES

Sport injuries are those injuries that occur during athletic activities and are frequently encountered by athletes. The following review of studies was attempted to understand the term thoroughly.

According to Ford et al. (2000), an injury is defined as a medical problem sustained during practice or competition that prevents participation (training or playing) for at least one day beyond the date of occurrence. Conn et al. (2003),
**Review of Literature**

defined the term, ‘injury episode’ as “any traumatic event during the past three months that caused an injury or injuries from an external cause (for example, colliding, tripping, or falling) where (1) the injured person was participating in a sport and recreation related activity and (2) the injury required treatment by a health care professional, either in person or by telephone.” It included episodes involving organized and unorganized sport (for example, basketball, football) or recreational activities (for example, biking, jogging, exercising); and excluded leisure activities (for example, playing in yard, climbing a tree, gardening). Further, the term, ‘injury diagnosis’ was defined as, “the physical harm caused by the traumatic event, such as a sprain or fracture.” An injury episode can have multiple injury diagnoses for the same person.

As per Petitpas and Brewer (2004), a sport injury may be defined as a physical injury sustained during participation in recreational or competitive sport activity. Sport injury may also be defined as, “any injury derived from any sporting activity leading to a visit to emergency department” (Chamorro et al., 2009). Further, Owoeye (2010) defined sport injury as, “any physical complaint sustained by an athlete newly incurred during the games and needing the attention of any member of the medical team.”

**Sport Injury Classification**

According to Davies (1981), sport injuries were grouped into three classes: psychological, soft-tissue, and overuse injuries.

(i) Psychological injuries: The sportsmen face lot of problems due to intense pressures and competition. The entire complex network leads to anxiety, depression and results in emotions which might affect performance. Even the most accomplished players fail to take the pressures and get struck down with physical maladies. This represents the psychosomatic aspect of sport injury.

(ii) Soft tissue injuries: These kinds of injuries occur during game or practice and include sprains and strains.

(iii) Overuse injuries: These injuries occur as a result of repetitive stresses and strain put on the structures. The overuse can lead to incapacitation at an early age.
As per Pringle et al. (1998), a minor injury is defined as, “one where the player was still in discomfort immediately after the game, but was able to play the following week.” A moderate injury is defined as “one that prevented the player from participating in the following weeks’ game.” According to Fuller et al. (2006), injuries should be classified on the basis of location, type, body side, and mechanism (traumatic or overuse) and also if the injury was a recurrence. In this context, a traumatic injury refers to an injury resulting from a specific, identifiable event; and an overuse injury is one caused by repeated micro trauma without a single, identifiable event responsible for the injury. In some studies, diagnoses of injuries may be required, in which, a qualified medical practitioner should provide a specific written diagnosis. Location of injury: The injury may occur at head, neck, upper limb, trunk and lower limb. Type of injury: The injury may involve muscle, tendon, ligament, bone, etc. (as cited in Fuller et al., 2006).

Further, as per Owoeye (2010), injuries documented could also be evaluated and classified as: (1) ‘minor injury’ (in which an athlete was able to return to his/her game immediately after an on-site treatment or able to participate in the next game after an off-site treatment) which includes lacerations, bruises, contusions, muscle cramps/spasm, mild sprains and strains; (2) ‘moderate injury’ (in which an athlete was unable to return to his/her game immediately after an on-site treatment or unable to participate in the next game after an off-site treatment) which includes lacerations involving suturing, joint dislocations, moderate sprains/strains, and small bone fractures; and (3) ‘major injury’ (a potentially life-threatening injury demanding immediate referral to a tertiary institution) which includes head injuries, multiple fractures of long bones, and spinal cord injuries.

PAIN

Pain is an unavoidable clinical symptom post sport injury. The following review of studies was attempted to understand the term thoroughly.

It was described by Sternbach (1974) that the clinical difference exists between acute and chronic pain. The author reported that pain of recent onset was associated with a pattern of physiological responses seen in anxiety attacks. In contrast, chronic pain was characterized by a habituation of autonomic responses and by a pattern of vegetative signs seen in depressive disorders.
Review of Literature

Over the past few decades, pain has been explained by the medical model of disease and was viewed as a pure sensory experience arising from noxious stimulation (e.g., physical injury or other pathology). The past three decades, however, have seen the rise of a number of alternative models that incorporated psychological (e.g., perception, cognition, affect) and behavioural (e.g., avoidance) factors to explain the pain experience (Melzack & Wall, 1982). According to Sanders (1985), pain is, “a sensory and emotional experience of discomfort which is usually associated with threatened tissue damage or irritation.”

The International Association for the Study of Pain subcommittee on taxonomy states pain as, “an unpleasant sensation and emotional experience associated with actual or potential tissue damage or described in terms of such damage” (International Association of the Study of Pain, 1986). Pain is typically conceptualized as a complex, subjective, perceptual phenomenon that involves a number of dimensions including, but definitely not limited to intensity, quality, time course and personal meaning (Merskey & Bogduk, 1994). One of the main psychological factors that influence the experience of pain is general emotional state (McCracken, 1997).

The problems associated with pain have been viewed as complex and multidimensional developmental processes where various psychosocial factors are of utmost importance. However, it has been difficult to specifically spell-out the mechanisms by which acute problems become chronic (Vlaeyen & Linton, 2000). After the occurrence of injury, acute pain frequently presents, but typically subsides during recovery in the following weeks and months. But, for a percentage of individuals, the pain persists for an extended period of time and becomes chronic. Although, it can typically persist for three to six months or above, and beyond what would be considered as the normal expectations for recovery (Weiner & Nordin, 2010).

ANXIETY

Anxiety is inadvertently encountered by an athlete following sport injury. The following review of studies was attempted to understand the term thoroughly.

Anxiety is defined as a state of apprehensive uneasiness of mind (Fresbach & Weiner, 1982). An individual will experience anxiety at a particular time, and if it is
Review of Literature

to be manifested in behaviour, it depends on the strength of trait anxiety and the presence of situational stimuli that will invoke state anxiety. The influence of trait anxiety and of external stimuli stressors can be mediated by the process of cognitive appraisal. If a stimulus is perceived as non-threatening, then no anxiety is elicited; but if the stimulus is perceived as threatening, then the individual may respond with feelings of anxiety (Fresbach & Weiner, 1982). One of the useful and unambiguous operational definitions of anxiety states it to be the combination of introspective verbal report and physiological behavioural signs. Physiological measures such as respiration rate and blood pressure fluctuate over time and have loadings on the state and trait anxiety (Spielberger & Sydeman, 1994).

Anxiety is a state of worry, apprehension or tension that most of the time occurs in the absence of real or obvious danger. Anxiety is different from fear which is regarded as a brief emotional reaction to a threatening stimulus. The constant state of anxiety may result in pain and impair normal physical and social functions (Buckworth & Dishman, 2002a). Further, Abdel-Khalek and Alansari (2004) stated that, “anxiety is one of the most fundamental of all constructs in psychology.”

Anxiety and Its Dimensions

It was stated by Cattell (1966) that a distinction exists between state and trait anxiety which was further elaborated by Spielberger (1966, 1972).

According to Spielberger (1966), anxiety represents the disposition of an individual to experience it as a personality trait. Spielberger’s model of state and trait anxiety (1966, 1972) described the process of experiencing anxiety by an individual, as resulting from a temporal sequence of interactions between internal and external stimuli, cognitive factors, and defense mechanisms. In context with this model, an anxious state characterized by physiological arousal and thoughts of impending doom, is initiated by either an external stressor (e.g., threat of shock) or an internal cue (e.g., muscular activity). If the internal or external stimuli are cognitively appraised as threatening, an anxious state is caused and cognitive and behavioural defence processes are activated to combat the anxiety. Trait anxiety is described as a reflection of frequent past experiences of state anxiety, which increase an individual’s proneness or sensitivity to experience future state anxiety by interacting with the cognitive appraisal of threatening internal or external stimuli.
Further, Spielberger (1966) described that anxiety states are characterized by subjective feelings of apprehension and tension. Anxiety could be categorized into two types: trait and state anxiety. Trait anxiety is defined as a long-term predisposition to become anxious, with either high or low frequency depending on the strength of the trait. State anxiety is defined as a temporary condition of nervousness and apprehension. The individuals with low trait anxiety will function better in a new situation than those with high trait anxiety, i.e., state anxiety increases in high trait individuals at a greater rate than in low trait anxiety individuals when presented with a difficult task. Therefore, those with high trait anxiety will have a high state anxiety score in reaction to the difficult situation.

State anxiety (A-State) is conceptualized as a transitory emotional state or condition of the human organism that is characterized by subjective, consciously perceived feeling of tension and heightened autonomic nervous system activity. Trait anxiety (A-Trait) refers to relatively stable individual differences in anxiety proneness, and differences between people in the tendency to respond to situations perceived as threatening with elevations in A-State intensity. The individuals who are high in A-Trait will exhibit A-State elevations more frequently than low A-Trait individuals (Spielberger et al., 1970). State anxiety may be conceptualized as a transitory emotional state of the human organism that varies in intensity and fluctuates over time and is demonstrated by subjective, consciously perceived feelings of tension and apprehension (Corsini & Marsella, 1983). Trait anxiety refers to individual differences in anxiety proneness, i.e., the differences exist in the individuals’ disposition to perceive a wide range of situations as threatening and in the tendency to respond to such threats with state anxiety reactions (Corsini & Marsella, 1983).

Anxiety refers to both a transitory state and an enduring pattern of behaviour. If an individual is exposed to anxiety provoking situations, the clinical picture includes increased heart rate, respiration rate, and tensed muscles (Corsini & Marsella, 1983). Also, Mastro et al. (1985) stated that state anxiety exhibits an individuals’ reaction to specific or transitory situations such as athletic contests, whereas trait anxiety refers to individuals’ permanent personality disposition. Anxiety as a process refers to a sequence of cognitive, affective, physiological and behavioural events. A-State component of anxiety is characterized by feelings of tension, apprehension, worry and autonomic arousal occurring in response to perceptions of
Review of Literature

either threats to personal adequacy or objective physical danger. A-Trait refers to the tendency of individual to respond with A-State elevations to situations which are perceived as potentially threatening to self-esteem (Mohan et al., 2000).

Kleinert (2002) defined sport injury trait anxiety as a widely stable and indefinite concern or worry to sustain an injury in different sport situations. The author reported that there are three dimensions of situations that cause injury anxiety: situations with low competency, situations with high importance, and situations with loss of control. Whereas, a low relationship of these three dimensions to general trait anxiety (STAI) and scales of physical self-concept was found, it was ascribed that the anticipation of loss of control in sport situations is supposedly significant and an essential factor in the development of injury trait anxiety. On the contrary, it was suggested that situational loss of control has to be differentiated from the individuals’ competence in a sport situation. This conclusion has also triggered debate associated with differences between self-efficiency and locus of control. Injury trait anxiety represents a relatively stable appraisal of experienced and potentially anticipated risky or harmful situations. The basic difference between this stable appraisal, or appraisal style, and the more typical situational appraisal is the object of appraisals. Whereas, situational appraisals regard elements of a certain situation, appraisal styles apply to numerous experienced or anticipated situations. Such appraisal styles may determine injury expectations, which could be related to the likelihood of sport injuries.

STRESS

The term stress denotes the psychophysiological reactions in response to stressors. The following review of studies was attempted to understand the term thoroughly.

According to McGrath (1970), stress is a process in which an individual interprets the environmental demands as threatening or non-threatening. It is based upon these interpretations, that the psychological reactions, such as fear or physiological reactions, such as increased heart rate or perspiration occurs, which affect the behaviour of an individual. This process views stress as an athletes’ perception of their environment or situation. As opined by Selye (1976), “We must not suppress stress in all its forms, but diminish distress and facilitate eustress, the satisfactory feeling that comes from the accomplishment of tasks we consider
worthwhile” (p.56). Stress is defined as the nonspecific response of the body to any demand. A stressor is defined as an agent that produces stress anytime (Selye, 1976).

The General Adaptation Syndrome (GAS) represents the chronologic development of the response to stressors when their action gets prolonged. It consists of three phases: the alarm reaction, the stage of resistance, and the stage of exhaustion (Selye, 1976). Despite the fact that there are various conceptualizations, still there is a general consensus that stress is best captured as a transaction between the person and the environment. The participation in competitive sport can create stress and various emotional states in athletes across the lifespan (Lazarus, 2000).

Further, stress can be defined as a relationship between a person and environment that is appraised as taxing or exceeding the resources of the person and endangers his/her well being (Lazarus, 1991, 2000). Stress may also be defined as, “the demands of a situation exceeding the resources to respond to those demands” (American College of Sports Medicine, 2006). According to Fletcher et al. (2006), the “stress” has been defined as an athletes’ response, an environmental stimulus or the result of the interaction between the environment and the athlete.

**Stress and Its Dimensions**

In a research on national skaters, Scanlan et al. (1991) purported stress as negative emotions, feelings and thoughts. It would include feelings of apprehension, anxiety, muscle tension, nervousness, physical reactions (such as butterflies in the stomach, shaking, or nervous sweating), thoughts centered on worry and self-doubt, and negative statements to oneself.

Further, Palmer and Dryden (1995) developed a multimodal-transactional model of stress which emphasized upon the importance of individuals’ reaction to a situation and their perceived abilities to cope up with the situation. The authors stated: “This model provides a simple but realistic explanation of the complicated nature of stress as it addresses the inter-relationship between the internal and external worlds of individuals.” The model was described as a five stage process:

**Stage 1** This stage depicted individuals’ perceived pressures from an external source (e.g., meeting with a coach or teammate, strength test).

**Stage 2** This stage depicted individuals’ perception of the demands or the pressures and the appraisal of their abilities to deal with it.
Stage 3 This stage represented the psychophysiological responses which included affective, behavioural, biological, cognitive, imaginal, interpersonal and sensory responses. These responses were collectively referred to as the stress response. This stress response also includes the effort made by an individual to cope with the situation.

Stage 4 This stage dealt with the consequences of the individuals’ coping attempts which may either be successful or unsuccessful. The perception of successful coping attempt is important as it eliminates further stress whereas perception of unsuccessful coping further perpetuates the stress.

Stage 5 This stage represented the feedback system in which if the coping attempts were successful, the individual returns to a state of equilibrium, or if the coping attempts were unsuccessful, the individual continues to perceive the situation as threatening and stress is prolonged.

In line with the research on stress, Fletcher and Hanton (2003) acknowledged the need for understanding and recognizing the role of organizational stressors in elite sport. The authors identified four categories of organizational stressors: environmental (e.g., selection, and travel), personal (e.g., injuries, goals, and expectations), leadership (e.g., coaches, and coaching styles), and team issues (e.g., support, and communication).

SOCIAL SUPPORT

Social support represents the individuals’ perception of the available support to rely upon when required. The following review of studies was attempted to understand the term thoroughly.

According to Cobb (1976), social support has been defined as the “information from others that one is loved and cared for, esteemed and valued, and is a part of network of communication and mutual obligations.” Social support refers to the awareness of adequate number of individuals to rely on and the degree of satisfaction with the available and provided support (Schaefer et al., 1981).

Further, Schaefer et al. (1981) defined social support as the existence or availability of people who care about an individual and on whom one can rely when needed. The authors also reported that some alarming situation may be better disentangled by a tangible/formal aids (loan, material help) whereas other situations
may be better resolved by intangible/informal events (sympathy, affection, listening, advice). Thus, social support may as well refer to the perception of a sufficient number of individuals to rely on (transactions) and the degree of satisfaction with the available and provided support. According to Thoits (1982), social support is supposed to have a beneficial effect on health and well being of people and can be defined as “… the degree to which persons’ basic needs are gratified through interaction with others …These needs may be met by either the provision of socio-emotional aid … or the provision of instrumental aid.”

A large body of literature discussed the concept of social support. Most of the empirical studies differ extensively in how they assessed the social support. Sarason et al. (1983) contended that for nearly twenty years, researchers have consistently reported that social support is beneficial for health and may act as an appropriate buffer against psychological distress induced by diseases. Social support may be defined as an “exchange of resources between at least two individuals perceived by the provider or the recipient to be intended to enhance the well being of the recipient” (Shumaker & Brownell, 1984).

According to Cohen and Wills (1985), there are two major models which explain the protective role of social support on stress. The first model is known as the Principal Effect Model, which posits that social support gives an individual a general positive context without regards to the actual experiences of stressful events. The second model is known as the Stress-Buffering Effect and has been studied largely with social support. This model purported that adequate social support will offset or moderate the impact of stress on health. These models explained the intricacies of the psychophysiological approach of social support.

Social support has both structural and functional aspects. The structural aspects relate to the presence of interlinks between the social structure whereas functional aspects relate to the functions performed by those social support ties (Cohen, 1988). Further, Sarason et al. (1990) opined that social support might affect various aspects of sport performance.

Richman et al. (1993) described eight categories of social support. These were:

1. Listening Support: the perception that another is listening without giving advice or being judgmental;
2. Emotional Support: the perception that another is providing comfort and care, and indicating that she or he is on the support recipients’ side;
3. Emotional Challenge: the perception that another is challenging the support recipient to evaluate his or her attitudes, values, and feelings;
4. Reality Confirmation: the perception that another, who is similar to the support recipient and who sees things the same way the support recipient does, is helping to confirm the support recipients’ perspective of the world;
5. Task Appreciation: the perception that another is acknowledging the support recipients’ efforts and is expressing appreciation for the work she or he does;
6. Task Challenge: the perception that another is challenging the support recipients’ way of thinking about a task or an activity in order to stretch, motivate, and lead the support recipient to greater creativity, excitement, and involvement;
7. Tangible Assistance: the perception that another is providing the support recipient with financial assistance, products, and/or gifts;
8. Personal Assistance: the perception that another is providing services or help, such as running an errand or driving the support recipient somewhere.

According to Suurmeijer et al. (2005), social support is conceptualized as an “actual transaction or exchange of resources between at least one recipient and one provider of these resources, intended to enhance the well being of the recipient.”

Social support is described as a multidimensional concept that includes the support actually received (informative, emotional, and instrumental) and the sources of the support (friends, family, strangers, and animals). It can be considered as structural (quantitative) or functional (qualitative) (Dumont & Provost, 1999). Further, functional support may be divided into perceived availability of support (perceived support) or support actually received (received support). Perceived and received support shared just 12% common variance, which might have different relationships with outcome variables (Haber et al., 2007).

SELF-ESTEEM

Self-esteem represents the individuals’ attitude towards the self. The following review of studies was attempted to understand the term thoroughly.

Self-esteem is defined by Harter (1985) as “the level of global regard that one has for the self as a person.” The construct of self-esteem is strongly related to
affective state of the individual. According to Harter (1991), self-esteem is not a fixed variable. The author reported that one-third to one-half of individuals followed for one year period manifested significant changes in self-esteem. Such changes in self-esteem occur during times of transition, e.g., educational transitions. Thus, measures of self-esteem for any individual may vary significantly across time. Global self-esteem is defined as, “ones’ overall sense of worthiness as a person” (Branden, 1994; Rosenberg, 1979).

Further, self-esteem can be viewed as an attitude towards an object, even though the holder of the attitude and the object towards which the attitude is held, are the same (Rosenberg, 1979). Also, Owens (1993) has reconfirmed the existence of the self-confidence and self-deprecation components of self-esteem. Global self-esteem is believed to be a better predictor of psychological well being than specific self-esteem. The theoretical foundation for this is based on the self-enhancement theory, which stated that self-esteem is a fundamental human motive. Both the global and specific self-esteem are neither equivalent nor interchangeable, and each one cannot automatically serve as a surrogate for the other. The effect of specific self-esteem on global self-esteem is affected by the degree to which the relevant role or behaviour is personally valued (Rosenberg et al., 1995).

Guindon (2002) formulated the definition of different types of self-esteem as follows:

1. **Self-esteem**: The attitudinal, evaluative component of the self; the affective judgments placed on the self-concept consisting of feelings of worth and acceptance, which are developed and maintained as a consequence of awareness of competence, sense of achievement, and feedback from the external world.

2. **Global self-esteem**: An overall estimate of general self-worth; a level of self-acceptance or respect for one’s self; a trait or tendency relatively stable and enduring, composed of all subordinate traits and characteristics within the self.

3. **Selective self-esteem**: An evaluation of specific and constituent traits or qualities, or both, within the self, at times situational variable and transitory, that are weighted and combined into an overall evaluation of self, or global self-esteem.

Global self-esteem can be subcategorized into components of self-competence (i.e., feeling one is confident, capable, and efficacious) and self-liking (i.e., feeling one is good, socially relevant, and contributes to group harmony). Maintenance of
self-esteem leads to self-protective motives, self-enhancement processes, and has a positive role in coping processes (Schmitt & Allik, 2005). Further, Sandstrom and Jordan (2008) differentiated between explicit self-esteem and implicit self-esteem: the former reflects an individual's conscious and deliberate view of self, whereas the latter reflects a less conscious and more automatic and reflexive view of self.

SELF-EFFICACY

The term self-efficacy represents the belief in one's capability to complete a particular task. The following review of studies was attempted to understand the term thoroughly.

Self-efficacy reflects an individual's belief in their ability to engage in specific behaviours that will yield a desired outcome (Bandura, 1986). The concept of self-efficacy has been defined as, “global confidence in one’s coping ability across a wide range of demanding or novel situations” by Schwarzer and Jerusalem, (1995).

As professed by Strauser (1995), self-efficacy relates to one's sense of competency and proficiency, and therefore affects one's choice of behaviour, activity, and exerted effort. The literature has focused on three different types of self-efficacy: task, barrier, and scheduling. Both barrier and scheduling efficacy are self-regulatory in nature, the two have been grouped together and considered as coping efficacy, which refers to an individual's confidence in the ability to perform tasks under challenging conditions (Bandura, 1997). Task efficacy is described as the confidence in one's ability to perform the fundamental aspects of a task in a specific situational context. Barrier efficacy is defined as confidence in one's ability to perform a task under challenging conditions or to overcome social, personal and environmental constraints; and scheduling efficacy is the confidence in one's ability to schedule or plan strategies for carrying out a specific action (Rodgers et al., 2002).

OPTIMISM

The term optimism represents the individual's tendency to look at the positive side of any situation or an event. The following review of studies was attempted to understand the term thoroughly.

Research has found that there are two forms associated with the optimism and pessimism. Unrealistic optimism, or optimistic bias, is defined as a tendency for people to believe that they are more likely to experience positive events, and less
likely to experience negative events, than similar others. The opposite tendency believing that positive events are less likely to happen to self than to others, and that negative events are more likely to happen to self than to others is called unrealistic pessimism, or pessimistic bias (Weinstein, 1980).

Further, Scheier and Carver’s (1985) conceptualization of optimism was derived from a model of self-regulation in which goal directed behaviour was best predicted by outcome expectancies. Expectations that good things will happen characterize the optimists. Optimists have more adaptive and stable coping tendencies.

Also, Scheier and Carver (1985) defined optimism and pessimism as generalized positive and negative outcome expectancies, while Dember et al. (1989) defined these concepts as a positive and negative outlook of life. Both these definitions entail that optimism and pessimism are relatively stable traits that are consistent across time and situations. Optimism has been defined as, “a generalized tendency to expect positive outcomes or the belief that good rather than bad things will happen in a persons’ life” (Scheier & Carver, 1993).

FEAR AVOIDANCE

The term fear-avoidance represents the individuals’ tendency to avoid physical activity due to fear of pain or re-injury. The following review of studies was attempted to understand the term thoroughly.

The phylogenetic origin of fear was thought to be injury (Shepard, 1916), and later on fear of injury or pain was considered a salient and distinct kind of fear (Dixon et al., 1957). The term Avoidance refers to a pattern of behaviour that delays, or puts off, an undesirable situation or experience. As such, avoidance behaviour has long been recognized as a spontaneous and adaptive response to acute injury (Wall, 1978). The term ‘fear-avoidance’ applied to the field of pain first appeared in an article by Lethem et al. (1983).

Kiresiophobia is defined as “an irrational and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or (re)injury” (Kori et al., 1990). Fear-avoidance, which refers to the avoidance of movements or activities based on fear, has been put forth as a central mechanism in the development of long-term pain problems (Kori et al., 1990).
AGGRESSION

Aggression reflects a behaviour that is attacking or forceful, which may occur after provocation or otherwise. The following review of studies was attempted to understand the term thoroughly.

It was stated by Bandura (1973) that: “A culture can produce highly aggressive people...by valuing aggressive accomplishment, furnishing successful models, and ensuring that aggressive actions secure rewarding effects.” The concept of aggression was defined by Moyer (1976), as a behaviour which causes (or leads to) harm, damage or destruction to another organism. According to Spielberger et al. (1983), the concept of aggression implies “destructive or punitive behaviour directed towards other persons or objects.” Bushman (2002) contended the idea that aggression breeds aggression which was also a part of cognitive neo-association theory, according to which venting of aggression activates aggressive thoughts and primes angry feelings, thereby increasing the possibility of further aggressive behaviour.

A more extensive definition from the Merriam-Webster Dictionary (online, 2013) states that aggression is: “(1) a forceful action or procedure (as an unprovoked attack) especially when intended to dominate or master; (2) the practice of making attacks or encroachments, especially, unprovoked violation by one country of the territorial integrity of another; and (3) hostile, injurious, or destructive behaviour or outlook especially when caused by frustration.”

REHABILITATION

Rehabilitation in its broadest sense includes the overall recovery of an individual, so that an individual is fit to resume its pre-injury level activities, and is physically as well as psychologically recovered. The following review of studies was attempted to understand the term thoroughly.

According to Williams (1985), rehabilitation can be defined as “an approach, a philosophy, and a point of view as much as it is a set of techniques.”

As professed by Kramer (1997), rehabilitation is an outcome-oriented field and the rehabilitation professionals think in terms of restoration of function, recovery of speech, and return to independent living in the community. To assess outcomes, rehabilitation professionals invest in measures that reflect their concerns rather than.
Review of Literature

the patient’s interests. The rudimentary framework included four basic dimensions of outcome from the patients’ perspective:

1. Recovery in amount of difficulty experienced in physical activities (e.g., activities of daily living).
2. Recovery in ability to participate in previous social and recreational activities.
3. Return and reintegration into previous environment.
4. Satisfaction with care.

B. REVIEW OF LITERATURE

Sport Injuries and Role of Psychosocial Factors in Sport Injury Rehabilitation

Sport Injury: Overall Perspective

Numerous studies have reported sport injury prevalence as well as the related outcomes. The following review of studies was attempted to understand the profound implications of sport injuries thoroughly.

The upsurge in participation in sport or physical activity could be one of the reasons for increased sport injury rates over the years despite of improvements in infrastructure. This could be attributed to culture pressures related to health and fitness, which might have encouraged the trend towards participation in physical activity (Ncholl et al., 1995).

It was stated by Parkkari et al. (2001) that sport injuries are one of the most common injuries in modern western societies. The rehabilitation of sport injuries is difficult, expensive and time consuming, and thus, preventive strategies and activities are justified on medical as well as economic grounds. The study further reported that a successful injury surveillance and prevention requires valid pre and post-intervention data on the extent of the problem. The aetiology, risk factors and exact mechanisms of injuries need to be identified before initiating a measure or program for preventing sport injuries, and measurement of the outcome (injury) must include a standardized definition of the injury and its severity, as well as a systematic method of collecting the information. Valid and reliable measurement of the exposure includes exact information about the population at risk and exposure time. It was also suggested that the true efficacy of a preventive measure or program could be best evaluated through a well planned randomized trial. Sixteen randomized controlled
trials (RCT’s) on prevention of sport injuries were included. According to these RCT’s, the general injury rate could be reduced by a multifactorial injury prevention program in soccer, or by ankle disk training, combined with a thorough warm up, in European team handball. Ankle sprains could be prevented by ankle supports (i.e., semi-rigid orthoses or air-cast braces) in high-risk sporting activities, such as soccer and basketball, and stress fractures of the lower limb by the use of shock-absorbing insoles in footwear. The study concluded that it is extremely important for researchers to seek consultation with epidemiologists and statisticians to be certain that the study hypothesis is appropriate and that the methodology could lead to reliable and valid information. Further, well-designed randomized studies are needed on preventive actions and devices that are in common use, such as pre-season medical screenings, warming up, proprioceptive training, stretching, muscle strengthening, taping, protective equipment, rehabilitation programs and education interventions (such as increasing general injury awareness among a team). The effect of a planned rule change on the injury risk in a particular sport could be tested via a RCT before execution of the change. The most urgent requirement as stated was in commonly practiced or high-risk sport, such as soccer, American football, rugby, ice hockey, European team handball, karate, floor ball, basketball, downhill skiing and motor sport.

The sport injury is considered as one of the inevitable consequence and most traumatic event of participation in sport and exercise. Most of the times, the athletes experience injury at some point of their career regardless of their experience and ability (Steadman, 2003).

In a study conducted by Stevenson et al. (2003), the magnitude of the sport injury problem at the non-elite level of participation and the cost of sport injuries in Western Australia was determined. The study recruited a sample of 1512 participants, who played Australian football (33%), netball (26%), field hockey (29%), and basketball (12%), from the Perth metropolitan area. All participants were non-elite, non-professional players without any sport injury in last three months. Information was collected using a baseline self-report questionnaire and monthly telephone interviews. The questionnaire included items about the players’ previous sport injury history, along with questions on their pre-season training, warm up, and cool down patterns, specific items about the equipment used, for example, footwear and
Review of Literature

protective devices, along with general health, lifestyle, and physical activity questions. The five-factor personality inventory test and the athletic life expectancy survey were also administered. Both the direct costs of treating injuries and the indirect costs resulting from time lost as a consequence of sustaining an injury were calculated. The result of the study revealed that the incidence of injury at the non-elite level of participation was 16 injuries per 1000 hours of sport participation, which was significantly less than the incidence of injury at the elite level of participation. The incidence of injury was highest in the contact sport such as Australian football and lowest in netball. The study concluded that if participants had undertaken a training program for their sport, then there would have been a decreased risk of injury. A back problem increased the possibility of injury by 69%. The average cost of sport injury each season for participants in this study was AUD$126 per injured player.

It was reported by Tripp et al. (2003) that around 20 million children and adolescents participated in organized sport programs in the United States, and more than $8 million was spent on childhood sport injuries in 1987. Other than monetary costs, sport injuries are important because an athletes’ physical and psychological well-being is threatened. Issues of adjustment and pain after sport injury are salient for adolescents because of incomplete development in both the physical and emotional realms and the fact that pain is the most pervasive and debilitating obstacle to effective rehabilitation of sport-related injury. The study recognized the need for research on pain after sport injury, especially in the adolescent age group. Most sport injuries for 8 to 17 year old involved lower extremities (73%), with a significant proportion occurring in the knee (22%).

In a study by Bahr and Krosshaug (2005), the current models that used to describe the etiology of injury and a reliable and efficient approach to understand the causes of injuries were investigated. The first model was the sequence of prevention having epidemiological perspective. This model has four step sequences. First step was magnitude of incidence and severity of sport injuries. Second step was the risk factors and injury mechanisms responsible for occurrence of injuries. Third step was the application of intervention or procedure that reduces the future risk or severity of injuries. The fourth step was evaluation of the third step by repeating the first step. The most important step of this four step model was to find out the causes because this step helps to find out risk factors and injury mechanisms for a particular athlete.
and the rest three steps depend upon this step. The second model was based on biomechanical perspective which describes the inciting event in other words as “injury mechanism.” This model explained the relationship between load and load tolerance that results in injury outcomes of an event. On comparison of biomechanical model with epidemiological model it was found that load and load tolerance were influenced in various ways by the chief factors of epidemiological model, internal risk factors, external risk factors and the incident event. The authors also described a comprehensive injury causation model. This model was based on the epidemiological model, biomechanical model as well as on the characteristics of the sport in question. This model was used to study the relation between different causes of injury and addressed the potential for prevention. It was concluded that increased neuromuscular control reduces the risk of injury, so by neuromuscular training one can improve the lower limb balance and correct the weight bearing on the ankle. Thus, the application of the traditional biomechanical approach to describe the inciting event was must to prevent injuries. It was suggested that a detailed description of the mechanisms for a specific injury type in a particular sport is must for the events leading to the injury situation (playing situation, player and opponent behaviour).

It was contended by Brooks and Fuller (2006) that the data which was available from epidemiological studies of sport injuries served as an essential requirement for developing injury prevention, treatment and rehabilitation strategies. There is a need to address the number of methodological issues and their potential effects using examples based on injury data. The authors obtained data from a single and large epidemiological study in professional rugby union and demonstrated that conflicting conclusions could be reached depending on how the data were collected and analyzed. The pivotal role played by injury definition (loss of time, missed matches, diagnostic assessment and surgery), recurrent injury definition (clinical judgment and same injury/same location/same season), method of reporting injuries (number, proportions and incidence) and method of calculating incidence (injuries per 1000 player-hours, per 1000 athlete-exposures and per 1000 matches) were highlighted and illustrated. It was also accredited that if training and match injuries were combined, the incidence of injury was more likely to reflect the incidence of training injuries and the distribution of injuries was more likely to reflect the distribution of match injuries. It was stated that the greatest concern with the
identification of injuries within a sport depends on whether the assessment was based on injury incidence, severity or risk. Examples were also presented to show that the relationships identified between sport injuries and risk factors might be dependent on whether case-control or cohort study designs were used. The study concluded that complex intricacies exist while reporting injury variables, and therefore demonstrated the importance, at least within a sport, of reaching consensus agreements on acceptable study designs and methods of data analysis in sport epidemiology.

A study by Yung et al. (2007) retrospectively reviewed the injury epidemiology on 44 Hong Kong elite badminton players in 2003. Team training records were reviewed to retrieve the training and competition hours, while the medical records from the physiotherapy department were reviewed to obtain information regarding injuries. A total of 253 injuries (128 recurrent and 125 new injuries) were recorded, which accounted for an overall incidence rate of 5.04 per 1,000 player hours. Elite senior athletes had a higher incidence rate of recurrent injuries, while elite junior and potential athletes had a higher incidence rate of new injuries. A total of 1,219 visits (4.82 per athlete) to the physiotherapy department were recorded. On examining the incidence of injury by body regions, it was found that injuries in the back, shoulder, thigh, and knee were the most common. Most new injuries were strain (80 injuries), and the most frequently injured body sites were the back (17 injuries), the shoulder (15 injuries), the thigh (15 injuries), and the knee (15 injuries). One-sided exact test showed that the previous injury experience was significantly associated with the occurrence of new injury. The high incidence rates of injuries in these body regions provided good evidence for specific evaluation of these targeted areas in preparticipation examination, musculoskeletal screening examination, and possibly conditioning programs in the future. Athletes from different categories demonstrated slightly different injury patterns by body regions. Both back and shoulder injuries had the highest incidence rates in the elite senior category, knee injury was the most common in the elite junior category, followed by shoulder, thigh, and back. Overall, knee and shoulder injuries in the elite junior athletes were the highest and second highest among all injured body regions across all three categories.

In a study conducted by Soligard et al. (2010), the risk of acute injuries among youth male and female footballers playing on third-generation artificial turf compared...
with grass were investigated. More than 60,000 players in the age group of 13-19 years were involved in the study. Participants were followed in four consecutive Norway Cup tournaments from 2005 to 2008. Incidence and rate of injuries were recorded by the team coaches throughout each tournament. The results showed that the overall incidence of injuries was 39.2 (SD: 0.8) per 1000 match hours: 34.2 (SD: 2.4) on artificial turf and 39.7 (SD: 0.8) on grass. There was no difference in the overall risk of injury [odds ratio (OR): 0.93 (0.77–1.12), p=0.44] or in the risk of time loss injury [OR: 1.05 (0.68–1.61), p=0.82] between artificial turf and grass between males and females. There was a lower risk of ankle injuries [OR: 0.59 (0.40–0.88), p=0.008], and a higher risk of back and spine [OR: 1.92 (1.10–3.36), p=0.021] and shoulder and collar bone injuries [OR: 2.32 (1.01–5.31), p=0.049], on artificial turf compared with grass. The study concluded that there was no difference in the overall risk of acute injury in youth footballers playing on third-generation artificial turf compared with grass.

In another study, Jacobsson et al. (2012) explored the prevalence of musculoskeletal injuries in Swedish elite track and field athletes. The authors did a study to ascertain 1-year retrospective and current prevalence of injury in same players. It was a cross-sectional study and the data was collected by a web based questionnaire. The results were categorized on the basis of musculoskeletal diagnoses into injury type, body location, and subgroup of events. The Swedish top adult or youth (age group, 16 years) track and field athletes at the end of the 2008 outdoor season, both male and female, were included in the study. Participants were excluded from the study if they were ranked higher in another discipline or if no postal address was available. The demographic data and participant characteristics were collected. The athlete was then asked for injury data and a self-reported diagnosis for each injury. Two hundred seventy eight athletes (87%) of the enrolled study population submitted their assessment via the web survey. The mean age of adult athletes was 24 years. The overall 1-year retrospective injury prevalence was 42.8% (95%, confidence interval [CI], 36.9%-49.0%). Twenty one athletes reported injuries to two body regions, and three athletes reported injuries to more than two body regions. The point prevalence of ongoing injury was 35.4% (95% CI, 29.7%-41.4%). Fourteen athletes suffered from injuries to two body regions at the time of the data collection, and two reported having suffered injuries to more than two body regions. The study concluded
that there was high injury prevalence among elite track and field athletes. Most of the recorded injuries were non traumatic with gradual onset, indicating an association with overuse.

In a study conducted by Swenson et al. (2012), the knee injury epidemiology among U.S. high school athletes in the year 2005/2006–2010/2011 was analyzed. The aim of the study was to describe rate, patterns, risk factors and outcomes associated with specific knee injuries. The study included nine sport, viz. football, male and female soccer, female volleyball, male and female basketball, wrestling, baseball, and softball for the academic years 2005/2006–2010/2011 and female field hockey, female gymnastics, male ice hockey, male and female lacrosse, male and female swimming and diving, and male and female track and field for the 2008/2009–2010/2011 seasons. The data was collected using the National High School Sport Related Injury Surveillance System which was an internet based sport injury surveillance system. Injury Rate Ratios (RR) and Injury Proportion Ratios (IPR) were calculated by formula. The result from 2005/2006 to 2010/2011 revealed that 25,700 injuries occurred at the rate of 22.81 injuries per 10,000. There were 3864 (15.1%) knee injuries, primarily ligament sprains (48.2% of all knee injuries), contusions (14.9%), and meniscal injuries (9.3%). The authors estimated that 1,234,291 knee injuries occurred during the academic years 2005/2006–2010/2011 nationally in these nine sports. Knee injuries were more common in competition than in practice. The highest injury rates in competition were in football (21.08 competition knee injuries per 10,000), female soccer (10.84), and female gymnastics (9.36). Knee injury rates in football were significantly higher than in female soccer. The most commonly involved structure was the medial collateral ligament. Football and female soccer had the highest rate of anterior cruciate ligament (ACL) injury. Female knee injuries were more often treated with surgery than male knee injuries. It was concluded from the study that knee injuries were a potentially distressing problem among U.S. high school athletes and imposed substantial time and financial load on athletes’ families and the healthcare system. Football players accounted for almost half of all knee injuries and sustained them at rates higher than those in any other sport.

Recently, Engebretsen et al. (2013) analyzed the injuries and illnesses that occurred during the Olympic Games, held in London in the year 2012. The study employed the International Olympic Committee (IOC) injury and illness surveillance
system for multisport events to record injuries and illnesses. The injuries and illnesses were defined as new or recurring musculoskeletal complaints or concussions (injuries) or illnesses incurred during competition or training during the London Olympic Games (27th July–12th August, 2012) receiving medical attention. The information with respect to injuries such as accreditation number, sport and event, whether the injury occurred during competition or training, date and time, body part, type, cause, and estimated time lost from competition or training was recorded. The information about illness was recorded as accreditation number, sport and event, date, diagnosis, affected system, main symptom(s), cause, and estimated time loss. The measure of injury and illness incidence was calculated by the formula ‘i=n/e’, where ‘n’ is the number of injuries or illnesses during competition, training or in total, during the study period and ‘e’ the respective number of exposed athletes. Total 10,568 athletes participated in the London Olympic Games, 4676 were women (44%) and 5892 men (56%). The results showed that a total of 1361 injuries equaling an overall injury rate of 128.8 injuries per 1000 registered athletes were observed. On an average, 11% of the athletes sustained at least one injury. There were 114, 18, and 7 athletes with two, three and four injuries, respectively. It was found that the risk of an athlete to be injured was the highest in taekwondo, football, handball, mountain bike, hockey, weightlifting, athletics and badminton (15–39% of registered athletes were affected in each sport). A total of 174 injuries (13%) were recorded from training or competition for more than 1 week. These injuries were 10 shoulder, elbow and knee dislocations; 38 muscle strains; 24 fractures and 6 stress fractures; 8 Achilles, knee and shoulder tendon ruptures; 47 ligament sprains and 15 knee sprains, including 6 anterior cruciate ligament (ACL) and 1 posterior cruciate ligament (PCL) ruptures. An incidence rate for illness was found to be 71.7 illnesses per 1000 athletes. The incidence of illnesses was significantly higher in female as compared to male athletes. It was found that 11% and 7% of all the 10,568 athletes suffered from at least one injury or illness, with overall rates of 128.8 injuries and 71.7 illnesses per 1000 athletes. There was substantial difference between the magnitude and characteristics of the injuries and illnesses between sport and gender. The highest rate of injuries was found in taekwondo, football, and handball whereas the highest rate of illnesses was found in beach volleyball, synchronized swimming and football. The authors concluded that 11% of the athletes incurred an injury and 7% suffered from at least one illness during the London Olympic Games.
Review of Literature

Pain and Rehabilitation

The following review of studies was attempted to understand the profound implications of pain and its effect on sport injury rehabilitation thoroughly.

In the earlier research, Anshel and Russell (1994) examined the effect of aerobic and strength conditioning on pain tolerance, pain appraisal and mood as a function of upper and lower limb pain location. Unfit males (n=48) were randomly assigned to one of four groups: aerobic training, strength training, combined aerobic and strength training, and a ‘no training’ (control) group. The fitness regimen consisted of exercising three times per week for 12 weeks. Pain tolerance, appraisal and mood were ascertained before the treatment (baseline), and after 6th and 12th week. Statistical analyses using MANOVA indicated that the presence of aerobic training increased upper limb pain tolerance but was also linked to a more severe pain appraisal compared with the absence of aerobic training. Results of the study suggested that aerobic work improved vigor while decreasing fatigue, tension and depression. Strength training had no influence on pain tolerance and positive mood states, but increased depression. Lower limb pain tolerance was unaffected by the treatments.

In line with the similar research, Koltyn and Arbogast (1998) assessed the influence of resistance exercise on pain threshold and pain ratings. The authors also measured state anxiety, body awareness, systolic blood pressure, diastolic blood pressure, and heart rate responses. The procedure involved the application of pressure (3 kg force) to the middle digit of the left hand for two minutes using a Forgione-Barber pain stimulator before and after (5 and 15 minutes) resistance exercise and quiet rest. The protocol of resistance exercise consisted of 45 minutes of lifting three sets of 10 repetitions at 75% of an individuals’ one repetition maximum. The subjects were asked to sit quietly in a room free from distractions for quiet rest phase. Data were analyzed by repeated measures analysis of variance for multifactor experiments. Results of the study indicated that pain threshold was significantly higher and pain ratings were significantly lower five minutes after resistance exercise. Changes in pain perception were accompanied by changes in heart rate, systolic blood pressure, and body awareness after exercise. The study concluded that a single bout of resistance exercise was capable of modifying the sensation of experimentally induced pain.
A study conducted by Sullivan et al. (1998) acknowledged the need for concern towards the psychological predictors of disability in the rehabilitation of individuals with soft-tissue injuries. Soft-tissue injuries following motor vehicle or work accidents could result in significant disability, and the cost of compensation associated with these injuries has been rising at an alarming rate. Pain and mobility restrictions resulting from soft-tissue injuries could prevent individuals from performing a variety of life activities, including activities related to their occupation. It was ascribed that pain has not only been considered as the primary determinant of disability in chronic pain sufferers, but it has also been suggested that pain and disability are distinct and partially independent phenomena. It was opined that environmental, social and monetary reinforcers, as opposed to pain, may be the primary determinants of disability. Further, it was suggested that emotional variables such as depression, anxiety, and fear may also be an important determinants of disability.

In another study, Meyers et al. (2001) investigated the pain coping response of college going athletes who were involved in high contact and high injury-potential sport and the study also quantified the possible differences across rank/skill level, injury-potential, and gender. The authors stressed upon the need to develop a proactive approach to understand the athletic response to injury prior to actual trauma rather than simply attributing the physical trauma as part of the inherent nature of contact sport. This proactive approach would help to enhance the opportunity to ward off potential subject-related risk factors involved in contact sport. Following written informed consent, the Sports Inventory for Pain (SIP) was administered to 185 college athletes competing in the National Intercollegiate Rodeo Association (NIRA). MANOVAs indicated significant rank, injury potential, and gender effects. Post hoc procedures indicated that top-ranked athletes scored lower in cognitive and body awareness, and higher in avoidance than bottom-ranked athletes. Athletes competing in high injury-potential events scored lower in catastrophizing and higher in body awareness than athletes in low injury-potential events. Males scored higher than females in body awareness. Significant differences were found in pain coping response which existed across rank, gender, and injury-potential. Findings also demonstrated that the SIP could be used to differentiate between rank and injury-potential, thus providing partial confirmation of construct validity of the SIP. These
findings may be used as a starting point for continued research delineating and contrasting pain coping response in traditional sport athletes.

In a study conducted by Cole et al. (2002), the predictive role of various measures of recovery expectations among workers with injuries resulting in time off work was examined. The participants were identified shortly after claim registration with the Ontario Workers Compensation Board (n=12,182). The subjects were screened for eligibility through review of their claim file. To be eligible, participants had to have a soft-tissue injury to the back or upper or lower extremity, and a new, lost-time workers’ compensation claim. The authors interviewed participants by telephone within three weeks after the injury and measured their recovery expectations along with other, potentially important prognostic factors. The primary outcome was total time receiving 100% wage-replacement benefits during the year following injury, obtained from OWCB administrative files. Self-reported measures of pain, health related quality of life and functional status, obtained up to four times during the year following injury, were both independent predictors and secondary outcomes. Results of the study showed that participants who expected to return to usual activities within three weeks had a 37% (95% CI 26%-47%) faster rate of stop receiving benefits than those who responded “don’t know” to this question, and participants who stated that they were fully recovered or would get better soon had a 25% (CI 5%-40%) faster rate than those who thought they would never get or stay better. Positive recovery expectations were also associated with reductions in pain grade and improvement in functional status outcomes.

In line with the research on pain, Straub et al. (2003) examined pain intensity and pain duration experienced by male and female athletes playing contact and non-contact sport using the Pain Apperception Test, or PAT. The PAT consists of 25 line drawings grouped into three series: (a) situations of felt sensation of pain (n=9); (b) anticipation of pain as opposed to felt sensation of pain (4 counterpart pairs); and (c) origin of pain, either self-inflicted or other-inflicted (4 counterpart pairs). Using a 7-point Likert-like scale, the athletes evaluated each PAT drawing as to the intensity and duration of pain. The drawings feature distinct facial and body characteristics that facilitated the athletes’ projection into the various pain situations. MANOVA analysis indicated that there were statistically significant differences (.05 levels) in pain apperception between (a) male and female athletes, (b) contact and non-contact
Review of Literature

athletes, and (c) athletes in various sport. Stepwise multiple discriminate function analysis (SMDFA) was used to test the dispersion of group centroids in the discriminate space and to identify the variables that contributed the most variance to the between-group differences. SMDFA's classification procedures assigned athletes to groups based on their pain apperception scores. MANOVA revealed significant multivariate effect for pain perception between contact-sport and noncontact-sport athletes. The study showed significant difference in pain apperception. Contact-sport athletes had lower pain apperception than did non-contact sport athletes. SMDFA also revealed a significant between-group difference in pain apperception between contact sport and non-contact sport athletes.

Further, Linton and Shaw (2011) studied the role of psychological factors which were involved in the development of persistent pain and disability. The authors stated that fundamental psychological processes are involved in most types of pain problems and explored how these processes contributed to the development of persistent pain problem. The psychological factors which were associated with the experience of pain were psychological processes, attention, interpretation, beliefs and attitude, expectations and cognitive sets. The authors stressed upon the use of fear avoidance model, acceptance and commitment model, misdirected problem solving model, self-efficacy model, and stress-diathesis model for coping of pain. The study concluded that psychological theories and model of pain had a significant role in cognitive, emotional and behavioural manifestation of pain model. Study revealed that based upon the model of the pain experience, effective strategies for coping with persistent, recurrent or chronic pain was different from those managing acute pain. It was also stressed that there is a need to translate these techniques into useful clinical tools and interventions for widespread dissemination. Assessing psychological factors in patients with low back pain and utilizing them in treatment could have a significant role in improving outcomes and preventing the development of chronic disability.

Anxiety: Its Dimensions and Rehabilitation

The following review of studies was attempted to understand the profound implications of anxiety on sport injury rehabilitation thoroughly.

In a study conducted by Ramanaiah et al. (1983), the correlation between the STAI A-State and A-Trait scales has been investigated. A sample of 212
undergraduate students in introductory psychology (106 men and 106 women) participated in this study for partial course credit. The STAI was administered to the subjects in groups of 30 to 50, using the standard instructions. The STAI consists of two 20-item scales for measuring state anxiety and trait anxiety. The STAI A-State scale requires people to describe how they feel at a particular moment using the 4-point rating scale. The STAI A-Trait scale, on the other hand, requires people to describe how they generally feel using the 4-point rating scale. Differences between the correlation of each item with its own scale and its correlation with the other scale were tested for significance using a one-tail $t$-test. Both the scales were reported to have very high internal consistency, reliability, and high inter-correlations.

In another study, Broadbent and Broadbent (1988) investigated anxiety attentional bias relationship with state and trait anxiety. In four experiments, a total of 104 subjects drawn from the general population were tested on different variations of this task. At the start of the session, subjects completed both parts of the Spielberger State-Trait Anxiety Inventory. In experiment one, there were 48 emotionally threatening words out of which 24 were related to the physical threat and the other 24 to social threat. Each of these threat words were paired with a neutral word matched for both number of syllables and frequency to create 48 critical pairs. In experiment two, the filler name was replaced by animal name. In experiment three, the 288 word pairs used were the same as in experiment two but the order of presentation for both the threat and animal pairs was reversed so that words presented in the first half of the test in experiment two appeared in the second half in experiment three. In experiment four there were 48 probed threat pairs and 48 probed filler pairs, the remaining 192 pairs being un-probed. The most reliable results across experiments were found by using Trait rather than State Anxiety, and particularly by fitting a curvilinear relationship such that the exact degree of anxiety makes little difference at low levels but becomes increasingly important at high levels. If State was used, the best relationship was found with an interaction with Trait, such that State makes more difference at high values of Trait. This means that the effect must be to some extent due to lasting personality characteristics and is not something that happens to everybody when in a temporary state. It was concluded that the anxious patients showed a tendency to react faster to a probe stimulus that appeared in the location of a threatening visual word rather than in that of a simultaneous neutral word.
Further, Hackfort and Schwenkmezger (1993) summarized the fear-anxiety debate and concluded that for fear, there is certainty regarding the sources of danger, and therefore fear leads to actions of escape. On contrary, anxiety is associated with the development of the higher nervous system and the abilities of abstraction and anticipation. Furthermore, the authors defined fear as stimulus-specific and associated with definite danger, whereas anxiety is connected to the anticipation and imagination of ambiguity and uncertainty. Finally, it was adduced that fear is more of a fundamental rather than a biological mechanism, whereas anxiety is composed of different components (e.g., fear, misery, interest) and is associated with learning and social processes.

In a study conducted by Lavallee and Flint (1996), the role of stress, competitive anxiety, mood state, and social support in athletic injury was examined. The authors hypothesized that athletes reporting high levels of stress, high competitive trait anxiety, negative mood states, and low social support would exhibit greater incidence of injury and injury severity. The study included 55 male varsity athletes (42 football, 81% of the football team, and 13 rugby, 74% of the rugby team), aged 19-28 years (Mean age=22 years). The following inventories: Sport Competition Anxiety Test (SCAT), Social Support Scale, Social Athletic Readjustment Rating Scale (SARRS), and Profile of Mood States (POMS) were administered to the athletes. Internal consistency of these self-report measures was tested using Cronbach’s alpha coefficient. Injury rate and severity were recorded by the head student therapist throughout the season. Correlational analyses were performed using Pearson correlational coefficient. The result revealed that competitive anxiety and tension/anxiety mood states were related to injury frequency, tension/anxiety, anger/hostility; and total negative mood states were related to injury severity. Individually, the two sports yielded somewhat different scores on injury frequency and injury severity; in football, both the injury frequency and injury severity were related to tension/anxiety. Vigor/activity was found to be significantly related to injury rate. But the internal consistency of vigor/activity was less than .70 on the Cronbach alpha scale, so this otherwise significant finding was disregarded. In rugby, injury frequency was related to tension/anxiety and depression/dejection. Conclusion of the study was that high scores on competitive trait anxiety and tension/anxiety were found to be significantly related to rate of injury, whereas tension/anxiety,
anger/hostility, and total negative mood states were significantly related to severity of injury. These findings are useful for athletic trainers in identifying athletes who may possess psychological factors predisposing them to athletic injury. The athletic trainers can also instruct these athletes for getting assistance in preventive psychological interventions.

In another study, Hale et al. (2002) investigated the influence of a single exercise session involving both aerobic and acute resistance training modes on state anxiety. The literature shows significant reductions in state anxiety following bouts of aerobic exercise, whereas no changes were observed after acute resistance training. So to address this issue, the authors examined state anxiety responses to sixty minutes of cross training in 16 collegiate athletes (12 females, 4 males). Each participant completed two cross training exercise sessions (30 minutes of resistance training, 30 minutes of bicycle ergometry) and then these exercises were reversed with a gap of one week. Each exercise mode was completed at about 70% of maximum VO2 max. State anxiety (STAI-Y1) was assessed five minutes before, and at 0, 10, and 60 minutes after exercise. The results for repeated measures analysis of variance showed a significant main effect for time. However, the main effect for order and the order by time interaction were not significant. Post hoc analysis showed that state anxiety was reduced from baseline at 10 minutes and 60 minutes after exercise, but not at 0 minute. The study concluded that combined session of aerobic and resistance exercise was associated with reductions in state anxiety, and that the order in which the exercise is completed does not influence this response.

A study by Alizadeh et al. (2012) examined the psychological factors that could increase the injury risk among junior football players. The study included 81 male football players of Tehran Junior Super League Championship (Asia Vision) who were selected by convenience method (aged between 16-20 years). The national team players were excluded from the study. The Competitive State Anxiety Inventory (CSAI-2) was used to measure competitive anxiety. Participants rated their anxiety responses over multidirectional constructs of cognitive anxiety, somatic anxiety and self-confidence. Self-reported previous injury questionnaire in various body parts (neck, shoulder, humerus, elbow, forearm, wrist and fingers, hip, femur, knee, calf, ankle and fingers and torso) including fracture, sprain and strain was used for injury occurrence. Participants were asked to report the number of injuries during the last 12
months including those injuries only that required medical attention or withdrawal from training for one day or more. The results showed that the majority of football players reported at least one injury over the previous 12 months with an average of 3.03 injuries over the previous 12 months. The Pearson correlation analysis revealed significant relationships between injury occurrence and cognitive anxiety and somatic anxiety. Relationship between self-confidence and injury occurrence was not significant.

Recently, Vago et al. (2013) studied relationship between anxiety and injuries in soccer players. The study included 100 amateur male soccer players (aged 18 to 45 years). Each player was asked to fill in a qualitative questionnaire about his personal characteristics, sport practice (training, matches, etc.) and previous injuries (muscle and meniscal injuries, tendinopathies, fractures, etc.). The participants also completed the State-Trait Anxiety Inventory investigating the anxiety level, both in a specific situation (before the match, in this study) and in everyday life. The results showed that tendinopathies and fractures positively correlated both with state and trait anxiety. It was also found that players with higher level of state and trait anxiety reported more tendinopathies and fractures. The authors concluded that anxiety is an important factor, significantly associated with injuries, such as tendinopathies and fractures. It was also concluded that psychological components, situation-related emotional states and coping resources represented important avenues for interventions aimed at preserving health status and preventing injuries among soccer players.

**Stress: Its Dimensions and Rehabilitation**

The following review of studies was attempted to understand the profound implications of stress on sport injury rehabilitation thoroughly.

In a study conducted by Bartholomew (2000), the effect of performance feedback on stress reactivity after recovery from maximal exercise was studied. The author analyzed the moderation in physical performance after manipulating subjects’ perceptions about their exercise performance while keeping intensity constant. For the experiment, 40 competitive athletes (17 males, 23 females) aged 18-25 years were taken to determine the effect of exercise on mood and cognitive functioning. Participants had a mean age of 21.2 years and mean VO2 max of 60.0 ml/kg/min. The participants were provided with the population norms for aerobic fitness and
Review of Literature

VO2 max and asked to predict their VO2 max on the upcoming test. Further, participants were asked to verify their accuracy. Exercise regimen was completed on a treadmill. Heart rate and oxygen consumption were monitored. Participants were randomly assigned into four conditions, i.e., accurate feedback, low and high performance feedback and no exercise. Performance feedback was manipulated on the basis of pre exercise prediction and the duration of exercise before exhaustion. Performance obtained later was positively influenced by this manipulation. Stressors were also introduced later as a mental challenge and a speech task. Performance manipulation was checked with two 5-point Likert scales. To assess the psychological response, one questionnaire was given to each participant. ANCOVA was the method used for analysis. In results, there were no significant differences between groups for heart rate reactivity to either the mental challenge or speech task. Similarly, no main effect difference was found for mean arterial pressure reactivity to the mental challenge. Mean arterial pressure was found lower in accurate feedback participants than no exercise controls but there was no such difference found between accurate feedback and high performance group. Mean arterial pressure reactivity to the speech was reduced in the high performance participants compared with the low performance participants, while no differences were found between the low performance and no exercise control participants. Study supported the importance of performance feedback as a buffering effect along with the usefulness of maximal exercise in reducing reactivity to stress and relationship between exercise and reactivity.

A study by Bond et al. (2002) evaluated the significance of social problem-solving ability, mode of exercise & age in relation to anxiety and stressors in daily routine. Study was based upon the possible role of exercise as an anxiolytic & anti-depressive, along with the ability to improve self-concept, coping ability & general well being. Adult participants (n=249) were recruited for the study, voluntarily. Participants were predominantly Caucasian, married and well educated college going females. Participants were classified as moderate aerobic exercisers, sedentary and Tai chi exercisers. Participants were categorized as effective or ineffective social problem solvers by means of their total problem-solving score on the Social Problem-Solving Inventory-Revised (SPSI-R). The State Trait Anxiety Inventory (STAI) was used as a measure for both specific and generalized forms of anxiety. The Daily Hassles Scale was used to assess the frequency and severity of daily hassles. ANOVA
was used to determine whether mean age differed with respect to exercise mode. The results showed that an effective social problem solver shows less anxiety trait. Similar results were found for state anxiety also. Furthermore, trait and state anxiety were reported less in mid-life/older adults as compared to younger adults. Although, no such differences were found for exercise mode and gender but later in discussion, the authors supported this notion that psychological stress in individuals is closely related to their social problem solving ability. Conversely, the study challenged the belief about the ability of moderate aerobic and anaerobic exercises in reducing the stress. The study also suggested age to be an important factor in stress management. It was also suggested that exercises may elevate mood, self-concept and resistance to depletion of coping energy sources, but may not resolve the actual hassle or problem. Several limitations including cross sectional nature of the study, data collection done by self-reports of participants and convenience sampling suggested that future research with a perspective replication of this study to eliminate the present limitations is highly required.

In line with the research on stress, Hanton et al. (2005) laid emphasis that stress has been and continues to be of heuristic value to the sports sciences. The content and quantity of competitive and organizational stressors in elite athletes was studied. Ten international performers were interviewed about sources of stress. The findings indicated that elite athletes experienced and recalled more demands associated primarily and directly with the sport organization than with competitive performance. Furthermore, this population also appeared to mention similar competitive stressors but varied organizational stressors, probably because the former are inherent and endemic to elite sport, whereas the latter are essentially extraneous and widely distributed. The results reinforced both competitive and organizational stressors as salient features of elite performers’ lives. The results also revealed that competitive demands are common to most athletes’ experiences of performance, with a minority being related to specific sport types. In contrast, organizational demands are generally disparate and subject to numerous sociocultural, political, economic, occupational and technological influences. Thus, the nature and pattern of competitive stressors appeared largely consistent across sport and stable through time, whereas organizational stressors are often environmentally diverse and temporally unstable.
**Review of Literature**

In another study, Tsatsoulis and Fountoulakis (2006) explored the beneficial effect of regular exercise in preventing the chronic stress induced metabolic & psychological comorbidities. In this study, the authors concentrated more on decreased insulin sensitivity and increased oxidation induced by physical activity. It was documented that absence of physical activity in chronic psychosocial stress, increases the risk for cardio-metabolic diseases and emotional or mood disorders. “Mental fitness” and “Physical fitness” were explained to be the major factors responsible for burden of disease. It was found that chronic or inappropriate activation of the stress system leads to increased amount of glucocorticoids and catecholamines in body which further suppresses the growth hormone and thyroid axes. This further increases insulin resistance and central obesity with hypertension and dyslipidemia. It was also found that chronic elevation of glucocorticoids and catecholamines produces memory and cognitive issues. The study strongly supported the “stress induced/exercise-deficient phenotype” since stress and physical inactivity with fat diet along with current lifestyle is becoming increasingly prevalent in modern society. It was reported that moderate physical activity produces central nervous system adaptations that constrain the deleterious effects of chronic stress on mental and physical health. The study concluded that regular physical exercise counteract the negative consequences of stressful environment.

Thatcher and Day (2008) investigated athletes’ underlying properties of coping stress during sport. Sixteen (8 males, 8 females) national standard trampolinists, within age group of 16-26 years were taken as participants in the study. Participants were interviewed by the second author. The purpose of interview was to help the participants to recall their most stressful events or situations during sport events. After completing all 16 interviews, data were transcribed in verbatim. Transcripts were compiled into quotations or paraphrased quotations and further grouped together to form organized raw data themes. These themes were grouped to define underlying properties. Verification of these data was done by first author. Final verification was done by a researcher to eliminate bias. In results, the stressful experiences expressed by the participants were discussed. The authors concluded that stressful events have the potential to be interpreted as both challenging and beneficial for the individuals. In results, the authors have recommended to use this information for further research on coping with stressful conditions.
A study by Thelwell et al. (2008) examined the varying stressors experienced by coaches who operated with elite athletes and explored whether coaches should be viewed as ‘‘performers’’ in their own right. The authors interviewed eleven coaches, and content analysis of the data revealed coaches to experience comparable number of performance and organizational stressors. The results concluded that performance stressors were divided between their own performance and that of their athletes, while organizational stressors included environmental, leadership, personal, and team factors. The findings provided evidence that coaches experience a variety of stressors. Stressors such as “inappropriate expectations of self,” “poor communication with others,” “having a lack of control over their athletes,” and “having problems with the recruitment of players,” as well as performance-related stressors, relate to their own and their athletes’ performance. Furthermore, coaches, like athletes, reported a number of organizational stressors in the form of environmental, leadership, personal, and team issues which affected their performance.

Harwood and Knight (2009) assessed the stressors experienced by British tennis players’ parents. The parents cited a number of stressors that represented factors intrinsic to the sport of tennis. These included time stressors associated with travel, training, competition, and tournament schedules, as well as financial stressors associated with lessons, transport, accommodation, and equipment. It was reported that some parents expressed stressors in a manner that included their negative appraisal, negative emotions, and lack of coping resources. The study concluded that parents noted a lack of professionalism, knowledge, and empathy in terms of skills of the coaches, policies, and on-court behaviour, with lack of communication, feedback, and match attendance being the most frequent stressors.

It was found by Main and Grove (2009) that there was a lack of multi-component assessment model to assess training distress among athletes, so the authors proposed a study to evaluate mood state, perceived stress and behavioural symptoms due to training distress, which provided wide range of commitment and involvement levels. A sample of 370 males and 122 females, total 492 athletes were recruited from 26 different sport disciplines, i.e., football (soccer, Australian rules football, rugby), individual sport, hockey (ice & field), netball, volleyball, basketball and other team sport. Subjects had experience of their sport for about ten years and had participated in major competitions. The following instruments were used to assess the training
Review of Literature

distress, i.e., 10-item Perceived Stress Scale (PSS) which assessed the extent of
general life situations considered stressful; 24-item Brunel Mood State Scale
(BRUMS) used to measure mood disturbance; 19-item Training Stress Scale which
was used to measure behavioural symptoms of training distress; and Athlete Burnout
Questionnaire (ABQ) which was used to determine difference between symptoms of
burnout and overtraining. The study concluded that depressed mood, reduced vigor
and perceived stress were important psychological responses of training distress,
associated with physical symptoms, sleep disturbances and general fatigue. It was
found that the measurement model for assessing training distress symptoms was valid
and reliable. This model had clean factor structure, good internal consistency within
the subscales and theoretically showed relevant relationship with burnout risk.
Further, it was reported that this model was less susceptible to measured error and had
cost benefit properties also.

In another study, Rimmele et al. (2009) examined the effect of different levels
of physical activity on psychosocial stress along with the possible modulating effects
of competitiveness on stress responsiveness. The study comprised of 18 elite
sportsmen, 50 amateur sportsmen, and 24 untrained men. MANOVA was used to
verify the group differences in levels of physical activity. Further, fitness test and
Trier Social Stress Test (TSST) were introduced. This stress protocol included mock
job interview, mental arithmetic tasks etc., and saliva were collected before and after
the stressor to see the cortisol level. Heart rate was also continuously monitored.
General competitiveness was assessed with the Competitive Index (CI) and sport
specific competitiveness was assessed with the Sports Oriented Questionnaire (SOQ).
Anxiety level was measured using the state scale of the State-Trait Anxiety Inventory
(STAI) and multidimensional mood questionnaires. Further, analysis of variance
(ANOVA), analysis of covariance (ANCOVA) and MANOVA were done with
repeated measurements. The results showed that elite sportsmen exhibited the lowest
cortisol level in response to psychological stress compared to amateur and untrained
sportsmen. Similarly, in response to stressors, increase in heart rate was found to be
minimal in elite sportsmen & amateur sportsmen compared to untrained men. Anxiety
level was highest in untrained men and the lowest level was found in elite sportsmen
during the experimental session. No significant difference was found among the three
groups while measuring the highest worsening mood and lowest calmness score during the stressor or the experiment.

**Interrelationship between Stress and Anxiety**

Both stress and anxiety increase the athletes’ susceptibility for injury and also adversely affect their coping abilities.

According to McGrath (1970), stress occurs as a result of imbalance between the perceived environmental demands and perceived response capabilities, when failure to meet these demands has important consequences. On the other hand, anxiety is the cognitive dimension of physiological arousal (Gould & Krane, 1992). This means that stress is the individuals’ interpretation of the environmental demands and anxiety is the cognitive reaction (i.e., expectations, body sensations) to perceived inability to cope with those demands.

A study by Rimmele et al. (2007) determined adrenocortical, autonomic and affective response of standardized psychosocial stressor administered to two groups, i.e., well trained (elite sportsmen) and untrained men. Twenty two elite sportsmen and twenty two untrained men took part in this study. Subjects who exercised minimum two hours per week were termed as untrained. No significant difference was found between the groups in age, BMI, psychological symptoms and perceived stress. Participants on medication or history of mental or medical illness were excluded. Smokers were also excluded. Participants avoided eating, drinking anything except water and strenuous physical activity for at least two hours prior to the data collection. A standardized grape juice about 250ml was given to the subjects, before the testing procedure. Then psychosocial stress induced by TSST, consisting of a 5-min public speaking task and a subsequent 5-min arithmetic task under observation of an unknown panel of one man and one woman was administered. Adrenocortical and autonomic responses to the psychosocial stressor were calculated by repeated measures of salivary free cortisol levels and heart rate. Heart rate was observed in every 5-second during the whole experiment by a wireless chest heart rate transmitter and a wrist monitor recorder. The German versions of the State-Trait Anxiety Inventory (STAI) to determine anxiety, the Inventory on Competence and Control Beliefs (ICCB) to determine self-efficacy and Recovery-Stress Questionnaire for Athletes (RESTQ-Sport) to assess possible overtraining were used. The State Scale of
**Review of Literature**

the STAI and the Multidimensional Mood Questionnaire were used to repeatedly assess affective responses before and after stress exposure. There was a significant increase in salivary free cortisol level in both groups after psychosocial stress protocol whereas the cortisol level was same at baseline in both groups. So, there were low cortisol responses to the stressor in trained men then untrained men. At baseline, there was no significant difference in heart rate, but on psychosocial stressor there was significant increase in heart rate and heart rate reactivity was lower in trained men as compared to untrained men. Stress protocol significantly increased state anxiety and worsened mood in both groups but no significant changes in calmness were observed. There was no difference in worsened mood at baseline but on stress exposure the more worsened mood in untrained group was observed as compared to trained men. There was increase in anxiety level in untrained men on exposure to stressor. It was concluded that cortisol, heart rate, state anxiety, mood, and calmness have no relationship with self-efficacy.

**Social Support and Rehabilitation**

The following review of studies was attempted to understand the role of social support as well as its effect on sport injury rehabilitation thoroughly.

It was professed by Johnston and Carroll (1998b) that provision of social support largely matches the demand. Emotional and practical forms of support decreased with time, while varieties of informational support were increasingly received, and preferred over time. Practical support in the form of personal assistance greatly depended upon the visibility of the injury and the mobility of the injured athlete. Friends and family were the main source of emotional and practical support. The situational and temporal context of the provision of support was represented diagrammatically. The results concluded that the provision of informational and emotional support appeared to be dictated by four temporally sequential appraisals: injury severity, rehabilitation progress, recovery/readiness to return, and sport performance.

A study by Rees et al. (1999) examined the relationships between dimensions of social support and components of performance in tennis. The study included 144 (134 males, 10 females) British tournament tennis players ranged from the British top-ten to lower-ranked but regular tournament players. Social support was measured.
using the Interpersonal Support Evaluation List which included Appraisal, Belonging, Tangible and Self-esteem. A specific performance questionnaire was formed to assess the performance components. There were eight components labeled as, Execution of (Flexible) Plan, Loss of Composure, Feeling Flat, Positive Tension, Worry, Flow, Effective Tactics and Double Faults. Results showed that the Appraisal dimension predicted Execution of (Flexible) Plan, Positive Tension and Effective Tactics; the prediction of Effective Tactics being highly significant. It was also found that the Belonging dimension predicted Feeling Flat and Flow, the latter being highly significant. In conclusion, it was suggested that good social support may be an important part of a competitors’ make-up. The study also suggested that the effects of social support upon performance were therefore, only apparent when attention was focused on the components of performance.

Ethgen et al. (2004) studied the association between social support and health-related quality of life (HRQoL) in hip and knee osteoarthritis (OA) patients. A prospective survey including the SF-36 and the Social Support Questionnaire (SSQ) was administered to 108 hip and knee OA patients attending an outpatient physical rehabilitation and rheumatology clinic. Multiple regression analysis were performed to study the relation between social support and each dimension of the SF-36, controlling age, sex, body mass index, number of comorbid conditions, socioeconomic status, site of survey completion and severity of OA which was gauged with the pain dimension of the WOMAC, and OA-specific health status instrument. It was found that greater social companionship transactions were associated with higher physical functioning, general health, mental health, social functioning, and vitality. Satisfaction with problem-oriented emotional support was related to better physical functioning, mental health, role-emotional, social functioning, and vitality. The study reported that social support components significantly account for HRQoL. Health interventions in osteoarthritis are primarily dedicated to pain and physical disability, and this could be supplemented with social support component in order to enhance health outcomes.

Handegard et al. (2006) studied the effects of relaxation and imagery in the sport rehabilitation setting on self-confidence and fear of returning to sport along with the possible relationships between perceived social support, self-confidence, and transition into play. Participants were two injured male collegiate athletes (soccer and
baseball, age 23 & 18 years) with upper extremity injuries of moderate severity levels and an estimated recovery period of two weeks. Participants were given a specifically designed audio cassette tape of a guided imagery script, which was used twice a day. A modified version of the Trait and State Sport-Confidence Inventory was used to assess each participant’s level of self-confidence about performing specific tasks. Results were processed and analyzed for any similarities and/or discrepancies between participants regarding the rehabilitation experience. Both participants experienced increase in self-confidence and moderate to high levels of social support. First participant received significant amount of social support from the athletic trainer and significant other. The second participant received most of the social support from the head coach. Neither of the participants was found fearful to return to play.

In another study, Rees et al. (2007) analyzed the main and stress-buffering effects of social support upon sport performance in a different context, using a different outcome measure, and a specific timeframe. Participants were 117 male British high performance golfers, who completed measures of social support and stressors before competitions. Participants had to complete measures of social support and stressors in two days preceding major competitions and after competitions. Social support was assessed using a 21-item self-report questionnaire designed for this study. Performance was assessed by Golf Performance Index (GPI). Over and above the variance accounted for by stressors, there were significant effects for social support upon performance in all models tested. Stressors were associated with worse performance, whereas social support was associated with better performance. The study concluded that the main effects for social support upon performance suggests that social support might have aided performance directly, regardless of the level of stress. It was also suggested that the influence of received social support upon performance is positive regardless of the amount of stress.

Further, Rees et al. (2010) examined the main and buffering effect relationships between social support and psychological responses to sport injury. Study included 261 injured athletes (213 males, 48 females) from 28 different sports with a Mean age of 27.27 years. The high-performance standard participants were of national and/or international standards. The low-performance standard participants were of college, recreational or local league standards. Measures of perceived social support were assessed using the Social Support Inventory for Injured Athletes.
Review of Literature

This 16-item self-report inventory assessed perceived social support and represented the dimensions of emotional, esteem, informational, and tangible support. Results showed that in low-performance sample, the detrimental relationships between stressors and psychological responses were reduced for those with high social support compared to those with low social support, but level of social support was relatively unimportant at low levels of stressors. The study concluded that the relationships between social support, stressors, and psychological responses to sport injury may differ depending upon the performance standard of an athlete.

In another study, Yang et al. (2010) investigated social support patterns of collegiate athletes before and after injury. The study population was a cohort of male and female collegiate athletes from one university in the Big Ten Conference. A total of 260 collegiate athletes from 13 sport teams were enrolled in the study. Of the 260 athletes who completed the survey, 4 were excluded from the analysis. Of those individuals excluded, 1 was injured at the time of the baseline survey, whereas 3 skipped more than half of the questions. Social support was measured using the modified 6-item Social Support Questionnaire (SSQ6). Participating athletes were asked to answer each of 6 questions using response choices of (1) family, (2) friend, (3) coach, (4) athletic trainer, (5) physician, (6) counselor, or (7) other. The results showed that female athletes had greater satisfaction with the support they received, it was observed that athletes’ social support patterns changed after they got injured. Injured athletes reported relying more on coaches, athletic trainer, 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. It was concluded that athletes need emotional support during the phase of injury which is also crucial for an injured athletes’ recovery.

Self-Esteem and Rehabilitation

The following review of studies was attempted to understand the role of self-esteem as well as its effect on sport injury rehabilitation thoroughly.

In the earlier research, Tracy and Erkut (2002) investigated the interrelationships among participation in a school-based sport and the benefits associated with it. The authors tested a model that postulated that school spirit, operationalized as a sense of physical well being, mediate the relationship between school sport and self-esteem. The study included 18,078 Caucasian girls, 17,566
Caucasian boys, 4,653 African American girls, and 3,535 African American boys. In the first model, sport participation and the control variables were used to predict self-esteem. In the second model, the hypothesized mediators, school attachment, and physical well being, were added to variables in the first model. Then, the sample was randomly split into race and gender group in two equal parts roughly. Results of the study showed that the positive effect of sport participation on self-esteem in adolescence was present for both Caucasian and African American adolescents.

In another study, Gotwals et al. (2003) examined the relationship between perfectionism and self-esteem among a sample of intercollegiate athletes. The study involved 81 intercollegiate athletes (36 males, 51 females; Mean age=19.65 years) from a mid-sized National Collegiate Athletic Association of USA. The respondents represented a variety of sport including: cross country running, track and field events, swimming, and diving. Perfectionism was assessed with the Multidimensional Perfectionism Scale. Self-esteem was assessed by Rosenberg’s Self-Esteem Scale and a modified sport-specific version of Heatherton and Polivy’s State Self-Esteem Scale (SSES). Exploratory factor analysis of the modified SSES revealed two factors that were labeled as Satisfaction with Current Sport Performance and Perceived Athletic Competence. Results showed that the athletes who adopted a maladaptive perfectionist orientation had low levels of self-esteem.

A study by Finez et al. (2012) examined the relationship between physical self-esteem and claimed self-handicapping among athletes by taking motives into consideration. The study was a compilation of two studies. Study one included 99 male athletes and study two included 74 male and 33 female athletes from extracurricular teams at levels ranging from regional to international and who practiced individual and collective sports. Study one participants were asked to report their tendency to engage in claimed self-handicapping for self-protective and self-enhancement motives (trait measures). Study two athletes participated in a test that was designed to assess high physical abilities, so as to encourage self-handicapping for self-enhancement motives or to assess low physical abilities, so as encourage self-handicapping for self-protective motives. Results of study one suggested that the physical self-esteem of athletes was negatively correlated with claimed self-handicapping for self-protective and self-enhancement motives. More the athletes reported a low physical self-esteem; more they reported engaged in claimed self-
handicapping for self-protective and self-enhancement motives. The study two results suggested that it was important for participants to have high abilities of force, speed and coordination. The high physical self-esteem athletes as compared to low physical self-esteem athletes reported a higher tendency to engage in claimed self-handicapping for both self-protective and self-enhancement motives.

Recently, Adachi and Willoughby (2013) studied the longitudinal associations between adolescents’ self-esteem and frequency versus enjoyment of involvement in sport. The study included 1,492 students from eight high schools in Ontario, Canada (studying in grade 9 to 12). All measures were assessed across all four grades of high school (i.e., grades 9 through 12) except for gender, parental education, and at-risk background which was only assessed in grade 9, and the enjoyment of sport which was assessed in grade 10, 11, and 12. The enjoyment of the sport was measured and self-esteem was measured with Rosenberg’s Self-Esteem Scale. The results showed that males reported higher levels of self-esteem in grades 9 and 10, as well as more frequent involvement in sport in all four grades than the females. Participants with higher levels of parental education reported higher levels of self-esteem and more frequent involvement in sport in all four grades than participants with lower levels of parental education. Participants who had a more at-risk background had lower self-esteem than participants who had a less at-risk background. The authors concluded that the enjoyment of sport predicted self-esteem over time, and self-esteem predicted the enjoyment of sport over time. Adolescents with higher self-esteem play sport more frequently and enjoy sport more than adolescents with lower self-esteem. The degree to which adolescents enjoy sport may be more important for increasing self-esteem than the frequency of their involvement in sport. But individuals if encouraged to find a sport that they thoroughly enjoyed at a young age, then they may experience increase in self-esteem, which may help set them on active and healthy trajectories that continue into their adolescent and adult years.

Self-Efficacy and Rehabilitation

The following review of studies was attempted to understand the role of self-efficacy as well as its effect on sport injury rehabilitation thoroughly.

In a study conducted by Martin and Gill (1991), the relationships among trait and state psychological variables and performance in male high school distance
runners were examined. The study included 73 male (age group 14 to 18 years) middle and long distance runners of local high school track teams. The study used the Competitive Orientation Inventory (COI), Sport Orientation Questionnaire (SOQ) and Confidence Measures. The results indicated that an individuals’ enduring and consistent level of sport-confidence is a powerful predictor of his or her more transitory precompetitive state sport-confidence levels. It was found that a positive association between state sport-confidence (SSCI), self-efficacy, and performance and a negative correlation between cognitive state anxiety and performance existed. The authors found no support for the contention that cognitively anxious athletes perform poorly as compared to less anxious athletes.

Lewther et al. (2002) explored the relationships between psychological skills, self-efficacy, and performance among soccer players participating in the Amputee World Cup. The study included 15 male soccer players (age group 19-28 years) from the England team which participated in 2000 Amputee World Cup. Players had an average of 11 years experience of playing soccer. On an average, players had 2.4 years of international experience. The Test of Performance Strategies (TOPS) was used to measure psychological skills. The self-efficacy and performance were also assessed. Results indicated that self-efficacy showed reciprocal relationships with performance. Several psychological skills were related to self-efficacy and performance. Relaxation skills used in training and competition were associated with high self-efficacy and successful performance.

A study by Paunonen and Hong (2010) evaluated the contribution of self-efficacy beliefs to the prediction of task performance in very specific cognitive ability domains. The study consisted of 176 university undergraduate (53 males, 123 females) students, who were assessed in groups of less than 20 persons in a 2-hr testing session, where they were administered, among other measures, paper-and-pencil self-efficacy questionnaires and timed abilities tests. The self-efficacy measures and timed abilities tests contained four aptitude domains: verbal, numerical, spatial, and mechanical. They administered a measure of general self-efficacy and a measure of general ability. Verbal, numerical, and spatial abilities were assessed with the Vocabulary, Arithmetic, and Spatial subscales of the Multidimensional Aptitude Battery. For each subscale, respondents were given 7 min to complete a series of multiple-choice items of increasing difficulty. The first two subscales contained
standard vocabulary (n=46) and arithmetic (n=26) problems. The Spatial subscale consisted of 50 figure rotation problems, in which the respondent must pick, in each case, one object out of five alternatives that, if rotated, correctly matches the target object. Mechanical ability was assessed with the Wiesen Test of Mechanical Aptitude. General cognitive ability was assessed with the Wonderlic Personnel Test. The self-efficacy questionnaires were completed first, followed by the cognitive abilities tests. Both sets of measures were administered in the following order: verbal, numerical, spatial, mechanical, and general. After these assessments, the participants were administered the Balanced Inventory of Desirable Responding and some other questionnaires. The study concluded that self-efficacy beliefs could add unique information to the prediction of task performance.

In another study, Gilson et al. (2012) examined athletes’ self-efficacy and strength training effort during an entire off-season. The study included 99 subjects from 4 different sport (Mean age=20.0 years). The subjects completed self-efficacy and effort measures at 4 distinct time points during off-season training. Strength and conditioning coaches also rated each subjects’ effort at each time point to get more valid measures. The data was analyzed using a multilevel approach. The results of the study revealed that self-efficacy was positively, and significantly, related to the current effort that athletes exerted in strength training sessions. The study concluded that practitioners should be advised to structure strength and conditioning training sessions and the overall environment in ways that would positively impact the four proven sources of self-efficacy.

Recently, De Pero et al. (2013) investigated the relationship between state anxiety, self-efficacy and fear of injury in National and European Team Gym competitions. A cross-sectional study design was employed using measures of anxiety, self-efficacy and fear of injury. The study included 14 (7 males, 7 females) Italian Team Gym athletes (age 26±3 years). All subjects filled in the Self-efficacy for Physical Abilities Scale and the Gymnastics Fear Inventory during their pre-competitive period and the State Anxiety Inventory immediately before every competition. The results showed that the competition level showed a positive effect on state anxiety, with the highest values emerging during the European Championship. Fear of injury and self-efficacy explained 43% and 68% of the variance in an athletes’ anxiety, respectively. The study concluded that self-efficacy
Review of Literature

dampened the anxiety level of Team Gym athletes and mediated the effects of fear of injury on anxiety prior to their competition. It was also found that athletes who experienced less fear of being injured and were more confident in their technical abilities, showed a lesser degree of pre-competitive anxiety.

Optimism and Rehabilitation

The following review of studies was attempted to understand the role of optimism as well as its effect on sport injury rehabilitation thoroughly.

In the earlier research, Braathen and Svebak (1992) examined the motivational differences among teenage athletes in relation to gender, type of sport, and level of excellence. The authors studied a range of motivational characteristics in a sample of 228 males and 124 females (age group, 15-16 years) recruited from the most promising performers of different sport, mainly in Western Norway. The subjects were asked to complete the Sport Orientation Questionnaire (competitiveness, win and goal orientation), the Short Sensation Seeking Scale, the Life Orientation Test (optimism), a new scale on Social Reactivity (reactive and proactive negativism) and questions on the importance of friendship among sport performers and of being the best were asked. Differences of motivational styles were tested between males and females, performers of endurance, explosive and team sport and moderately versus highly successful performers. The results reported that males scored significantly higher on competitiveness, win and goal orientation, sensation seeking and so-called reactive negativism, but scored significantly lower than females on the importance of friendship. More complex group differences were also significant.

In another study, Gould et al. (2002) examined the psychological characteristics and their development in Olympic champions. The study included 10 U.S. Olympic champions (winners of 32 Olympic medals), 10 respective coaches, and a parent guardian, or 10 significant others. A battery of psychological inventories was administered to the athletes. It was found that athletes were characterized by: (a) the ability to cope with control anxiety; (b) confidence; (c) mental toughness/resiliency; (d) sport intelligence; (e) the ability to focus and block out distractions; (f) competitiveness; (g) a hard work ethic; (h) the ability to set and achieve goals; (i) coach ability; (j) high levels of dispositional hope; (k) optimism; and (l) adaptive perfectionism. Results revealed that a number of individuals and institutions influenced the athletes’ psychological development including the community, family,
the individual himself or herself, non-sport personnel, sport environment personnel, and the sport process. Coach and family influences were particularly important. It was also found that practical implications focusing on implementing parenting and coaching practices were related to the development of psychological characteristics associated with athletic success.

A study by Abele and Gendolla (2007) investigated the relationship between exercises and dispositional optimism. The study included 67 volunteer students (10 females, 57 males) aged 19-28 years. The subjects were tested in a regular class. 40 participants indicated that they were active exercisers (median 3 hours per week), and 27 respondents did not exercise (no exercise at all or less than half an hour per week). The subjects were asked to complete the Life Orientation Test (LOT) which was used as a measure of dispositional optimism and indicated the time they spend exercising per week. After assessment of individual differences in optimism and the intensity of exercising, participants responded to an immediate and a one-week delayed recall test of personally relevant versus irrelevant information. The processing of health-related information was determined by information’s personal relevance: referring to immediate recall, relevant health-related information was better recalled than irrelevant health-related information. This effect was due to the better recall of relevant health-related information by highly active exercisers. Results of the study showed that memory for relevant health-related information was best for highly active exercisers who simultaneously scored high on optimism. The effects of optimism on pragmatic information processing were basically the same in both the immediate and the delayed recall test.

It was professed by Whalen (2007) that optimistic individuals mostly have positive expectancies for future events in various situations. The Life Orientation Test-Revised (LOT-R) was designed to assess individuals’ global expectancies for the future as an indication of dispositional optimism; however, global assessment may include content irrelevant to sport outcomes. The study evaluated the inter-item preferred sport contextualization of the LOT-R to decrease attenuation and thus enhance predictive validity. College athletes (n=423) were asked to complete an online version of a variety of questionnaires. The 10-item Life Orientation Test-Revised which was used to assess an individuals’ level of dispositional optimism was filled by subjects. Sport optimism was assessed using a contextualized version of the
Review of Literature

LOT-R (CLOT-R). The 10-item Rosenberg Self-Esteem Scale measured scores of an individual’s global self-worth. Other scales used were fear of failure, trait hope, sport anxiety, sport confidence, and coping skills in sport. Dispositional optimism control was the additional variance in both general and sport related measures. The study concluded that sport optimism contributed more to overall variance explained for sport, compared to global outcomes. Sport psychology professionals may benefit from utilizing preferred sport contextualization of the LOT-R.

In a study, Nicholls et al. (2008) deliberated upon the relationship between mental toughness and coping, mental toughness and optimism, and coping and optimism. Study included 677 athletes (454 males, 223 females) aged 15-58 years competing at international (60), national (99), county (198), club/university (289), and beginner (31) levels. Coping was assessed using the Coping Inventory for Competitive Sport (CICS). The CICS had nine four item subscales and one three item subscale, with all items being rated on a 5-point Likert-type scale. The MTQ48 was used to assess total mental toughness (MT) along with its six subcomponents: challenge, commitment, interpersonal confidence, confidence in own abilities, emotional control, and life control. The Life Orientation Test (LOT) was used to assess dispositional optimism and pessimism. Results showed that people who scored high on commitment used more increased effort expenditure and logical analysis coping strategies, but used less distancing to cope. The study concluded that higher levels of emotional control resulted in less venting of emotions or mental distraction whereas higher levels of interpersonal confidence resulted in higher levels of venting emotions and distancing but less mental distraction.

Recently, Vega et al. (2012) analyzed changes in expectations of self-efficacy in young athletes with different levels of tendency towards optimism, under the hypothesis that the athletes in the high level of optimism group would make an evaluation of their own self-efficacy in the dynamometry task that would be more resistant to the manipulated feedback that was offered. The sample consisted of 53 male soccer players, integrated into three youth category competition teams belonging to the same club in the Community of Madrid (Spain). The sample selection was performed by incidental sampling and voluntary participation. Participants compete in successive categories: youth “A” competes in Honor Division, youth “B” in the National League, and youth “C” in the Autonomic League. The three teams trained
Review of Literature

four days a week plus one day of competition, totaling 12 hours a week of athletic involvement. The players were assessed using the Revised Life Orientation Test (LOT-R) and an objective test of strength using hand dynamometry. A two-phase protocol was established to ensure that the application conditions were identical for all participants, and expectations of individuals. In the first phase, to complete the LOT-R and enable the distribution of the two experimental groups and the control group, all participants were asked to arrive one hour before the start of training in one of the rooms of the club. In the second phase of investigation, athletes were instructed that they should perform the test to obtain maximum strength in their two attempts, after each of which, a type of feedback would be offered in terms of the assigned experimental condition. The results showed no significant difference between the three levels of optimism/pessimism respecting self-efficacy. Significant differences appeared when the effects of the individual feedback provided for each experimental group was analyzed.

Fear-avoidance and Rehabilitation

The following review of studies was attempted to understand the profound implications of fear-avoidance behaviours and its effect on sport injury rehabilitation thoroughly.

In the earlier research, Vlaeyen et al. (1999) hypothesized that confrontation with feared movements would lead to symptom-specific muscular reactivity in chronic low back pain patients who reported high fear of movement/(re)injury. Thirty one chronic low back pain patients were asked to watch a neutral nature documentary, followed by a fear-eliciting video-presentation, while surface electromyography (EMG) recordings were made for the lower paraspinal and the tibialis anterior muscles. It was further hypothesized that negative affectivity (NA) would moderate the effects of fear on symptom-specific muscular reactivity, as well as the effects of muscular reactivity on pain report. The results were partly as predicted. Unexpectedly, paraspinal EMG readings decreased during video-exposure but this decrement tended to be less in fearful patients than in the non-fearful patients. Negative affectivity did not moderate this effect, but moderated the effect of pain related fear on muscular reactivity of lower leg muscles. In addition, NA directly predicted muscular reactivity in the right tibialis anterior muscle. As predicted, there was a significant covariation between left paralumbar muscular activity and pain report. This association was
moderated by NA, but in the opposite direction. The findings supported the idea that pain-related fear perpetuates pain and pain disability through muscular reactivity. The findings suggested that pain-related fear is an important factor in eliciting symptom-specific psychophysiological reactivity in chronic pain patients.

It was stated by Fritz and George (2002) that psychosocial factors are known to affect recovery from acute low back pain (LBP). The study examined baseline psychosocial variables and their ability to predict prolonged work restrictions. The subjects were 78 people with work-related low back pain who participated in a clinical trial. A baseline examination including measures of impairment, disability, and psychosocial variables was performed. Subjects were asked to rate their current level of LBP intensity using 11-point pain rating scale. The Fear-Avoidance Beliefs Questionnaire (FABQ) was used to quantify the level of fear of pain and beliefs about the need to change behaviour to avoid pain in individuals with LBP. All subjects were randomly assigned to 1 of 2 intervention groups. All subjects in the first group received therapy based on the guidelines regardless of their individual signs, symptoms and history. The treatment for this group consisted of low-stress aerobic exercise, general muscle reconditioning exercises and advised to remain as active as possible within the limits of pain. Participants were also reassured by the therapist that they would recover and return to full work capacity. Subjects in the second group were re-examined during each appointment by the treating physical therapist, and they were placed into 1 of 4 treatment classifications based on the subjects’ signs and symptoms. Subjects then received treatment based on their classification. The 4 classifications were: (1) manipulation followed by active range of motion exercises, (2) repeated end-range exercises, (3) spinal stabilization exercises, and (4) traction. Work status was assessed after four weeks. Sensitivity and specificity ratios were calculated for the prediction of work status by the use of psychosocial variables. The study concluded that fear avoidance beliefs are the most important psychosocial variable for patients with acute work-related LBP. It was also suggested that the FABQ work subscale may serve as an effective screening tool for estimating risk of prolonged work restrictions based on assessment of the level of fear-avoidance beliefs about work activities.

A study by Silver et al. (2002) investigated the role of fear of physical movement and activity in Chronic Fatigue Syndrome (CFS) patients. The first phase
Review of Literature

consisted of modifying an existing chronic pain measure of kinesiophobia: fear of physical movement and activity (Tampa Scale of Kinesiophobia-Fatigue; TSK-F) and validating it on the CFS population (n=129). The subscales of illness beliefs and beliefs about activity were identified. The second phase consisted of evaluating whether behavioural persistence was predicted by the TSK-F (n=33). The results indicated that behavioural persistence did not correlate with maximal heart rate or resting heart rate, level of tiredness, symptom severity, illness identity or emotional distress. The TSK-F believed that activity subscale appeared to be the predictive factor, explaining 12% of the variance in exercise performance or rather 12% of the avoidance of exercise. The study concluded that in predicting behaviour and avoidance of exercise, activity appeared to be an important variable.

It was stated by Vlaeyen et al. (2002) that fear-avoidance beliefs and fear of movement/(re)injury in particular have been shown to be strong predictors of physical performance and pain disability. Six consecutive patients with chronic low back pain who reported substantial fear of movement/(re)injury were included in the study. In the first intervention, patients received exposure in vivo followed by graded activity. In the second intervention, the sequence of treatment modules was reversed. Before each treatment module, treatment credibility was assessed. Daily measures of pain-related fear, pain catastrophizing, and pain intensity were completed using visual analog scales. In addition, standardized measures of pain disability, pain-related fear, and pain vigilance were taken before and after each treatment module and at the one year follow-up. Results showed that improvements in pain-related fear and pain catastrophizing occurred only during the exposure in vivo and not during the graded activity, irrespective of the treatment order.

In another study, Nederhand et al. (2006) explored the neurophysiologically oriented pain adaptation model explaining reorganization, as a useful adaptation to prevent further pain and injury. The cognitive-behavioural-oriented fear avoidance model suggested that fear of movement, in addition to the effects of pain, modulates the muscle activation level. The authors analyzed the extent to which pain and fear of movement influenced the activation patterns of the upper trapezius muscle during the transition from acute to chronic post-traumatic neck pain. Visual analog scale ratings of pain intensity, response on the Tampa Scale of Kinesophobia-fear of movement, and surface electromyography of the upper trapezius muscles during a sub maximal
isometric physical task were obtained. Multilevel analysis revealed that an increased level of both fear of movement and pain intensity were independently associated with a decreased level of muscle activation. Moreover, the results suggested that the association between fear of movement and lower muscle activity level was stronger in patients reporting high pain intensity. The contribution of pain intensity to the muscle activation level appeared to decrease over time after the trauma. The results supported both the pain adaptation and the fear avoidance models and suggested that the decrease in muscle activation level is aimed at avoiding the use of painful muscles.

A study by Roelofs et al. (2007) examined the factor structure, reliability (i.e., internal consistency), and validity (i.e., concurrent criterion validity) of the Tampa Scale for Kinesiophobia (TSK), a measure of fear of movement and (re)injury, in a Dutch sample of patients with work-related upper extremity disorders (Study 1). The authors investigated the factor structure involved in a test of three competitive models: the one-factor model of all 17 TSK items and a two-factor model of the 11 TSK items. Second, invariance of the aforementioned TSK models was examined in patients with chronic musculoskeletal pain conditions (i.e., work-related upper extremity disorders, chronic low back pain, fibromyalgia, osteoarthritis) from Netherlands, Sweden, and Canada (Study 2). Results from Study 1 showed that the two-factor model of the TSK-11 consisting of ‘somatic focus’ (TSK-SF) and ‘activity avoidance’ (TSK-AA) had the best fit. The TSK factors showed reasonable internal consistency, and were modestly but significantly related to disability, supporting the concurrent criterion validity of the TSK scales. Results from Study 2 showed that the two-factor model of the TSK-11 was invariant across pain diagnoses of Dutch, Swedish, and Canadian samples. Considering the TSK-11 and its two subscale a psychometrically sound instrument of fear of movement and (re)injury, it was recommended to use this measure in future research as well as in clinical settings.

Piva et al. (2009) examined the changes in impairments related to functional and pain outcome in patients with patellofemoral pain syndrome (PFPS) undergoing physiotherapy treatment. Individuals with a primary diagnosis of PFPS, between the age group of 12-50 years were included in the study. Seventy-four patients suffered from patellofemoral pain syndrome and underwent physiotherapy treatment. Baseline measurement consisting of self-reported function and pain were included in the dependent variables; and independent variables included strength of quadriceps, hip
Review of Literature

abductors and hip external rotators; length of hamstrings, quadriceps, plantar flexors, iliotibial band/tensor fascia lata complex, and lateral retinaculum; quality of movement, and fear-avoidance beliefs (FABQ-PA). Measurements were repeated at two months follow-up. Data was analyzed on the basis of the function outcome and pain outcome. The results showed that there were significant improvements in the quadriceps femoris strength, quadriceps, hamstrings and soleus length, quality of movement, and FABQ-PA. Patients with decreased levels of fear-avoidance beliefs about physical activity and increased length of gastrocnemius improved their function. The study concluded that change in fear-avoidance beliefs about physical activity was the strongest predictor of function and pain outcome. The patients who decreased their fear-avoidance beliefs showed improvement in function and decreased levels of pain which indicated that fear-avoidance beliefs should be targeted during the treatment of patients with patellofemoral pain syndrome.

Aggression and Rehabilitation

The following review of studies was attempted to understand the profound implications of aggression and its effect on sport injury rehabilitation thoroughly.

In the earlier research on aggression, Ferraro (1999) explored the relationship between aggression and performance in context with cross cultural perspective. Desire to win was considered as an important cause in the rise of aggression. The study discussed mechanisms which were responsible in the expression of aggression and its inhibition and uncovered many psychological mechanisms required for a player to maintain an aggressive attitude in order to win. The three states of psychosexual development of the athlete were described. First was the state of poise. Poise means the earliest skills the infant displays in orality which include superstitious behaviour about food and orality. Second was the anal state in which the child first learns to perform and carry through on a task demanded by the parent. The third psychosexual state of development was the phallic state in which the child learns to master competitiveness and aggression in order to obtain the pleasure of love. In sport, this phase was reflected in the ability to handle aggression, overcome guilt and obtain success. This review suggests that the American athletes were more promiscuous and aggressive and were frequently charged with sexual assault. Self-issues and performance depend upon independence, boundary establishment and self-esteem. Independence was the basic need of American population. Cross culturally,
no difference between American and Asian orientation to family was observed. Both the cultures feel that family had important role in life. There was another unconscious mechanism, i.e., superego which contains the values, ideals, self-demands and the need for punishments. The Japanese athletes were more controlled, less aggressive and calmer. The American athletes were more aggressive, angry and out of control. The American athletes suffered from superego deficits that made them vulnerable to range and impulsivity. Violence in the coaching profession is probably a reflection of this problem, whereas in Japanese athletes superego functioning produces greater calmness and less anger.

A study by Osterman et al. (1999) examined the relationship of locus of control with different types of aggressive behaviour, i.e., physical, verbal, and indirect. The authors found that there were two types of locus of control, internal and external. The study examined both types of locus of control with context to physical, verbal and indirect aggressive behaviour. A total of 722 children (358 girls, 364 boys) in the age group 11-15 years, from Turkey, Finland and Italy, participated in the study. Two scales were used in this study. First was the direct and indirect aggression scales used for the measurement of aggressive behaviour of children. These scales were based upon the peer estimation and consisted of three subscales, i.e., direct physical aggression, direct verbal estimations and indirect aggression. This was 5 point (0 to 4) scale. Second was locus of control scale for children, a 10 item with 5 point (0 to 4) scale. This was used as a measure of locus of control. The original scale was a yes or no answered scale but in the study this was transformed into five point scale. Analysis to investigate the effect of sex and age group on locus of control was done. Internal locus of control was found to be higher at age of 15 years, than at the age of 11 years. Internal locus of control score was higher in the case of girls than the boys. The relationship between aggressiveness and external locus of control was insignificant in girls, but was significant in boys. External locus of control weakly correlated with indirect aggression than with physical aggression. The difference between verbal and indirect aggression was not significant. It was concluded that aggression correlated with external locus of control significantly only in the case of boys. In case both sexes were aggregated, external locus of control correlated less with indirect aggression than with physical aggression. The external locus of control has relation with aggression at a particular age, i.e., at the age of 15.
Pappas et al. (2004) studied relationship of the athletes’ nature of aggression and violence in their sport with violent interpersonal behaviours both inside and outside the sport. There were three main factors in socialization which were responsible for acts of violence (1) Coaches, teammates and family of athlete; (2) Sport structure and implementation of rules by organization and referees; and (3) The attitude of the fans, media, courts of law and society in general. It was found that the sport training runs along with violence training; players who backed away from fights were often labeled with nick name and were viewed as signs of personal failure and weak character. Five former hockey player aged 25-30 years participated in this study. Each player had at least ten years of professional competition at various levels and was thought to be fully immersed into the culture of ice hockey. The primary source of data consists of in depth interviews for the study. The interview was semi-instructed because it was guided by a set of predetermined questions with a number of branching questions that were focused on aims of the study. It was important that the participants shared their personal involvement in hockey, off and on field and also commented on their observation of others in the sport and their overall view of violence and aggression associated with the hockey. The data analysis began with a verbatim transcription of the audio recorded interviews. Results showed that all participants were able to identify a number of situations which lead to aggression and violence. The participants agreed that in hockey, violent culture was encouraged. The players, management and indeed the fans expected and desired this aggression and violence. Masculinity was another factor which was responsible for aggression and violence. Strongest levels of masculine ideologies were more likely to fight than other players. The study also suggested that the use of drugs and alcohol were also responsible for aggressive behaviour, both on and off hockey field. Peer pressure, expectation, and pressure to perform play important role in expression of aggression and violence.

In line with the research on aggression, Kokko and Pulkkinen (2005) investigated the stability of aggression from childhood to middle age in men and women. Correlations showed that aggression at age 14 was more strongly related to aggression at age 42 in women than in men, whereas aggression at age 8 had a stronger correlation with aggression at age 36 in men than in women. The aggression in boys at age 8 was significantly and directly related to aggression in these men in
Review of Literature

adulthood. This shows that male aggression in adulthood was accounted for by both indirect links from age 8 (via aggression at age 14) and a direct link which explained the higher overall stability estimate, over the 30 year period, observed in men compared to women (.34 versus .06). Physical and verbal aggression were also assessed separately, and it was implied that the former would be more typical in males and the latter more typical in females.

In another study, Reza (2012) compared the rate of aggression among student athletes in judo, taekwondo, volleyball, and indoor soccer. The study included 90 male subjects with age group 19-23 years. In the study, four groups of athletes in judo, taekwondo, volleyball and indoor soccer; and individual athletes from 25 sports as a simple random sample selection for investigation were selected. The descriptive statistics included the evaluation of central tendency index (mean, median, thumb) and the size of the dispersion (range, variance, standard deviation). In the inferential statistical test, one way ANOVA was used. The results from the statistical analysis showed that there was no significant difference between student athletes’ aggression in judo, taekwondo, volleyball and indoor soccer. The author concluded that the trend of sportsmen with violent behaviour was not only related to the sport but there were other factors also.

Further, Tiric-Campara et al. (2012) investigated the relation between aggressiveness and anxiety in fighting sport. The study included healthy 55 male athletes such as kick boxers, karate fighters, and boxers. The study examined group consisting of 45 males with average age of 20.2±3.8 years. In analysis of level of aggression. Questionnaire A-87 was used to assess aggressive behaviour in provoked situations, or to measure impulsive aggression. Questionnaire A-87 consisted of 15 items of different situations with five possible responses: a) verbal manifest aggression (VM); b) physical manifest aggression (PHM); c) indirect aggression (IND); d) verbal latent aggression (VL); and e) physical latent aggression (PHL). In the analysis of anxiety, Beck Anxiety Inventory (BAI) was used. Average training period was 7.8±3.6 years. The results showed that there was a significant positive correlation between all components of aggression with level of anxiety. Slightly significant positive correlation of total aggression with age of examiners was also observed. There was also a positive correlation between level of anxiety and number of injuries. The study concluded that higher level of aggression and anxiety might
change attitude of some sports authorities (especially coaches), and additional psychological training of fight sport might be necessary. Assessment of basic levels of aggression and anxiety in athletes might be valuable not only in sport activities, but in overall aspects of life.

Rehabilitation: Role of Physical Rehabilitation

The literature shows the paramount importance of physical rehabilitation in the management of sport injuries. The following review of studies was attempted to illuminate the role of physical rehabilitation in sport injury rehabilitation thoroughly.

In the earlier research, Kannus (1988) studied the peak torque and total-work ratios of hamstring to quadriceps femoris muscles’ (H:Q) with an anterior cruciate ligament insufficient knee (ACLIK) and also determined the relationship between H:Q ratios and long-term subjective outcomes. The study included 41 subjects (27 males, 14 females; Mean age=35 years). Quadriceps femoris and hamstring musculature strengths of both legs were measured at follow-up with an isokinetic dynamometer, and peak torque values were recorded at lower (60°/sec) and higher (180°/sec) speeds. Maximal isometric extension and flexion outputs were measured at a 60-degree knee-flexion angle. Three standardized knee-scoring scales were used to determine the overall outcome of the ACLK. The results showed that there was high inter subject variability of the H:Q ratios in all strength tests, including tests of healthy knees. The injured knee of all subjects had a higher H:Q ratio (46%–95%) in every test than the healthy knee (42%–85%). The H:Q ratio difference between knees was significant at the isokinetic higher speed and for the total work tests because of the weak quadriceps femoris muscle of the injured knee. Outcome scores did not differ significantly between the groups with low, optimal, or high H:Q ratios of the ACLK. The scores were significantly better in subjects whose H:Q ratio of the injured knee was similar to that of their uninjured knee. The study concluded that the ideal H:Q ratio for an ACLK may be the H:Q ratio of the opposite healthy extremity.

In another study, Fredericson et al. (2000) examined hip abductor strength in long distance runners with iliobibial Band Syndrome (ITBS), comparing their injured limb strength to their non-affected limb and to the limbs of a control group of healthy long distance runners; and determined whether correction of strength deficits in the hip abductors of the affected runners through a rehabilitation program correlates with
Review of Literature

a successful return to running. Participants were 24 long distance runners with ITBS (14 females, 10 males) randomly selected from patients presenting to Runners’ Injury Clinic with history and physical examination findings typical for ITBS. The control group comprised of 30 long distance runners (14 females, 16 males) which were randomly selected from the Stanford University Cross and Track teams. Main Outcome was group differences in hip abductor strength, as measured by torque generated were analyzed using separate two-tailed t-tests between the injured limb, non-injured limb, and the non-injured limbs of the control group. Results of the study showed that average pre rehabilitation hip abductor torque of the injured females was 7.82% BWH versus 9.82% BWH for non-injured limb and 10.19% BWH for the control group of female runners. Average pre rehabilitation hip abductor torque of the injured males was 6.86% BWH versus 8.62% BWH for non-injured limb and 9.73% BWH for the control group of male runners. The runners were then enrolled in a 6-week standardized rehabilitation protocol with special attention directed to strengthening of the gluteus medius. After rehabilitation, females demonstrated an average increase in hip abductor torque of 34.9% in the injured limb, and males showed an average increase of 51.4%. After 6 weeks of rehabilitation, 24 athletes were pain free with all exercises and able to return to running and at 6 months follow-up there were no reports of recurrence. The study concluded that long distance runners with ITBS have weaker hip abduction strength in the affected leg compared with their unaffected leg and non-injured long distance control group counterparts. The study also concluded that symptom improvement with a successful return to the pre-injury training program parallels the improvement in hip abductor strength.

Bassett (2003) discussed the adherence of the patient to physiotherapy by means of its occurrence, measurement, as well as, how physiotherapists determined the adherence of the patient towards treatment program. Physiotherapy could remain untouched from poor adherence like other forms of health care, but the extent was still ill defined. In the study, the attendance of patient for schedule physiotherapy session was used as an indicator to evaluate clinic-based adherence. A survey of outpatient physiotherapy clinics in Great Britain showed that 5.8% to 10.68% patients failed to present for their first appointments, and 7.17% to 14.3% patients did not return for follow-up appointments. There were several studies done to determine the adherence of physiotherapy to home based treatment program. So all these studies showed that
there were fewer adherences towards physiotherapy programs than desirable and it was also difficult to calculate the extent of the problem. The Sport Injury Rehabilitation Adherence Scale (SIRAS) was used to determine the adherence of the patient during the clinic session. This was a 3-item, 5-point Likert scale to assess the intensity with which patients’ complete their exercises, the extent to which they follow guidelines of treatment and patients’ change in response during the rehabilitation session. It was found that successful rehabilitation was achieved only when the patient was adherent to the home plan. To examine the adherence to home-based rehabilitation plan the commonly used electronic devices were electromyographic feedback, pedometers and stopwatches activated by video players. If it was found that patients are not adhering to rehabilitation program, then it was important to determine the reasons for this behaviour. Socio-demographic variables, adherence history, motivation and social support were the patients’ chief personal characteristics which reflected the adherence to rehabilitation program. From disease or injury perspective, it was found that if the injury or disease were asymptomatic or mild, then patients either do not adhere or adhere less to the rehabilitation program, whereas in case of severe injury, patients showed more adherence to rehabilitation. Treatment variables which interfered with the adherence were the timing of the treatment appointments, the clinic environment, the content of the treatment program and patients’ attitude towards the treatment. In terms of patient-therapist interaction, positive relationship among patient-therapist was must for adherence to rehabilitation program. It was suggested that most of the rehabilitation plan failed not due to lack of knowledge or attempt but due to non-adherence of the patients. It was also suggested that there is need for the appropriate use of home and clinic based adherence scale to determine the patients’ response. Further, it was concluded that SIRAS was one of the best tools to measure adherence of the patient to rehabilitation program.

Recently, De Mey et al. (2012) examined the effect of a 6-week training program on muscle recruitment and functional outcome in overhead athletes with impingement symptoms. The study included 47 overhead athletes with mild impingement symptoms (25 men, 22 women). The Shoulder Pain and Disability Index (SPADI) score was individually obtained before and after the 6-week training program. Maximum voluntary isometric contraction (MVIC) values were determined by surface electromyography. Mean muscle activation levels, muscle ratio data, and muscle onset timings were assessed for the upper (UT), middle (MT), and lower (LT)
Review of Literature

Trapezius and Serratus Anterior (SA) muscle during arm elevation in the scapular plane. The results showed that the SPADI scores significantly decreased from initial assessment to post measurements. The three trapezius muscle parts showed increased Maximum Voluntary Isometric Contraction values and decreased activation levels during arm elevation, whereas this was not the case for the SA muscle. After the training program, UT/SA significantly decreased, whereas UT/MT and UT/LT did not change. No differences in muscle timing between pre and post-measurements could be identified. The LT showed significant earlier activation compared with MT. The Serratus Anterior showed significant earlier activation compared with UT, MT and LT muscles. The study concluded that previously selected exercises improved pain and function based on SPADI scores, reduced relative Trapezius muscle activation, and altered UT/SA ratios. These exercises were unable to change the timing of the scapular muscles during arm elevation when compared before and after a 6-week training program in overhead athletes with mild impingement symptoms.

Rehabilitation: Integration of Psychological Components

Many studies have been attempted to understand the process of rehabilitation from the psychological perspective. The following review of studies provides insight into the role of psychological correlates in sport injury rehabilitation thoroughly.

In the earlier research, Williams et al. (1993) investigated the relationship between Positive States of Mind (PSOM) and Athletic Injury Risk. The study included 169 male and 108 female intercollegiate athletes representing 10 different sports from the southwestern NCAA Division I Universities. To evaluate the ability of subjects to enter desirable states of mind, Positive States of Mind (PSOM) scale was used. PSOM is a Likert scale, used to express each positive states of mind (i.e., 0=unable to have it; 1=trouble in having it; 2=limited in having it; 3=have it all). According to authors, PSOM was never used for athletic population before this study, so to confirm the validity of the PSOM scale some additional measures were also done, i.e., Marlowe-Crowne Social Desirability Scale, Sport Competition Anxiety Test and the Life Event Scale for collegiate anxiety test. The second hypothesis stated that an athlete who has high PSOM score has less duration of modified activity or nonparticipation because of injury. To test this hypothesis, 60 male and 22 female intercollegiate athletes of football, volleyball, and cross-country took part in the study. In testing procedure, PSOM and Life Events Scale for Collegiate Athletes (LESCA)
tests were completed by the athletes before the beginning of the athletic season, and an authorized trainer recorded all injury data and also maintained the record of days of modification in activity and/or days of rest. The results showed that each of the six specific PSOM items correlated with the total PSOM score. The PSOM scale had high internal consistency. The total PSOM score was not altered by the ethnicity, gender or social desirability. The PSOM score was not affected either with the incidence of injury or the severity of injury in the year, before the present athletic season. The study concluded that an athletes’ injury history from the previous 12 months did not influence positive states of mind as measured by the PSOM.

A study by Taylor and May (1996) examined the effects of threat appraisal and coping appraisal in Protection Motivation Theory (PMT). Sports Injury Rehabilitation Beliefs Survey was constructed with 19 items to assess the PMT components. The study sample consisted of 62 subjects (68% females) from a single university-based sports injury clinic. The patients were asked to complete the questionnaire immediately after leaving the clinic. Immediately after the second appointment both the patient and physiotherapist completed a compliance data sheet in separate room. The data was collected from 62 patients, with the corresponding information on compliance from the physiotherapist. The results revealed that over half the subjects were subsequently non-compliant to some degree. The study concluded that greater perceptions of both susceptibility to retarded rehabilitation and injury severity, at the first appointment were related to subsequent non-complaint behaviour. The findings provided some support for PMT and serve as an important tool for designing sport therapist interventions focused on threat and coping appraisal.

In another research, Ahem and Lohr (1997) explored the psychosocial and behavioural risk factors which contributed to sport injury risk and rehabilitation. The factors which affected the stress-injury relationships were generalized muscle tension, narrowing of the visual field, and increased distractibility. The authors also studied that the psychosocial distress can sensitize athletes to pain, especially when recovery is prolonged owing to severity or re-injury and it is also involved in muscle guarding, which has a chance to occur as a sequel of injury. The survey of 20 sports medicine physicians was conducted which indicated a high degree of psychological or behavioural concerns occurring in conjunction with sport injuries, and an increased interest in the services of clinical sports psychologists. The survey consisted of
appreciation of mind-body interactions and how they function during stress and sport performance. The authors stressed upon the need to incorporate cognitive stress management techniques which included cue-instructional self-talk, attention refocusing, cognitive restructuring and use of techniques such as positive self-talk and mental imagery in conjunction with relaxation training or biofeedback. The study concluded that psychological consideration of sport injury is essential for optimal recovery.

Hedgpeth and Sowa (1998) reviewed the effects of incorporating stress management into athletic training and rehabilitation. The study reported that the transactional model plays a central role in how the individuals react to the event. The components of the transactional scale were increased awareness, information processing and appraisal, modified behaviour and peaceful resolution which provide a paradigm for athletic trainers to incorporate stress management into the rehabilitation process. The increased awareness involved a series of interactions in which both the athletic trainer and the injured athlete develop a clear understanding. Information process and appraisal assessed the existing harm and loss that the stressor elicited. To develop peaceful resolution, the athletic trainer reviews the rehabilitation process with the injured, thus helps the athlete in evaluating the psychological and physical accomplishments associated with the rehabilitation process. The study concluded that personality of the athlete, the athletic and the specific stressors associated with the injury and rehabilitation process and education, expertise of the athletic trainer determine the specific techniques of employment in the process. It was suggested that there is necessity of athletic trainers to be knowledgeable in the psychological aspects of injury, as well as in the psychological and physical techniques.

In line with the similar research, Wiese-Bjornstal et al. (1998) examined the psychological and sociological dynamics of sport injury and rehabilitation process. The effect of injury on the athletes’ self-esteem and self-worth, self-confidence and self-efficacy were studied. The authors stressed upon the importance of incorporating control group, which helps to separate influential moderator factors specific to injury occurrence affecting healthy participants from the same teams, sports, levels of participation and the researchers continue to track both injured and non-injured athletes at same time. It was also stressed that there is a necessity to identify the dimensions of response variables such as fatigue. The study revealed that the
researchers should be clear with their interest while examining psychological responses of athletes who sustain injury or psychological response to sport injury. The study suggested that efficacious interventions for injured athletes depend on established directionality of the relationship between psychological response and physical recovery. The study concluded that cognitive appraisal and emotional response components play important role in injury rehabilitation.

In another study, Brewer et al. (2000b) investigated the relationships between psychological factors, rehabilitation adherence and short-term rehabilitation outcomes after reconstructive surgery. The study included 95 participants (28 females, 67 males) out of which 49 participants were competitive athletes, 41 recreational athletes, 3 non-athletes and 2 did not respond to the information. The following variables, i.e., demographic, injury-related, psychological, adherence to rehabilitation, and rehabilitation outcome were measured. To measure the demographic and injury-related variables, a questionnaire was used which included age, gender, race-ethnicity, date of anterior cruciate ligament (ACL) injury, source of ACL injury, and level of sport involvement. The psychological measures investigated in the study were self-motivation by Self-Motivation Inventory, social support by Social Support Inventory, athletic identity by The Athletic Identity Measurement Scale, and psychological distress by Brief Symptom Inventory. Participants’ adherence towards the rehabilitation process was measured in three ways: first, the attendance of the patient for rehabilitation sessions; second, on each physical therapy appointment; and third, home exercise and cryotherapy completion report formed by patients themselves. Psychological characteristics were measured 10 days before reconstructive surgery. Adherence to rehabilitation variables were taken after reconstructive surgery. Rehabilitation outcomes were taken at regular interval of rehabilitation schedule about 6 months after reconstructive surgery. The results showed that self-motivation was an important factor of rehabilitation adherence, athletic identity had direct relationship with favorable outcomes and psychological outcomes had indirect relationship with favorable outcomes. It was concluded that psychological intervention reduced psychological distress and enhanced rehabilitation adherence of the patient in rehabilitation process after surgery.

Green and Weinberg (2001) examined the relationship between athletic identity, coping skills, social support, and physical self-esteem in recreational...
Review of Literature

participants after an episode of injury. The study included 30 participants (18 males, 12 females) within the age group 19-70 years and was further classified by type of injury. The majority of the participants were Caucasian (93.3%, n=28) and the remaining 6.7% were African Americans (n=2). The evaluation was done by Athletic Identity Measurement scale, The Athletic Coping Skills Inventory, Profile of Mood States, and The Physical Self-Perception Profile. In results, it was found that athletic identity and total mood disturbances were not correlated significantly. It was also found that higher levels of coping skills and social support were related to lower levels of mood disturbance. It was observed that athletic identity, coping skills, and social support did not affect the total mood disturbance. Smaller sample size and failing to assess the cognitive appraisals of the injured participants were the major limitations of the study.

A study by Pizzari et al. (2002) investigated the subjective experience of anterior cruciate ligament (ACL) rehabilitation and identified variables that influence adherence as perceived by ACL reconstructed patients. Eleven patients were interviewed at an average of 4.8 months (SD=0.8) after ACL reconstruction. The results contented that there were three categories of variables which influence adherence: environmental factors, physical factors, and psychological factors. The perceived lack of time and a lack of self-motivation were the variables specifically affecting adherence to home exercise. Fear of re-injury emerged as a significant consideration for those who were non-adherent. Factors such as therapist support, rehabilitation clinic, and progression of exercises were identified as being important for attendance at physiotherapy appointments and adherence during appointments.

Potter et al. (2003) investigated a broad range of patient behavioural attributes and identified the attributes which were hardest to deal with. The authors stated that this includes: passive responsibility, angry/aggressive behaviour towards physiotherapist regarding injury, rehabilitation and/or other health care professionals involved in their management, patients who think they ‘know it all’ and those who are ill-informed. dependence on a particular physiotherapist or treatment program, non-compliant with rehabilitation advice, demanding of a physiotherapists’ knowledge, time, or attention, manipulative of health care professionals, lack trust in physiotherapist, unreliable, seek multiple opinions from various health care professionals, denial of problem, lack motivation in physiotherapy, high performance
drive, catastrophisers/negative thinkers, unhappy with treatment and/or life in general, ageist, confused, helpless/hopeless, highly anxious, low self-esteem or self-confidence, obsessive, over talkative, or make significant self-disclosures. The second issue reflected patients with preconceived ideas about physiotherapy, including the nature of their problems, appropriate treatment and the number of treatments required. Physiotherapists identified the issue of patients with multiple physical problems being difficult due to potentially high levels of pain and the extra time required managing these patients. The undiagnosed injury or pathology, frail patients, patients with allergic reactions to tape, patients who are obese, patients with pacemakers, or patients with physical problems that are slow to respond to treatment, all pose difficulties in treatment. Further, patients with a low pain threshold, patients with chronic pain, pain-focused individuals and patients with neuropathic or neurological pain, were considered by physiotherapists as difficult to treat. Patients with cultural differences and communication problems were also described as difficult to deal with. Patients with psychological problems and psychosocial concerns like: bad debtors and financially challenged patients; failed patients whom no-one else had been able to help; younger age groups, specifically 8 to 12 year old children with poor parental support, and disinterested teenagers; patients with poor body awareness; and those with gender conflict, i.e., male therapist treating female patient and vice versa were all described as difficult to deal with.

A study by Klenk (2006) adapted the Emotional Response of Athletes to Injury Questionnaire (ERAIQ) to collect information from athletes at NCAA Division I University about their response to injury. Two hundred fifty varsity athletes volunteered to participate (127 males, 122 females; Mean age=19.9 years). The athletes represented 14 different teams including individuals who had experienced injuries and those who had not. The results suggested several important implications for resources to address the emotional as well as physical rehabilitation of sport injury. It was acknowledged that the importance of the psychological aspects of injury is not widely recognized as only 6.74% of injured athletes sought counseling to cope with the emotions associated with injury, which is consistent with previous findings that athletes are less likely than non-athletes to make use of psychiatric counseling services and often the psychological distress caused by injury goes untreated. More athletes, coaches, and athletic training staff need to realize the possible benefits of establishing a multi-faceted and versatile their approach towards injury recovery. To
help prevent the loss of identity when injury occurs in athletes; parents, coaches, and training staff should help them recognize other strengths in addition to their athletic skills. Some athletes are reluctant to seek psychological counseling to cope with athletic injury. Therefore, strategies should be developed to ensure injured athletes that emotions that occur because of injury are normal. Such efforts should also encourage athletes to seek help if their emotional response and coping to athletic injury begins to interfere with their day-to-day functioning. A more inclusive approach may encourage athletes to face the emotional challenges that come along with athletic injury and consequently, rehabilitation could be expedited. Sport injury can be traumatic for many athletes because it is an important component of their self-identity. In addition to the physical pain of an injury, athletes struggle psychologically, but little is known about their emotional response, recovery, and need for social support. Frustration and anger were the most strongly experienced emotions. Family and teammates were important sources of social support during recovery.

Sheard and Golby (2006) observed the effects of a mental skill intervention program on competitive swimming performance and positive psychological development of national-level adolescent swimmers. The study consisted of 36 swimmers (13 boys, 23 girls) in the age group 10-18 years. The sample was drawn from three separate clubs and all competed at the national level. The intervention consisted of goal setting, visualization, relaxation, concentration, and thought stopping. Performance timings were obtained from official meets. Participants completed seven inventories measuring quality of performance, and six positive psychological attributes: mental toughness, hardiness, self-esteem, self-efficacy, dispositional optimism, and positive affectivity. The Psychological Performance Inventory contains 42-items which yield an overall mental toughness score, as well as seven 6-item subscale scores: (a) self-confidence; (b) negative energy control; (c) attention control; (d) visualization and imagery control; (e) motivation; (f) positive energy; and (g) attitude control. Hardiness measured commitment, control, and challenge. The 10-item Rosenberg Self-Esteem Scale yields a score for global feeling of self-worth. It is rated on a 4-point Likert scale anchored by ‘strongly agree’ and ‘strongly disagree.’ The 10-item Generalized Self-Efficacy Scale rates on a 4-point Likert scale anchored by ‘not at all true’ and ‘exactly true.’ The results of the
study showed a statistically significant improvement in three 200 m events. The other finding of the study was that, there were significant improvements in 17 of the 18 positive psychological measures.

A study by Niven (2007) provided a comprehensive list of the various traits of an athlete as well as other variables influencing rehabilitation. The factors influencing good rehabilitation adherence included positive individual attributes, trust in physiotherapist and rehabilitation, good social support, facilitative environment, and understanding of the rehabilitation process. The factors influencing poor rehabilitation adherence included negative individual attributes, negative emotions, maladaptive thoughts, individual factors related to over-compliance, lack of social support, environmental constraints, negative injury and rehabilitation experiences, pressures, and skepticism about physiotherapy and rehabilitation.

The literature was reviewed by Podlog and Eklund (2007) to qualitatively assess the relevant studies pertaining to the psychosocial aspects of return to sport following injury using a self-determination theoretical (SDT) framework. Stages of the return to sport model was composed of five physical and psychological stages including: “initial return,” “recovery confirmation,” “return to physical and technical abilities,” “high intensity training,” and “return to competition.” It was observed that the various stages of return to sport make sometimes lengthy return to full functioning. It also gives athletes’ a greater sense of predictability and control over their transition from rehabilitation to training and competition. This model was unable to explain the beginning and end point of various stages, failed to account for individual differences with regards to athletes’ ability to move from one stage to next, as well as no feedback contingencies were considered in the model. The biopsychosocial model was used to examine the issues faced by athletes making a return to sport following injury. This model included an extensive list of variables and identified general relationship among variable categories that may influence injury rehabilitation outcomes. This model suggested other factors such as socio-demographic, biological, psychological, and social/contextual variables which may play important role in an athletes’ course of recovery and ability to return to full activity. Self-determination theories focused on the social-contextual factors that facilitate versus undermine health, psychological well-being and intrinsic (self) motivation. It was found that athletes typically moved from a predominance of
negative emotions to more positive ones as rehabilitation progressed. It was found that injured athletes experienced fear during rehabilitation, and a significantly higher number reported the same emotion upon return to competition. On autonomy issues, athletes may have differing levels of autonomy in return to training and competition following injury. It was also found that athletes could face external pressures to return to sport from a variety of sources including coaches, teammates and fans. On the relatedness issues, coaches and rehabilitation specialists may be ideally positioned to provide social support and to keep athletes involved in their sport in meaningful ways. Relatedness linked with improved psychological functioning and well being was achievable not only with the support of environmental factors but also with the help of social support.

In another research, Gucciardi et al. (2008) studied the impact of Personal Conduct Psychology (PCP) on mental toughness in the context of Australian football. Eleven male coaches (Mean age=42 years) with considerable playing and coaching experience at the elite level were included in the study. Interviews lasted for 30 and 90 min and transcribed verbatim data were analyzed using grounded theory procedures. Participants were requested to (a) list and describe what was considered to be the contrasting pole for each characteristic, (b) rank the characteristics in order from most important to least important for mental toughness in Australian football, and (c) list all the situations for which each characteristic was applicable. Results showed the key mental characteristics and their contrasts together with those situations that demand mental toughness, and the behaviours commonly displayed by mentally tough individuals. The study concluded that mental toughness in Australian football works as a buffer against adversity and also a collection of enabling factors that promote and maintain adaptation to other challenging situations.

A study by Cano et al. (2009) examined changes in mood state during the rehabilitation process (from start to finish) as well as the level of adherence by the injured athletes to the rehabilitation program. Five injured sportspersons of various sport of Murcia having recent injuries within 2 days prior to their first visit to the health center participated in the study. The two psychological variables measured during rehabilitation were mood state and the adherence to the rehabilitation program. Spanish version of 29 items by Fuentes, Garcia-Merita, Meli and Balaguer from Profile of Mood State (POMS) by McNair, Lorr and Droppleman was used to
determine the states and changes in mood of the injured sportsperson. In this version of POMS, a Likert scale from 0 (none) to 4 (high) was used to evaluate 5 dimensions i.e. tension, depression, anger, vigor and fatigue. The whole study was conducted in three phases; at start of the rehabilitation period, middle period, and end period. To assess the adherence to rehabilitation program, 9-item scale to examine the achievement of the treatment administered in the clinic on the basis of assistance, punctuality, collaboration etc., and 5-item scale to examine the follow up of home program were used. So a total of 14-item scale to evaluate the adherence to rehabilitation of an injured sportsperson was utilized. The findings of this study were: (a) over the course of the rehabilitation an injured sportsperson slowly adapts the ICEBERG emotional profile, (b) the factor tension remains high during the whole process of rehabilitation, (c) as the rehabilitation process progresses the depression and fatigue decreases, (d) anger was another factor which decreased as the rehabilitation progressed, and (e) the factor vigor increased during rehabilitation process but it was more accountable in the middle of the process and low at the end. So, it was concluded that the adherence towards the rehabilitation program of the injured sportspersons maintains the same level from the initiation of the process towards the middle of it, and thereafter, adherence of the sportspersons towards the end of the rehabilitation begins to decrease slightly.

Zafra et al. (2009) studied the relationship between injuries in tennis players and psychological variables such as stress control, assessment of performance, motivation, mental ability and team cohesion. The study included 63 tennis players aged between 16-49 years (M=31.62; SD=8.93) out of which 50.8% were injured and 49.2 % were not injured. Self-report questionnaire was used to assess the history of injuries and CPRD questionnaire (a questionnaire of psychological characteristics related to sports performance) assessed five psychological values, i.e., stress control, index of performance assessment, motivation, mental ability, and team cohesion. The result indicated that tennis players with moderate injuries depicted higher level of motivation. Findings showed significant relationship between moderate injuries and the motivation. Tennis players with lower number of muscular injuries showed greater self-control. In case, when tendinitis was lower, the tennis players showed better performance and in small fracture incidences they exhibited greater team cohesion.
A study by Crust and Swann (2010) examined relations between two measures of mental toughness. Study involved 110 male athletes (Mean age=20.81 years, SD=2.76), all participants with at least one year of experience in their chosen sport (Mean experience=9.34 years, SD=5.43). The sample consisted of athletes who were mostly team sport players (i.e., soccer, rugby union, etc.) and represented 10 sports. They were selected from university sport teams and local sport clubs, with informed consent before filling the questionnaire regarding the assessment of mental toughness. Participants were provided demographic information and were given a booklet that included two measures of mental toughness. Pearson correlations showed the significant and positive relationship between higher order mental toughness scores. Results suggested that sub-scale with similar labels does not measure the same components of mental toughness.

Podlog et al. (2010) examined associations between components of athletes’ psychological well being and perceived psychological return to sport outcomes. The study included 204 athletes (138 males, 66 females) aged 18-36 years. Out of 204 athletes, 37 athletes were competing at professional level, 28 athletes at international, 13 athletes at national, and 126 athletes at intercollegiate level. A total of 15 sports were represented in the sample including amateur wrestling (n=40), athletics (n=32), American football (n=27), rugby (n=18), Australian rules football (n=15), soccer (n=15), swimming (n=14), ice hockey (n=12), gymnastics (n=8), volleyball (n=6), basketball (n=5), baseball (n=4), tennis (n=1), softball (n=1), and triathlon (n=1; n=5 missing). Participants completed an injury information questionnaire, an adapted version of the Need Satisfaction Scale and three measures of well being including the positive and negative affect scale, the self-esteem scale and subjective vitality scale. Perceived return to sport outcomes was assessed using the Return to Sport after Serious Injury Questionnaire. The results demonstrated that well being indicators would mediate the relationship between need satisfaction and a renewed perspective on sport. The positive affect partially mediated the relationship between competence and autonomy need satisfaction and a renewed perspective on sport. The study also demonstrated positive association between competence and autonomy need satisfaction as well as athletes’ emotional well being during injury rehabilitation and enhanced return to sport outcomes.
Golby and Meggs (2011) investigated the effect of prenatal testosterone upon the sporting brain. A putative marker for exposure to prenatal testosterone is in the ratio 2D:4D. Testosterone influences the growth of the ring finger (4D), whereas estrogen exposure stimulates the growth of the index finger (2D). The study examined the relationship between 2D:4D and mental toughness, optimism, goal orientations, aggression, coping style, and their association with sporting achievement. The participants in this study were an opportunity sample of 122 (60 males, 62 females) sport people from a North Eastern University categorized as 18-25 years (n=90) and 25+ years (n=32), from all levels of sporting achievement: international/national (n=23), regional (n=43), and school/recreational (n=56). Participants included competitors from a range of sport, including swimming and climbing, and had 4-30 years experience of competition. The Alternative Psychological Performance Inventory was used to measure mental toughness. The questionnaire obtains an overall toughness score, and 4 subscale scores: self-belief, determination, positive cognition, and visualization. The Sport Mental Toughness Questionnaire was used as a secondary measure of mental toughness. The questionnaire yields a total mental toughness figure, and 3 subscale scores: confidence, constancy, and control. The Buss-Perry scale provides an overall value of aggression and four subscale measures: physical aggression (9 items), verbal aggression (6 items), anger (6 items), and hostility (8 items). The Revised-Life Orientation Test comprised of three positive items, three negative items and four filler items. Vernier Caliper and 30-item coping scale was also used to measure digit ratio hand scans. The conclusion of the study was that MANOVA revealed significant gender differences in 2D:4D with males demonstrating lower ratios. The other finding of the study was that high prenatal levels of testosterone may contribute to the development of increased mental toughness, optimism, ego/task goal orientations in individuals, and hence aptitude towards sport.

Recently, Frank and Yawen (2013) examined how hope and social support uniquely and jointly predicted post injury rehabilitation beliefs, rehabilitation behaviour, and subjective well being. The study included 224 injured Taiwanese collegiate student-athletes. Trait Hope Scale (THS) was used to assess an individual’s dispositional hope. Sports Injury Rehabilitation Beliefs Survey (SIRBS) was used to assess an individual’s appraisal of rehabilitation treatment after a sport injury.
Review of Literature

Subjective well being was assessed with the SWLS. Multidimensional Scale of Perceived Social Support was used to assess injured athletes’ perceived social support. The results showed that social support and 2 types of hope in injured athletes predicted their rehabilitation beliefs and subjective well being. Only hope agency predicted their rehabilitation behaviour. Hope and social support had an interactive effect on the prediction of subjective well being; for participants with low hope pathways, the perception of more social support was associated with higher levels of subjective well being, whereas social support had only a relatively low association with subjective well being among participants with high hope pathways. The study concluded that enhancing hope perceptions and strengthening injured athletes’ social support during rehabilitation are beneficial to rehabilitation behaviour and subjective well being.

Undoubtedly, the literature is replete with research on sport injuries. The studies reviewed in this chapter have attempted to provide a conceptual framework as well as useful insight into the role of psychosocial correlates in sport injury rehabilitation process. Also, the literature reviewed in the present study has focused on the implications of sport injuries; ways in which athletes’ respond to and deal with pain and injury rehabilitation, drawing in particular, the literature on the elements of rehabilitation, and the attitudes and beliefs of injured athletes.

Thus, the above mentioned studies were directly or indirectly, related to the present study and highlighted the role of psychosocial factors associated with sport injury and rehabilitation as well as the utility of psychosocial skills in athletic injury rehabilitation.