THE INFLUENCE OF INJURY RELATED PATIENT EDUCATION ON PAIN PERCEPTION AND MOOD STATES IN RECREATIONAL ATHLETES

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The purpose of this study was to investigate the influence of injury-related patient education on the pain perception and mood states of recreational athletes. Participants were recruited from a sports medicine clinic and included recreational athletes over the age of 18 who suffered a musculoskeletal injury. A repeated measures design was used to examine participants pain perception and mood state at two separate occasions during the physician consultation. Both the control and experimental group participants completed the pain perception and mood state assessments prior to the physician consultation. The control group completed the second assessment after the physical exam but prior to the patient education. The experimental group completed the second assessment after both the physical exam and the patient education. MANOVA was used to determine the effects of patient education on pain perception and mood states. Results demonstrated a main effect for time among all participants ($F(4,35) = 5.18$, $p = .002$); however, patient education did not have a significant effect of pain perception and mood states between the control and experimental group ($F(4,35) = 1.17$, $p = .340$). Three possible explanations for these results include: (a) patient education does not have an effect on pain perception or mood state during the beginning phases of rehabilitation; (b) cognitive appraisal, which was not assessed in this study, plays a role in the effect of patient education on pain perception and mood state; or (c) simply meeting with a medical professional may have a more profound effect on the psychological aspects of injury than simply the informational content of patient education.
There have been specific people in my life, all of whom have given me the love and encouragement needed to finish this degree.

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INTRODUCTION

Pain is a prominent response to any injury and the corresponding rehabilitation. One of the primary objectives of any rehabilitation program is to decrease the pain experienced by the injured athlete. Physiological and psychological components of pain should be considered equally important when treating an injured athlete, yet research into the psychological aspects has begun to gain popularity only recently. Limited research on the psychology of pain may be due partially to the ethical issues of studying pain, as well as the limited external validity of laboratory based research studies.

Components of a rehabilitation program, including patient education, may alter the injured athlete’s pain perception associated with the injury. Health care practitioners are taught to include educational information, such as the injury diagnosis and treatment options, when consulting with a patient as it is believed it is both the patient’s right to be fully informed about his or her injury and because it will hopefully lead to better rehabilitation compliance (Prentice, 2003). Education about an injury can lead to an increased understanding of the severity or seriousness of the injury and possibly increase or decrease the individual’s pain perception (Melzack & Wall, 1983; Ryan & Kovacic, 1966). Despite the apparent importance of patient education, minimal research has focused on its effect on pain perception.

In addition to affecting pain perception, it is possible patient education may affect an injured athlete’s mood state. Mood states are psychological responses to an individual’s life circumstances that are characterized as “transient, fluctuating affective states” (McNair, Lorr, & Droppleman, 1992, p. 1). Due to the dynamic nature of an athlete’s mood state, it is possible that fluctuations in the mood can occur at any time and with any trigger. One possible fluctuation could occur when the injured athlete is presented with information regarding the injury. No
research has been conducted to examine the effects of patient education on mood states in injured athletes.

The integrated model of psychological response to the sport injury and rehabilitation process by Wiese-Bjornstal, Smith, Shaffer, and Morrey (1998) provides a theoretical framework to examine relationships among patient education, pain perception, and mood state. The Wiese-Bjornstal et al. model proposes there are many factors that affect reactions to injury and recovery outcomes. Listed within the context of this model are various components of patient education, the injured athlete’s pain perception, the injured athlete’s mood state, and how the various factors affect an his or her recovery. This model was used as a framework to develop the hypothesis of this study because it proposes relationships among the variables of patient education, pain perception, and mood state.

Purpose

The purpose of this study was to examine the influence of patient education (injury-related, informative consultation) on the pain perception and mood states of injured athletes. The research questions were: (a) will a patient educational consultation affect an injured athlete’s pain perception? and (b) will a patient educational consultation affect an injured athlete’s mood state?

Hypothesis

It was hypothesized that patient education would have an effect on an injured athlete’s pain perception and mood state. More specifically, it was hypothesized that there would be a significant difference in the change of perceived pain or mood states between the control group, which did not receive patient education between pre and posttest conditions, and the experimental group, which received patient education between pre and posttest conditions.
Definition of Terms

Acute Pain: pain which has lasted less than three months (O’Hara, 1996).

Chronic Pain: pain which has lasted more than three months (O’Hara, 1996).

Mood State: psychological responses to an individual’s life circumstances that are characterized as “transient, fluctuating affective states” (McNair et al., 1992, p. 1).

Nociception: “reception of signals in the central nervous system evoked by activation of specialized sensory receptors (nociceptors) that provide information about tissue damage” (Janssen, 2002, pg. 131).

Pain: “An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (International Association for the Study of Pain (IASP), n.d., ¶ 11).
REVIEW OF LITERATURE

Significance of Pain

The ultimate goal of any injured athlete is to recover from the injury, both physically and psychologically, in order to return to competition quickly. Pain is a very important symptom of any injury and affects the subsequent recovery from an injury. In fact, pain is so important in the healing process that it is often used as a key determinant of the healing rate of the injured tissue and, therefore; most individuals determine the rate of rehabilitation of their injury based on the pain they experience. Despite the unpleasant sensations associated with it, pain has the essential function in humans to warn of harm and prevent further tissue damage. The physiology of how pain occurs helps to explain why individuals feel pain when experiencing tissue damage, such as with an athletic injury. Although little research has been reported concerning how patient education affects an individual’s pain perception, research concerning athletes and pain perception has been studied extensively. Understanding the mechanisms of pain is important in order to further study the affects of pain.

Definition of Pain

It is important to have a thorough understanding of pain, including its exact definition within the medical community, to understand an athlete’s response to the pain experienced after suffering an injury. Pain is a subjective and multidimensional phenomenon researchers have struggled to adequately define. The definition of pain should include both physiological and psychological components, both of which are considered equally important in the explanation of pain perception (Chapman, 1995). The International Association for the Study of Pain (IASP) offered one of the first pain definitions that included both the physiological and psychological components, as follows: “An unpleasant sensory and emotional experience associated with actual
or potential tissue damage, or described in terms of such damage” (IASP, n.d., ¶ 11). Within this definition, there are different classifications of pain that can lead to various responses from an injured athlete.

**Pain Classifications**

Classifications of pain distinguish between the different types including variations in time of onset, duration, as well as psychological and physiological effects. O’Hara (1996) designed one such classification system, which termed different categories of pain as transient, acute, or chronic. Craig (1989) classified pain with a similar system to O’Hara with the exception of phasic replacing the term transient. Despite subtle differences in terminology, these classifications of pain constitute the most widely utilized categorization system by both researchers and health care practitioners.

Transient or phasic pain reflects the immediate impact of pain at the onset of the injury and is generally of short duration (Craig, 1989). This pain is not associated with any long-term effects (Melzack & Wall, 1983). As the physiological distress of the patient escalates, his or her body attempts to promote healing of the injury. Pain limits further injury through the avoidance of harmful behaviors. This mechanism is facilitated through the initiation of immediate withdrawals or changes in behavior to limit further injury. For example, the pain experienced after an ankle sprain limits the ankle movement that could cause further harm to the injured ligaments. People learn to avoid mechanisms that cause transient pain (Melzack & Wall). In addition to pain, an immediate psychological reaction to the transient or phasic pain is fear (Craig). Long-term transient pain may lead to a more acute pain classification if the injury persists.
Acute pain is generally classified as lasting less than three months and is described as a transition period between the cause of the injury and future recovery (Melzack & Wall, 1983; O’Hara, 1996). The physiological response of anxiety associated with acute pain causes the activation of the sympathetic nervous system (Melzack & Wall; O’Hara). This activation can lead to increased heart rate, respiratory rate, blood pressure, and profuse sweating (Craig, 1989). Anxiety is affected by the mechanism of the injury, the treatment of the injury, and what the athlete believes are the physical or psychological consequences of the injury (Melzack & Wall). When acute pain continues for a longer period of time, it becomes chronic pain.

Chronic pain is classified when acute pain persists longer than three months and recurs on a regular basis (O’Hara, 1996). This pain persists beyond the regular acute pain time period required for tissue healing (Craig, 1989; Melzack & Wall, 1983). O’Hara proposed three classes of chronic pain: (a) Recurrent pain, which is episodic with a predicted end; (b) chronic acute pain, which does not have a predicted time span, but is expected to cease; and (c) chronic nonmalignant (benign) pain, which causes disability due to the daily reoccurrence of the pain. Chronic pain patients often lose hope of relief (Craig). The common psychological response associated with chronic pain is depression (Craig). The longer the pain persists in chronic patients, the more distressed the individual becomes.

It is possible to use pain qualifiers to help describe and often measure an individual’s pain. Melzack and Wall (1983) found when pain was induced with a gradual increase in intensity that there were four levels of pain intensity that could be qualitatively measured: (a) sensation threshold, (b) pain perception threshold, (c) pain tolerance, and (d) encouraged pain tolerance. Sensation threshold occurs when the individual feels a tingling or warmth from the stimulus. Pain perception threshold is the minimum amount of stimulus required to produce a sensation or
response considered painful, that is, when an individual first begins to feel pain (Pen, Fisher, Sforzo, & McManis, 1995). Pain perception threshold is also often used to describe the duration and intensity of the stimulus experienced by an individual (IASP, n.d.). Pain tolerance refers to the point at which the person withdraws from the painful stimulus (Pen et al.). An individual’s tolerance is generally measured by one’s ability to sustain a noxious stimulus up to the point of withdrawal, recorded as either the amount of pain inflicted (e.g., pressure with a cleat pressure test) or enduring time (e.g., cold presser test). Encouraged pain tolerance is similar to pain tolerance, but the individual is encouraged to endure higher stimulation levels.

Despite what type of pain is experienced, it is vital to understand that pain occurs for a reason and has a very important function within the human body. The noted occurrence of pain should become a priority for health care providers to better support the patients they diagnose and treat.

*Function of Pain*

Pain, although unpleasant, is important because it functions as a protective mechanism working to prevent further harm or injury. It is our body’s natural alarm to indicate there is potential or real tissue damage. Although pain has no direct curing properties, indirectly it helps the healing process by limiting further harm. It is common practice by health care professionals to use an individual’s perception of pain as one of the primary diagnostic tools to assess an injury and its severity, despite the fact that it is very unpredictable and may lead to a misdiagnosis (Feine, Lavigne, Thuan Dao, Morin, & Lund, 1998). Pain is also used to assess the effectiveness of a rehabilitation program, but again, pain is an unpredictable tool making it unreliable.

Pain recall is often used to report previous pain or perceived relief despite research that has determined its inaccuracy for this function (Feine et al., 1998). For example, pain relief
during a patient’s rehabilitation is often measured retrospectively, where the patient returns for a subsequent treatment and reports pain relief from the previous treatment. Brauer, Thomsen, Loft, and Mikkelsen (2003) studied whether patients were able to retrospectively recall the intensity of musculoskeletal pain for a three-month period in a workplace setting. Results indicated that participants were able to satisfactorily recall pain ratings; however, they tended to underestimate their worst pain and overestimate their average pain. Thus, inaccurate pain recall and perceived relief can lead to unreliable conclusions regarding the effectiveness of treatments administered.

Even if a patient’s pain perception is appropriately reflective of his or her injury and severity, it has been shown that health care professionals underestimate their perception of the patient’s pain (Marquie et al., 2003). Melzack and Wall (1983) stated it is impossible for one to know the pain someone else feels. Yet, health care professionals are constantly assessing injuries based on their own perceptions. Feine et al. (1998) hypothesized that physicians rated pain based on factors of a nonmedical nature, such as patient gender and the apparent cause of the injury. However, estimating pain felt by the patient should not be the role of any health care professional. Rather, they should listen to how a patient perceives her or his own pain. This will lead to a better understanding of both the physiological and psychological factors that affect pain, which is crucial in understanding an individual’s perceptions of pain.

The primary goal of any health care professional is to significantly improve a patient’s health and quality of life. Understanding the complexity of pain and the need for a team approach to rehabilitation is critical for effective pain management by health care professionals. Teams designed to assist a patient with pain should be comprised of a variety of knowledgeable practitioners, such as physicians, rehabilitation specialists, and possibly pain specialists if
required. Many health care professionals are allowing a gap to develop between their current pain management standards and important research discoveries regarding pain management because they are not staying up to date with current research (University of Toronto Centre for the Study of Pain (UTCSP), n.d.). This gap could lead to inappropriate interpretations and treatment of a patient’s pain that can be detrimental to all aspects of recovery, including misdiagnosing the injury or inaccurately assessing the effectiveness of a treatment protocol.

Unrelieved pain that extends beyond the initial recovery process has led to longer hospital stays with patients being more likely to experience other health complications (UTCSP, n.d.). When patients still experiencing some level of pain are discharged, they may put up with considerable interference in their normal daily activities due to this ongoing pain. Preventing or minimizing a patient’s pain is critical to decreasing long-term health problems. If the goal of any health care professional is to improve the patient’s life by helping to decrease her/his pain, the practitioner must continue to investigate and put into practice results from current research. In the athletic setting, studies investigating pain have been conducted, unfortunately, with numerous methodological and ethical issues.

Pain Research in the Athletic Setting

Pain is an important, but difficult topic to study, with numerous practical and ethical issues limiting the application of research to real life settings, particularly within athletics (Scott & Gijsbers, 1981). Although pain research in a laboratory setting is considered of little value to real life pain, it is often considered unethical to study pain in a field setting with real athlete’s experiencing pain. Literature in the field of pain perception related to athletic injuries emerged in the 1960s and involved the comparison of pain rating, tolerance, and threshold between various groups, including athletes participating in different sports or athletes versus nonathletes (Egan,
Previous research has indicated athletes in different sports exhibit different pain perception and tolerance levels. Ryan and Kovacic (1966) measured pain threshold and pain tolerance levels and compared these measures in contact sport athletes, noncontact sport athletes, and nonathletes. They hypothesized that contact athletes would have a higher pain tolerance than noncontact athletes. The authors found no significant difference in pain threshold among the two categories of athletes and the nonathletes, although there was a significant difference in pain tolerance. As suspected, the contact sport athletes had the highest pain tolerance followed by the noncontact sport athletes and then the nonathletes. The classification of sport was found to account for 44% of the variance of pressure pain tolerance and 48% of the variance with ischemia pain tolerance (Ryan & Kovacic). One limitation in the experimental design of the study was that causation for increased pain tolerance could not be determined. Tajet-Foxell and Rose (1995) performed a similar study in which they compared ballet dancers to nonathletes. The authors tested differences in a cold presser test between the two groups. They found the dancers had significantly higher pain tolerance with 43% of the variance being accounted for by the dance participation.

Variations in pain tolerance/threshold within competition levels of different sports have also been studied. Scott and Gijsbers (1981) compared the pain threshold and tolerance in competitive, club, and noncompetitive level swimmers. The ischemic pain test was employed as it was thought to be relatively close to the pain that swimmers experience during heavy training. They discovered no difference in pain threshold; however, a difference in pain tolerance was
found. The authors viewed the higher pain tolerance of competitive swimmers as a result of “complex experiential and motivational factors rather than any simple physiological mechanisms” (Scott & Gijsbers, p. 93). They further explained the amount of training competitive athletes undergo could alter the uncertainty linked to high levels of pain.

Egan (1987) reached contradictory results when he studied the difference in pain tolerance among athletes in different sports. Football players and cross-country skiers reported significantly higher pain tolerance compared to fencers and boxers. These findings contradicted the contact/noncontact previous finding as the boxers, a contact sport, did not tolerate as much pain as the skiers. The authors rationalized their findings based on the use of the cold presser induction protocol in the experimental protocol. Cross-country skiers train in the cold and may be less sensitive to hand immersion in cold water. This could have accounted for the decreased pain tolerance in these athletes.

Ryan and Foster (1967) examined whether athletes tended to reduce or augment the pain felt during a cleat presser test. Five tests were performed, including a reaction time test, two minute time estimation test, 20 second time estimation test, pain tolerance, and a kinesthetic measure of augmentation and reduction. During the pain tolerance test, the participants were asked to stand as much pain as possible during the cleat pressure test. The participant was then informed by the examiner that the participants score was considerably lower than the group average, and the participant was asked to repeat the test. During both trials, the contact athletes were able to withstand the greatest amount of pain, followed by the noncontact athletes, and finally the nonathletic group. The authors concluded that athletes may have had more motivation to withstand more pain, especially after being told they had performed poorly as compared to the group.
Differences in pain perception of various groups have also been examined, including gender differences. Hall and Davies (1991) studied the difference between pain perception in athletes and nonathletes using gender as one variable. They found no significant differences between males and females on perceived pain intensity.

Another commonly explored topic is the effect of pain coping strategies on pain perception and tolerance. Thorn and Williams (1989) looked at the effect of cognitive strategy training programs on pain perception and found it to be a successful means to decrease pain perception. Johansson et al. (1998) studied chronic pain patients and found that programs such as education sessions, goal setting training, graded activity training, pacing strategies, applied relaxation strategies, cognitive training techniques, social training, drug reduction methods, contingency management of pain behaviors and planning of work return were all useful in pain reduction. They concluded that these management strategies successfully decreased pain perception. These management strategies are one area of research that continues to be explored that has a practical application as a useful mechanism for decreasing pain ratings and increasing pain tolerance. Many of these tools are used in chronic pain clinics to facilitate the patient’s decreased pain (Johansson et al.).

It is apparent that there are many issues regarding the study of pain within the athletic setting. Although many research studies have been conducted, they lack external validity and, therefore, little applicability to real life within athletics.

*Methodological and Ethical Issues of Studying Pain*

Pain perception research has been performed primarily in laboratory settings with limited external validity regarding real world situations. Brewer, Karoly, Linder, and Landers (1990) stated, “the traditional pain threshold and pain tolerance measures are inappropriate for assessing
these hypotheses” (p. 269). The hypotheses they refer to are related to the pain experienced by injured individuals. The authors mentioned the common pain-inducing protocols used in past research including thermal, mechanical, ischemic, electrical, and chemical induction stimuli tests. Jaremko, Silbert, and Mann (1981) found that an individual’s pain perception could be different based on the type of painful stimulus. Therefore, generalizations across different types of pain induction protocols may be limited (Jaremko et al.). Given this possibility, the methods of pain induction used in pain research may have limited generalizability with respect to the pain that occurs with injuries sustained in an athletic setting (Pen et al., 1995).

To date, research on actual pain induced by a real athletic injury is limited. Pen et al. (1995) introduced and recommended a muscle soreness protocol. The authors stated “muscle soreness provides a more realistic representation of the inescapable pain experienced by injured athletes than previously used pain-induction techniques” (p. 192). They recognized a limitation in previous pain induction protocols as the inability to generalize to real athletic injuries. Pen et al. formulated this new muscle soreness protocol to use in future research, as they felt it was more related to athletic injuries. However, the similarity of general muscle soreness to real athletic injuries has yet to be determined.

The IASP (n.d.) recommended that pain should be described as an internal source and not as the external event causing the pain. The IASP suggested that pain should never be measured by the intensity of an external stimulus causing the pain. Recording an external stimulus to determine a participant’s pain threshold is currently and historically used in most pain research. For example, in a study conducted by Tajet-Foxell and Rose (1995), the participant’s pain tolerance was determined by the amount of pressor a patient could sustain in a cold presser test. The amount of pressor applied is an external stimulus measurement, not a measurement of the
pain felt by the participant. IASP recommended that patients should be allowed to rate the pain the experience. To appropriately follow this recommendation, researchers in future studies should utilize protocols that measure the internal pain experienced.

It is important to remember the definition of pain, as stated by the IASP (n.d.), also includes a psychological element. Devising ways to study pain in a field setting and using participants with real athletic injuries is important to literature. Field research with actual patients will also allow researchers to examine the true psychological component of the pain experienced by an injured athlete as it is actually occurring. Since perceived pain has such a large psychological constituent, it is important to have a thorough understanding of the psychology of pain.

*Psychology of Pain*

Pain perception is commonly thought of as a descriptor for the psychological aspect of pain. Evidence has shown that large discrepancies often exist between individuals’ pain perception due to the subjective nature of pain. (Melzack & Wall, 1983). This subjectivity indicates that many psychological factors may affect a patient’s pain perception, although there is little research to support these notions. Decreasing pain is one of the ultimate goals of any rehabilitation program and every tool should be utilized to achieve this goal. In order to accurately interpret a patient’s pain perception, researchers and health care practitioners who treat patients experiencing pain should be aware that pain perception is affected by both physiological and psychological components (Chapman, 1995). Thus, psychological factors that affect pain may be considered as important as physiological factors.

Athletes who sustain injuries go through various physical rehabilitation stages that encompass the actual sensation of pain and psychological states that elicit an emotional reaction
Individuals’ reactions to the pain and emotion associated with these stages help to determine the variations in pain perception (IASP, n.d.; Pen et al., 1995). Individual differences in pain perception could be dependent on interpretations of both physiological and psychological factors (Scott & Gijsbers, 1981). Factors such as experiences associated with actual or potential tissue damage or how the word “pain” is interpreted early in life contribute to the pain experienced by an individual (IASP). Likewise, Egan (1987) found that the ability to cope with physical and psychological states is influenced by cultural values, early experience with previous pain, and the meaning the individual attributes to the pain. It is apparent that many factors contribute to these individual variations of pain perception.

One such factor that is hypothesized to alter an individual’s pain perception is patient education provided by a health care practitioner. Musculoskeletal pain is not only the result of tissue damage, but is also determined by the ability to understand the reason and the consequences of the injury causing the pain (Egan, 1987). Individuals often feel there is meaning attached to their injury, which affects both the degree and quality of the pain. Education about an injury can lead to an improved understanding of the severity or seriousness of the injury and possibly increase or decrease the individual’s pain perception (Melzack & Wall, 1983; Ryan & Kovacie, 1966).

Minimal research has been conducted to determine how a consultation by a health care practitioner that provides adequate patient education may affect an injured patient’s pain perception and why this effect occurs. Melzack and Wall (1983) reported the effects of a physician’s consultation on patients with abdominal pain. The authors stated that a patients association with devastating illnesses can affect his or her pain perception. Abdominal pains
were often ignored when it was assumed by the patient that the pain was associated with minor cramping, a low-threat cause of abdominal pain. The pain became more severe and was a cause for concern if the individual learned that someone close to them had stomach cancer, a high-threat cause of abdominal pain. The authors reported that pain associated to stomach cancer may have continued to worsen until a qualified health care professional reassured them that they were healthy, after which the pain disappeared altogether. Melzack and Wall assumed that the meaning attributed to or the appraisal of the situation, more specifically the threat level, helped to determine pain. When respected advice from a medical professional is unavailable, the perceived pain may worsen. When there is help available to determine the meaning of the pain, it may diminish or can even stop all together depending on the perceived outcome. Therefore, perceived threat of a serious injury causing the pain may affect a patient’s pain perception, but may also be mitigated by patient education given by a health care professional.

Friedman et al. (1985) examined how perceived threat or safety altered the participant’s pain perception and tolerance. This study was laboratory-based and utilized the pain induction protocol of cold-water immersion. A “nonthreat” group was given a passage to read that informed the participants that the test would inflict no long-term harm. The other groups were not given the passage to read. Results indicated there was a significant increase in the pain tolerance of the nonthreat participants with an effect size of 0.22, which the authors attributed to the passage read to this group, thus reducing the fear of the participants. The authors explained the participants had less fear associated with the task because the information provided lessened the threat of potential harm and thus, they tolerated more pain. However, the external validity of this test was limited because most participants in studies are aware that research experiments
cannot inflict long-term harm. This is commonly explained through the informed consent before a participant agrees to participate in a study and may partially explain the small effect size.

Since pain has a central role in any injury and the corresponding rehabilitation, one of the primary objectives of any rehabilitation program is to decrease the pain experienced by the injured athlete. Pain is often the athlete’s chief complaint when an injury is sustained and can be the limiting factor for resuming sport participation. In fact, to return to play, one of the criterions that health care professionals assess is whether the athlete is pain free with all activity (Prentice, 2003). Since patient education is considered an important element of rehabilitation according to health care professionals, it would be prudent to determine the effects of patient education on the pain perception of injured athlete’s.

Patient Education

Patient education is considered a vital component of the injury rehabilitation process (Petitpas & Danish, 1995). Health care practitioners are taught to include educational information when consulting with a patient, as it is believed that it is both the patients’ right to be fully informed about her or his injury and because it will lead to better compliance with rehabilitation (Prentice, 2003). There is limited research to support the claim that patient education is important in injury rehabilitation and there is inadequate information regarding the effects of education on the injured athlete within the literature.

Various scholars have listed what they believe patient education should include (Danish, 1986; Prentice, 2003; Tajet-Foxwell & Rose, 1995). Danish developed a comprehensive list of information that should be included when educating an injured athlete. He indicated patient education should provide: (a) specific knowledge concerning the nature of the injury (i.e.,
diagnosis, severity, and outcomes); (b) the particular treatments that will be initiated and the goals of the treatment; (c) the details regarding the medical procedures to be performed; (d) the sensations or side effects that will be felt; and (e) probable coping strategies. Prentice provided a vague yet all-encompassing list of patient education components. He mentioned the importance of counseling and informing the injured athletes about the rehabilitation and treatment of the injury, as well as providing any other information that will help the athlete. Although these authors noted slightly different components of patient education, the central idea of what should be included, such as a diagnosis, treatment, and rehabilitation expectations, are similar. Due to the comprehensive nature of the list produced by Danish, references to it will be made in this paper when discussing the components of patient education.

Subjective support for including patient education in a physician’s consultation as well as in a rehabilitation program is limited within the literature. One study actually addressed the need for patient education within the discussion, although patient education was not directly studied by the authors. Tajet-Foxell and Rose (1995) examined differences in pain tolerance between dancers and nonathletes. The authors concluded that participants in their study would benefit from education on the meaning of injury, subsequent pain experienced, and appropriate pain responses.

Brewer, Van Raalte, and Petitpas (1999) stated that, since limited research exists concerning communication between the patient and medical professionals in sports medicine, literature in counseling psychology may serve as a framework to explore the patient-practitioner interaction in the sports medicine field. Therefore, references from the counseling psychology field are made in the following paragraphs. Within the counseling literature it is thought that consistent and effective communication, including the agreement on goals, the agreement on
tasks, and the establishment of a bond between the patient and practitioner needs to be present to ensure that the education given facilitates a positive recovery outcome (Bordin, 1979).

The importance of the patient-practitioner interaction, specifically effective communication, should not be underestimated (Brewer et al., 1999). It is thought that the interaction between the patient and health care practitioner can affect the outcome of rehabilitation, as injured athletes have been found to rate their sports medicine practitioner as second behind parents/significant others in terms of support providers (Brewer et al.). To determine the most effective approach to take with patients, the practitioner must understand his or her role within the context of the relationship and the rehabilitation process (Brewer et al.). During the initial interaction, there are unequal roles between the patient and practitioner, where the practitioner usually holds a position of authority. The practitioner possesses the knowledge of both the injury and recovery process and therefore, much of the initial control over the recovery progression. In essence, athletes become dependent on the practitioner for advice and guidance. Kivlinghan and Schmitz (1992) found that during this initial interaction, hasty attempts to be supportive or to investigate emotions might have a negative impact on the relationship as it further enhances the athlete’s passive or second tier role. The authors mentioned that information should be limited to important educational components such as the nature of the injury, treatment goals, possible side effects, and coping strategies. Providing patients with information regarding the injury should help restore the injured athlete’s sense of control as well as provide a sense of predictability about the rehabilitation process (Brewer et al.).

Contrary to the Brewer et al. (1999) suggestion to limit the initial emotional interaction between the patient and practitioner, Petitpas and Danish (1995) established a four-phase psychological management protocol for an injured athlete that emphasizes emotional support.
The first phase is considered the rapport-building segment in which the practitioner should seek to understand the athlete’s perception of the injury. Petitpas and Danish acknowledged that emotional support would most likely be needed and is important in this initial interaction phase. Within the second period, the education phase, information about the injury and recovery are provided to the injured athlete. Knowledge about the injury is provided to help the athlete feel in control of his or her injury outcomes and to diminish fear and anxiety associated with the unknown. The third phase is the skill-development phase, wherein the athlete learns coping strategies to assist in dealing with the injury and pain. Finally, these strategies are employed in the practice and evaluation phase. These four phases run concurrently with rehabilitation of the injury, but can progress independent of the physiological phases of rehabilitation.

The preceding discussion illustrates contradicting recommendations on what role a medical practitioner should assume when dealing with an injured athlete and how the patient-practitioner relationship should be developed. Additionally, the effects of patient education provided by a health care practitioner have not been explored despite the recommendations that it is a crucial component of any rehabilitation program (Petitpas & Danish, 1995; Prentice, 2003). Determining the effects of patient education could help to determine what role a medical practitioner should play in the injured athlete’s recovery process as it will provide insight to understand how a patient reacts to both the practitioner and the information they provide. Since patient education is hypothesized to alter a patient’s pain perception through psychological mechanisms, psychological effects on pain perception should be explored simultaneously in order to better understand how and why pain perception could be affected.
Mood State

The mood state of an athlete, particularly while dealing with an injury, has been well documented. Athletic injuries have been shown to affect an athlete’s mood state (Brewer, Linder, & Phelps, 1995; Green & Weinberg, 2001; Johnston & Carroll, 1998; MacDonald & Hardy, 1990; Quackenbush & Crossman, 1994). However, one component of injury rehabilitation that has not been well researched in terms of its effects on mood states is patient education.

Definition of Mood States

Mood states are psychological responses to an individual’s life circumstances that are characterized as “transient, fluctuating affective states” (McNair et al., 1992, p. 1). Mood states can influence how a person perceives his or her life and generally persist longer than emotions (Schimmack, Oishi, Diener, & Suh, 2000). Emotion is a strong instinctive feeling or, “a state of mind in which feeling, sentiment, or attitude is predominant” (Quackenbush & Crossman, 1994). Emotions tend to be intense, momentary reactions to stimuli. Negative mood states felt after an athlete has experienced an injury are thought to increase symptoms and lengthen the rehabilitation time of the injury (Brewer et al., 1995). For this reason it is important to determine what effects an injured athlete’s mood states has on rehabilitation and determine how to improve mood after an injury occurs to minimize any negative effect. There is literature that suggests how an athlete’s mood states are affected by an injury. However, no studies have determined whether patient education affects the injured athlete’s mood states.

Mood States and Athletic Injuries

It is generally accepted that experiencing an injury is a very emotional experience, where an athlete reports elevated mood disturbance (Morrey, Stuart, Smith, & Wiese-Bjornstal, 1999; Pearson & Jones, 1992; Quackenbush & Crossman, 1994; Smith, Scott, O’Fallon, & Young,
1990; Smith et al., 1993). Throughout the psychology of injury literature, moods such as fear, anger, depression, frustration, and anxiety are commonly reported (Brewer, 2001; Johnston & Carroll, 1998; Smith, 1996; Pearson & Jones; Quackenbush & Crossman).

It was originally thought by researchers that mood disturbance shifted from negative to positive as the injured athlete began to recover (Johnston & Carroll, 1998; MacDonald & Hardy, 1990). However, current beliefs indicate that mood changes appear to be more dynamic, so regardless of the physical phase of injury recovery, mood fluctuations between positive and negative can be experienced (Morrey et al., 1999; Wiese-Bjornstal, 2001). Therefore, it appears that mood states associated with athletic injuries tend to be variable throughout the rehabilitation process.

Morrey et al. (1999) examined fluctuations in mood state throughout the rehabilitation process. They examined the emotional influence of injury and surgery on 27 athletes who had suffered an anterior cruciate ligament tear. Using a repeated measures design, athletes completed the Emotional Response of Athletes to Injury Questionnaire, the Short Form Profile of Mood States, and the Sports Inventory for Pain. The results supported that mood states oscillated throughout rehabilitation. Interestingly, the authors also examined the differences between competitive and recreational athletes and found that competitive athletes had higher overall mood disturbances associated with an injury, which further diverged when the athletes were given permission to return to sport participation. The authors speculated this result occurred due to the competitive athlete’s fear of re-injury and because they would not be able participate at a preinjury level.

Other researchers have examined in depth the exact moods experienced throughout the rehabilitation process and why differences occur at various stages of rehabilitation. Contrary to
Morrey et al. (1999), Quackenbush and Crossman (1994) found that as athletes began to recover from an injury, their mood began to improve. Quackenbush and Crossman performed a retrospective study and examined the moods experienced during four phases of injury – initially, the following day, during rehabilitation, and returning to practice. They recruited 25 participants who had dealt with an athletic injury during the previous year. The participants were required to complete a questionnaire, which included a checklist of different words describing moods. The authors determined patients initially experienced negative moods, such as frustration and anger, when the injury first occurred. As the athlete began to recover, the negative moods decreased and the positive moods increased.

Although Johnston and Carroll (1998) found the specific mood states of frustration and depression were the most common moods felt after an injury, they also determined the meaning of these moods fluctuated at different stages of rehabilitation. The authors used a grounded theory approach qualitative study and determined moods occurred for different reasons throughout various stages of rehabilitation of an athletic injury. Frustration and depression occurred due to the cessation of participation in activity during the initial rehabilitation phase. During the middle of rehabilitation, these particular moods were attributed to a negative interpretation of rehabilitation progress and apathy was often felt towards rehabilitation. In the end, frustration and depression began to develop as they became more eager to return to sport, although there was a common fear of re-injury (Johnston & Carroll). Although in this study athletes did not show a variation in mood states during rehabilitation, it did demonstrate that the antecedents of a mood associated with a rehabilitation phase can fluctuate.

Pearson and Jones (1992) produced slightly different findings in a combination of qualitative and quantitative studies to determine: (a) the negative feelings associated with
injuries, and (b) the effects of an athletic injury on an athlete’s mood state. The authors found that the mood most commonly associated with an athletic injury was frustration, similar to Johnston and Carroll’s (1998) study reported above. However, depression was not reported by the participants as often as in the Johnston and Carroll study. The mood states of the injured athletes were determined by administering the Bipolar form of the Profile of Mood States (POMS-BI), another variation of the POMS that measures six bi-polar mood states. Overall, the participant’s scores demonstrated an elevated mood disturbance of the injured athletes as compared to the norms reported for the instrument and the noninjured control group. The qualitative analysis performed by these authors supported their quantitative findings outlined above.

Smith et al. (1993) also assessed mood state disturbances in injured athletes using the Profile of Mood States measurement tool in a prospective study. The participants were approached at the beginning of their seasons and were asked to participate in the study. If they agreed, they were instructed to complete the emotional response of athletes to injury questionnaire, the Profile of Mood States, and the Rosenberg self-esteem inventory to acquire baseline results for the athletes. If the athlete became injured, they were then instructed to complete the questionnaires again. The results of the study should there was a significant difference between preinjury and postinjury mood for depression, anger, and decreased vigor as compared to scores for the participants taken prior to their injury. Specifically, depression and anger increased while vigor decreased. Additionally, the authors found that injury severity was a significant predictor for postinjury depression.

It is apparent from these studies that there is a well established link between injury and mood state, generally showing an increase in mood disturbance when an athlete became injured.
(Morrey et al., 1999; Pearson & Jones, 1992; Quackenbush & Crossman, 1994). It is important to investigate how athletes are affected by an injury, specifically with regard to their mood state because understanding psychological factors that influence recovery can aid in promoting healing. One component that needs further examination is how patient education, considered an important component of any rehabilitation program by the health care community, affects the injured athlete’s mood state.

**Mood States and Patient Education**

Due to the dynamic nature of the athlete’s mood state, it is possible that fluctuations in the mood can occur at any time and with any trigger. One possible fluctuation could occur when the athlete is presented with information regarding the injury such as with patient education. No known study has determined if patient education specifically affects mood state in injured athletes.

A limited number of research studies examining the effects of components of pain perception on mood state in injured athletes have been performed. Mainwaring (1999) examined ten athletes who suffered an anterior cruciate ligament injury severe enough to require arthroscopic surgery. Through a qualitative study, the author sought to develop a model of psychological reaction to severe sport-related knee injuries. Many themes emerged that were related to patient education. The author reported that, in order to get through rehabilitation, athletes sought information to combat the feeling of limited knowledge. The athlete’s psychological response to his or her injury was affected by the information available, the medical treatment, and the social consequences. Since the results of this study showed that the athletes did not receive the anticipated social support and information from the medical personnel, the injured athletes experienced feelings of frustration and sometimes depression. This study helps to
demonstrate how patient education could affect an injured athlete, specifically their mood state. Other studies have been conducted that address similar issues.

Udry, Gould, Bridges, and Beck (1997) found comparable results to Mainwaring (1999) when the authors performed a qualitative analysis to determine the psychological responses of twenty-one United States ski team athletes who endured season-ending injuries. Interviews of approximately 60 to 90 minutes in length were performed using an interview guide developed by the authors based on several sources in the sport injury psychology literature. One of the most common reaction of these athletes to season ending injuries was a theme labeled “injury-relevant information processing/awareness” (Udry et al., p. 234, ¶ 7). The authors explain that it is expected that athletes who are in pain would try to find out the extent of their injuries. Since it was important for any injured athlete to process the injury-relevant information before than can react emotionally, the differences in time the athletes took to process this information may account for the differences in emotional reactions. The theme was composed of four second order themes: (a) pain of injury and rehabilitation, (b) awareness of injury and injury extent, (c) questioning, and (d) recognized negative consequences. Within these second order themes, there was one related to patient education. The “awareness of injury and the injury extent” (Udry et al., p. 234, ¶ 7) second order theme was acknowledged by 80.9% of the athletes. The authors reported that this percentage included athletes who knew there was something wrong as well as those who were unaware of the seriousness of their injury.

Previous studies also have looked at particular components of patient education, specifically that of injury severity. Smith et al. (1993) used a prospective design to examine the differences in the severity of injury, gender, level of sport participation, and type of sports on the preinjury and postinjury differences in mood state. The authors examined 36 athletes from a
variety of sports who sustained an injury. The results of the study indicated that the severity of the injury was the only postinjury predictor of depression. In a similar study, Smith et al. (1990) showed comparable results. These authors found that athletes with the most serious injuries demonstrated the greatest mood disturbances. Likewise, Brewer et al. (1995) studied patients within a sports medicine facility in an attempt to determine the association between situational variables and emotional adjustment to athletic injuries. The authors determined that physician-rated injury status, impairment of sport performance, and social support were related to the emotional reactions of an injured athlete, specifically postinjury depression.

Health care practitioners should recognize that emotional reactions and mood disturbances are associated with an athletic injury. Determining the effects of patient education on the injured athlete, specifically on her or his mood state, may help health care practitioners determine a safe and appropriate manner in which to deliver the information. Examining the effects of patient education on an injured athlete’s mood state can be examined based on a comprehensive model that integrates many aspects of the psychological responses to injury.

Integrated Model of Psychological Response to Sport Injury and Rehabilitation Process

The psychology of sport injuries has become an increasingly popular topic within the research community. This popularity continues to rise as the number of injuries within athletic competition increases (Pargman, 1999). Research in this field amalgamates sports medicine and sport psychology literature and seeks to determine how an athletic injury affects an athlete (Heil, 2000). Although physical factors are the primary focus of athletic injuries, psychological factors can also play a role in how the injury is interpreted (Weinberg & Gould, 2003). Therefore, it is also important to understand both the psychology of sport injury and how psychological factors enhance or prevent the rehabilitation from an injury.
Pargman (1999) indicated there are four main concepts to explore when examining the psychology of athletes with injuries, including: (a) personality, (b) compliance, (c) self-concept, and (d) social factors. Personality of the athlete has been studied extensively within the literature, especially with respect to the relationship between trait and injury frequency and intensity. However, the relationships developed in the literature are not definitive (Pargman). The injured athlete’s compliance to a rehabilitation program is an area of research that is primarily subjective with little experimental evidence to support any of the findings (Pargman). Self-concept has been explored minimally with little conclusive findings. Since self-concept may fluctuate within a short time period, further research needs to be performed to determine the relationship between sport injury and self-concept at various time frames (Pargman). Lastly, social factors, such as positive and negative interactions with other individuals can greatly influence an athlete’s recovery from an injury (Pargman).

Feltz (1992) discussed the history of sports psychology and outlined three main time periods in the field. First, there was personality research, followed by social facilitation research, and lastly, the cognitive approach. The personality research dates back to 1950 to 1965 where researchers sought to develop a relationship between personality and athletic participation (Feltz). However, little research was valid because of methodological limitations. Therefore, research began to focus more on the social aspect of sport, specifically the testing of social-psychology theory and its relevance to motor skill (Feltz). However, due to the laboratory testing procedures, many of these studies had little generalizability to the athletic setting. Research then began to turn towards cognitive appraisal research that was mainly developed in the field setting. Much of the research during this time led to the development of the cognitive appraisal models,
including the integrated model of psychological response to sport injury and rehabilitation process (Wiese-Bjornstal et al., 1998).

When discussing the relationship between pain perception, patient education, and mood state, there is one model that provides an excellent theoretical framework to explore this association (see Figure 1). The integrated model of psychological response to sport injury and rehabilitation process (Wiese-Bjornstal et al., 1998) was developed to help explain psychosocial factors that can affect an injured athlete’s recovery. Understanding the components of the model and how they relate is important to understanding how this model was used as a theoretical framework for this study.

The Wiese-Bjornstal et al. (1998) model describes five aspects of the rehabilitation process that influence recovery outcomes. The personal factors are those intrinsic to the injured athlete. The situational factors are those that encompass the environment in which the injured athlete resides. According to the model, the personal and situational factors are related to the injured athlete’s cognitive appraisal, or how the injury is interpreted. Cognitive appraisal, emotional responses and behavioral responses are then in a recursive and reversible cycle that include various factors that affect recovery outcomes.

The component of the Wiese-Bjornstal et al. (1998) model most relevant to this study is the personal and situational factors, as well as the emotional responses. Within the personal and situational factors, the model lists various components of patient education (see Figure 1). Situational factors related to patient education include the sports medicine team influence and the rehabilitation environment. Included in the personal factors are injury type and severity. Although this is intrinsic to the individual, the education regarding the injury provided by the physician can affect the patient’s belief about the injury type and severity.
The athlete’s pain tolerance as well as the mood state of the athlete is also listed in the personal factor category. These baseline intrinsic factors could be affected by patient education provided by a physician. According to the model, the personal and situation factors including those that are a component of patient education, could affect the injured athlete’s cognitive appraisal of the injury.

Cognitive appraisal refers to how the athlete views his or her injury. According to the integrated model of psychological response to the sport injury and rehabilitation process, cognitive appraisals include goal adjustment, rate of perceived recovery, self-perceptions, beliefs and attributions, a sense of loss or relief, and cognitive coping strategies, all of which are related to the injury (Wiese-Bjornstal et al., 1998). The injured athlete’s cognitive appraisal then affects her or his emotional response to the injury as depicted in the Wiese-Bjornstal et al. model.

Emotional responses to an injury encompass those experienced by an athlete during the injury rehabilitation and how they change throughout various stages of the rehabilitation process (Brewer, 2001). Emotional responses specifically mentioned in the Wiese-Bjornstal et al. (1998) model include: fear of the unknown, tension, anger, and depression, frustration and boredom, positive outlook/attitude, grief, and emotional coping. It should be mentioned that many of these emotional responses are components of an individual’s mood state as measured by the Profile of Mood States (McNair et al., 1992). According to the integrated model, emotional responses are thought to affect the injured athlete’s behavioral responses.

Behavioral responses listed in the model include adherence to rehabilitation, use/disuse of social support, risk-taking behaviors, effort and intensity, malingering, and behavioral coping. These behavioral responses, according to the model, cycle back to the injured athlete’s cognitive
appraisal of the injury completing the cycle that leads to factors that affect both psychosocial and physical recovery.

The Wiese-Bjornstal et al. (1998) model is recursive and reversible; responses and outcomes may influence cognitive appraisals (Wiese-Bjornstal, et al.). Wiese-Bjornstal et al. mentioned the cycle should be viewed as a three-dimensional spiral moving in an upward direction. If the rehabilitation outcomes are positive they will lead to physical and psychosocial recovery from the injury. Conversely, if the rehabilitation outcomes are negative, they spiral downward causing delay in the recovery.

It is possible to use this specific cognitive appraisal model to hypothesize how patient education could affect an injured athlete’s recovery. Since decreased pain perception and improved mood state are important to a full recovery from an athletic injury, it is important to determine if patient education affects these components of recovery.

*Theoretical Framework for Patient Education Affecting Pain Perception and Mood States*

The Wiese-Bjornstal et al. (1998) model can serve as an excellent theoretical framework to explain how patient education could affect an injured athlete’s pain perception or mood state. When discussing how patient education can have an affect on an injured athlete’s pain perception, it is important to understand two concepts: (a) one’s pain tolerance, a subjective and emotional experience, is a personal factor that affects an injured athlete’s cognitive appraisal of the injury; and (b) diminished pain is a crucial aspect of recovery that is a component of the rehabilitation end result. When looking at the effect of patient education on mood state, the model links components of patient education and the elements of mood states listed in the model under emotional factors, such as depression, tension, and anger. These concepts help to demonstrate the hypothesized link between patient education and pain perception or mood states.
As mentioned previously, the integrated model of psychological response to the sport injury and rehabilitation process has listed many personal and situational factors that affect an injured athlete’s recovery outcomes. Personal factors listed in the model include both the individual’s pain tolerance. Personal factors related to patient education are injury severity, type, perceived cause, and recovery status. Since both pain perception and patient education are considered to have an effect on cognitive appraisals of the injury, it is possible that patient education could affect pain perception.

Injured athletes often gauge their injury and subsequent healing by the pain experienced. As previously mentioned, the Wiese-Bjornstal et al. (1998) model infers that patient education can affect cognitive appraisal of an injury which can decrease pain perception. Part of the influences of the sports medicine team is educating the athlete about the injury and rehabilitation. Such information may help the athlete cope with the injury or feel more optimistic about recovery, leading to a decrease in pain perception. Therefore, it can be hypothesized that patient education will decrease the pain experienced by the injured athlete.

Additionally, mood states are part of the emotional response within the integrated model. If patient education can lead to a more positive cognitive appraisal of injury, then pain may also be positively affected by mood states. Thus, it can also be hypothesized that patient education can improve the mood states of the injured athlete. However, this pathway of personal and situation factors affecting emotional responses via the cognitive appraisal has not been examined comprehensively.

Conclusion

Patient education may have an effect on an injured athlete’s pain perception and mood state, but has not been previously addressed in the literature. Understanding the effects of patient
education on pain perception and mood states can assist medical professionals in determining the appropriate use of patient education during the rehabilitation process. This study will address three specific aspects (patient education, pain perception, and mood states) of integrated model of psychological response to sport injury and rehabilitation process and how they interact, specifically the effects of patient education on injured athlete’s pain perception and mood state.
METHOD

Design

A multivariate experimental research design was implemented for this study. Participants seeking medical advice from a sports medicine doctor regarding their injury were recruited at the Levy Elliott Sports Medicine Clinic in Burlington, ON, Canada (see Appendix A). Permission was obtained from the physician/owner of the Levy Elliott Sports Medicine Clinic to perform this study. The Bowling Green State University Human Subjects Review Board granted permission to conduct the experiment. Informed consent from participants was obtained before participation was allowed (see Appendix B).

Participants

An overall sample of 40 participants, with 20 in each of the control and experimental group participated in the study. This number was chosen based on the sample size suggested by Tabachnick and Fidell (2001). Tabachnick and Fidell indicated when performing a MANOVA, there should be more participants that dependent variables in every cell. The mean age of the participants was 42 ± 24 years. Genders of the participants consisted of 47.5% females and 52.5% males. Ethnic origin consisted of 95% Caucasian, 2.5% Black, and 2.5% Other.

Instrumentation

Demographic and Injury History Information

Demographic and injury history information was gathered from the participants via a questionnaire (see Appendix C). The questionnaire inquired about the participant’s age, gender and ethnicity, the description of the injury, previous injuries sustained, the sporting event in which the injury was sustained, and the expectations from the visit.
Profile of Mood States (POMS)

The POMS is a vital tool for assessing mood state in an injured athlete (McNair et al., 1992). The Short Form Profile of Mood States (SF-POMS) was used to assess the participant’s mood state. The SF-POMS was administered instead of the regular length POMS because the shorter time period required to take the test was required for the repeated measures design and the shortened time frame in which participants had to take the surveys. The SF-POMS has been found to be both reliable and valid (McNair et al.).

The SF-POMS is a 30-adjective questionnaire with a 5-point Likert type rating scale ranging from 0 (not at all) to 4 (extremely) (McNair et al., 1992). The SF-POMS measured six mood states: Tension-Anxiety (T), Depression-Dejection (D), Anger-Hostility (A), Vigor-Activity (V), Fatigue-Inertia (F), and Confusion-Bewilderment (C) (McNair et al.). Each scale (representing tension, depression, anger, fatigue, confusion, and vigor) has an equal number of adjectives that are summed to give a total score for the scale. Summing the score for tension, depression, anger, fatigue, as well as confusion, and subtracting the values for vigor (T + D + A + F + C – V = TMD) was used to calculate total mood disturbance (TMD) (McNair et al.).

Although typical instructions stated to choose the answer which best described feelings during the past week including the current day, success has been found with more temporal time periods such as “today,” “right now,” or “the past three minutes” (McNair et al., 1992). Participants were instructed to describe their current feelings (i.e., “right now”) each time the SF-POMS were administered. The SF-POMS was typically completed in 3 to 5 minutes.

McGill Pain Questionnaire (MPQ)

The MPQ, developed by Melzack (1975), was designed to provide a quantitative measure of an individual’s pain perception in terms of both intensity and quality of pain. This measure
uses groupings or categorical sets of words including sensory, affective, evaluative, and miscellaneous measures of pain (Melzack).

In this study, the Short-Form McGill Pain Questionnaire (SF-MPQ) was used to measure participant’s pain perception (see Appendix D). The SF-MPQ was developed to provide a solution for researchers who wished to acquire more information regarding a participant’s pain than simply intensity, but who had time restrictions such as with a repeated measures design (Melzack, 1987). The SF-MPQ provided an overall index of pain intensity through the use of three measures: the pain rating intensity (PRI), visual analogue scale (VAS), and present pain intensity (PPI).

The PRI was obtained by adding the sensory and affective scores (Melzack, 1987). Melzack and Wall (1983) described sensory qualities as words that express pain in terms of temporal, spatial, pressure, thermal, and other properties. Affective words describe the tension, fear, and autonomic properties experienced (Melzack & Wall). The SF-MPQ retains its usefulness as a measure of pain qualities, but has a smaller selection of words than the Long-Form McGill Pain Questionnaire (LF-MPQ) to determine sensory, affective, and total pain quality through the PRI. Words chosen from the LF-MPQ that were included in the SF-MPQ were those chosen 33% or more of the time when administering the LF-MPQ (Melzack). In a study by Melzack, the sensory, affective, and overall intensity score of the SF-MPQ correlated significantly with the major PRI of the LF-MPQ (coefficients varying between 0.67 and 0.90).

The VAS was adapted from other areas of research and used to measure pain intensity. A 10-centimeter long line, where one end represented no pain and the other end represented the worst pain, was used. An individual was asked to make a mark on the line that represented his or her pain intensity. A ruler was used to measure where the mark was located, and this distance
was used as an intensity unit. The advantages of this scale include: (a) its high sensitivity to small changes in pain perception; (b) its ability to measure intensity and relief; and (c) its ease of use and recurrent application possibilities, especially at frequent intervals. One disadvantage of this measure is that it reflects only a single dimension, pain intensity. For instance, when testing the effectiveness of an analgesic, the VAS indicates if pain decreased, but not what type of pain (e.g., burning) was specifically affected (Melzack & Wall, 1983).

The PPI is a number and word combination based on a pain intensity scale of values one to five. The value of the PPI was matched with the following words: (a) 1, mild; (b) 2, discomforting; (c) 3, distressing; (d) 4, horrible; and (e) 5, excruciating. The values were presented equal distance apart. The PPI was established to determine whether the patient has a propensity to rate pain either high or low (Melzack, 1975).

The instructions for the SF-MPQ questionnaire, as provided by Melzack, were as follows:

This questionnaire provides you with a list of words that describe some of the different qualities of pain. Please check those words that best describe the pain you feel at this instant, and indicate their intensity as none, mild, moderate, or severe. Check 0, or none, if the word does not describe your pain. Another way to indicate your pain intensity is the visual analogue scale, which is a horizontal line from no pain to worst pain. Make a small vertical line at the intensity level you think best describes your current pain. Finally, make a check beside the word in the vertical list of words that best describes your present pain intensity from mild to excruciating (Melzack, personal communication, June 26, 2004).
Scoring procedures for the SF-MPQ were established according to R. Melzack (personal communication, July 26, 2004). They are as follows:

1. The descriptor words consisted of both sensory and affective terms. Words 1 to 11 represented the sensory dimension of the pain experience, while words 12-15 corresponded with the affective dimension. The participant ranked the descriptors based on an intensity scale, with 0 = none, 1 = mild, 2 = moderate, and 3 = severe. The ranked values were then added; first words 1 to 11 to obtain only a sensory score, then words 12 to 15 to get an affective score. The final two numbers were added to obtain an overall score for the SF-MPQ.

2. The VAS, which utilizes a line 10 cm long, provided a quantitative measure of the patient’s pain intensity. This was calculated by measuring where the patient marked their pain intensity on the 10 cm line. The marking was measured from the left side of the line, indicated by the words no pain.

3. The PPI is another overall intensity score. The corresponding number associated with the PPI chosen was taken as the score.

Procedure

Upon arrival at the Levy-Elliott Sports Medicine Clinic, the principal investigator informed patients of the experiment and requested their participation in the study. The principle investigator used a set script during the recruitment process (see Appendix A). Participation in the study was limited to participants over the age of 18 who experienced a musculoskeletal injury. Participants referred to the sports medicine doctor by another physician were excluded from the study. Exclusionary questions, including the age of the potential participant and if the patient was referred to the clinic via another physician were incorporated into the script. All
participants who were eligible and agreed to participate were randomly assigned into either the experimental or control group. Random assignment was accomplished via a lottery system where participants were assigned to either the control or experimental group as indicated by a randomly pulled card.

Next, participants were asked to read and sign an informed consent document. Participants were then asked to complete the demographic questionnaire, the initial SF-MPQ to test for pain, and the initial SF-POMS, to test the mood state of the participants. Mood state was tested simultaneously with pain perception because of the noted psychological component associated with pain perception. Concurrent testing of pain perception and mood states helps to understand the emotions associated with the pain felt by injured athletes and to understand the emotional contributions to their pain.

After the participants completed the questionnaires, they were led into the physician’s office for the beginning of the consultation and the examination. The traditional physician routine for an examination included a history-taking session, a physical exam, and finally, the patient education component. The participating physician was informed of the testing procedures and agreed to follow the procedures. The physician was instructed on the required criteria for patient education as outlined by Danish (1986), which included:

1. The nature (diagnosis) of the injury and the medical reasons for initiating particular treatments
2. The goals of treatment
3. Details of medical procedures that will be performed
4. Possible sensations or side effects
5. Coping strategies for adjusting to the upcoming treatment
No formalized script was provided to the physician, as each injury assessed by the physician was different, thus, information provided to patients was specific to their injury. Due to the medical privacy act, the principal investigator could not be present to assess the accuracy in the physician’s patient education session. However, the physician was instructed to make sure all of the above mentioned patient education criteria outlined by Petitpas and Danish (1995) were met within the patient education session. The physician began the consultation with an initial history-taking session in which no information regarding injury diagnosis or severity was provided. Following this history-taking session, which was performed in the doctor’s office, the patients were brought to the examination room to be assessed by the physician. The physician assessed the patient while performing a physical examination of the injured body part and diagnosed the injury to determine the most appropriate plan for treatment. The physician then provided the patient with educational information regarding the injury.

The SF-MPQ and SF-POMS were administered a second time to participants, but at different times depending on whether the patient was in the experimental or control group (see Table 1). For the experimental group, the second assessment was administered after the patient received both the physical exam and education. For the control group, the second assessment was administered after the physical exam used to assess the injury but before the educational component of the physician visit. Therefore, the physician consultation was disrupted to administer the second round of questionnaires to the control group. This procedure allowed for the effects of patient education to be independently assessed while still controlling for all other aspects of the physician consultation, including the meeting with the physician and the effects of the physical examination during the consultation.
Table 1

Difference Between Questionnaire Completion Times for Participant Groups

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<tr>
<th>Group</th>
<th>Before Consultation</th>
<th>History</th>
<th>Physical Exam</th>
<th>Patient Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Statistical Analysis

A 2 (treatment group) x 2 (time) multivariate analysis of variance (MANOVA) with one between group factor (treatment group) and one within-group factor (time) was used to determine the effect of these factors on the four dependent variables PRI, VAS, PPI, and TMD. Univariate post hoc analyses were performed on the individual dependent variables to determine the nature of any significant global MANOVA tests.

A baseline MANOVA was performed to determine if significant differences were present between groups after the initial test questionnaires were given. In addition, post hoc pretest and posttest MANOVAs were performed to determine if there were differences between participants with acute injuries and participants with chronic injuries, as well as between participants who had previously experienced an injury to the same body part and those who had not. An a-priori alpha level of 0.05 was used to determine significance.
RESULTS

Descriptive Data

Descriptive statistics, including the means and standard deviations of the SF-POMS and SF-MPQ scores are reported in Appendix E. The participants in this study had a variety of injuries. Participants reported their injuries as follows: 40% knee injuries, 15% foot (ankle, feet, arch), 10% shoulder, 7.5% elbow, 7.5% back, 5% leg, 5% hip, 2.5% arm, and 7.5% not determinable from the data provided by the participants. According to the data, 60% of the participants had not injured this area previously, while 40% reported they had previously injured this area. Within the control group, 50% of the participants were in the acute pain phase (pain has lasted less than three months), 40% of the participants were in the chronic pain phase (pain has lasted more than three months), and 10% did not report a time period. The experimental group had similar results, with 45% of the participants within the acute pain phase, 50% in the chronic pain phase, and 5% not reporting a time period.

Preliminary Analysis

The baseline MANOVA omnibus test indicated there was no significant difference between groups on the four dependent measures (PRI, VAS, PPI, TMD) after the initial questionnaires were given ($F(4,35) = 1.14, p = .354$).

Hypothesis Test

The MANOVA indicated there was no main effect for groups ($F(4,35) = 2.24, p = .085$). However, power estimates were moderate for the main effect of groups (1- $\beta = .595$). There was a significant main effect for time ($F(4,35) = 5.18, p = .002$) with an effect size of $\eta^2 = 37.2\%$. Post hoc univariate analyses for the main effect of time indicated the PRI on the MPQ ($F(1,38) = 13.30, p = .001$) and the TMD on the POMS ($F(1,38) = 9.70, p = .004$) were the only two
significant univariate measures. Specifically, scores for the PRI score decreased, indicating the patient’s perception of their pain diminished. The significant findings for the TMD indicated the scores also decreased. This demonstrated an improvement in mood state from pretest to posttest.

More importantly, there was no interaction effect for group vs. time \( (F(4,35) = 1.17, p = .340) \) which indicated there was no significant effect with respect to changes in pain perception or mood state due to patient education. However, power estimates for the group by time interaction were low \( (1 - \beta = .328) \). See global MANOVA omnibus results in Appendix F.

**Additional Post Hoc Testing**

MANOVA results revealed that there was no significant difference between the acute and chronic pain group pretest scores \( (F(8,68) = 1.72, p = .109) \). There was also no significant difference between acute and chronic pain group posttest scores \( (F(8,68) = 1.63, p = .134) \). Additionally, there was no significant difference between participants who previously injured the affected body part and those who had not previously injured the affected body part with respect to their pretest scores \( (F(4,35) = .450, p = .772) \). Additionally, there was no significant difference between those previously injured and those who had not previously injured the affected body part with respect to their pretest scores \( (F(4,35) = .637, p = .640) \).
DISCUSSION

The purpose of this study was to examine the influence of patient education on the pain perception and mood states of injured athletes. It was hypothesized that there would be a significant difference in the change of perceived pain or mood states between the control group, which did not receive patient education between pre and posttest conditions, and the experimental group, which received patient education between pre and posttest conditions. However, the results indicated there were no statistically significant differences in pain perception or mood state between the control and experimental group. Present findings in this sample suggest that patient education may not affect the injured athlete’s pain perception or mood state. There was, however, a significant main effect for time indicating that differences in group scores from pretest to posttest played a role in obtaining the significant global effect for time.

There are many possible interpretations of the results. The stage of rehabilitation, the participant’s own interpretation of the injury, and the effects of simply meeting with a health care professional, are all possible reasons for the nonsignificant interaction effect for patient education. The results have important clinical applications within the medical community. Currently, there are no guidelines set by medical associations for providing patient education. Results of this study may be useful in helping the medical community begin to establish such procedures.

Interpretation of Results

The explanation of these results will focus on three probable conclusions. First, it is possible that patient education does not have an effect on the combination of pain perception or mood state variables in injured athletes during the beginning phases of rehabilitation; however,
there is the potential that an effect could exist later in the rehabilitation process. Second, it may be likely that cognitive appraisal, as presented in the integrated model (Wiese-Bjornstal et al., 1998), plays a significant role in mediating the effects of patient education on pain perception and mood state. Third, the interaction of patient education and simply meeting with a medical professional may have a more profound effect on the psychological aspects of injury than simply the informational content of patient education. These explanations will be more thoroughly explored in the following paragraphs.

*Stages of Rehabilitation*

Results of this study suggest that patient education may not affect pain perception or mood states at the beginning of rehabilitation. The participants in the study were only starting the process of seeking medical attention. Therefore, the participants had only begun gaining information regarding their injury, as this was the first physician they had consulted about the injury (participants were excluded if they were referred by another physician). Since the results of a study should only be generalized to the population studied, it may be a possibility that patients who are in later phases of rehabilitation could react to patient education differently than those in the beginning stages of rehabilitation.

As mentioned in the literature review, the role of the practitioner within the various stages of rehabilitation is not well defined. Brewer et al. (1999) indicated that during the initial interaction between the patient and practitioner, the practitioner is usually in a position of authority as he/she has the knowledge and information about the injury and the rehabilitation process. Brewer et al. recommended that patient education should be provided during this phase to restore the athlete’s sense of control over their injury. Alternatively, Petitpas and Danish (1995) established a four-phase psychological management protocol. The first phase of
rehabilitation is the rapport-building phase where emotional support is needed. It is not until the second phase that patient education becomes important, initiated only after a rapport is established with the injured athlete. This second phase helps to restore control over the injury for the athlete and lessens the fear and worry associated with the injury (Petitpas & Danish).

Although both Brewer et al. and Petitpas and Danish agree patient education helps to restore the patient’s sense of control over her or his injury, discrepancies in when the education should be provided further exemplifies the medical community’s lack of consensus of how patient education affects an injured athlete. It is possible that patient education could affect an injured athlete differently during various stages of rehabilitation.

With regards to the injured athlete’s mood states, research has indicated there are fluctuations in mood states throughout the rehabilitation process (Wiese-Bjornstal, 2001; Morrey et al., 1999). Wiese-Bjornstal reported that mood disturbances are elevated during the initial phases of rehabilitation. In a study performed by Morrey et al., postsurgical ACL patients had fluctuations in the mood disturbances throughout the rehabilitation. Initially after surgery, patient’s mood disturbances were significantly elevated. However, what has not yet been determined is whether the variability in mood states affects how the injured athlete perceives and is affected by patient education. It may be that patient education could have a different effect on the patient’s mood state depending on his or her current mood state. If the injured athlete’s mood state is fluctuating throughout the rehabilitation, patient education could potentially cause different effects in mood state during different phases limiting the ability to generalize these results to all phases of rehabilitation. It should be noted that participants in the study had a mean TMD of 10.10 for the control group and 6.45 for the experimental group. Normative data for an
adult population is 17.7 for the TMD (McNair & Heuchert, 2003). Therefore, the participants in this study had a slightly more improved mood state than the population norms.

Variability in mood state within the initial phases of rehabilitation could also be affected by whether the injury is in the acute or chronic pain phase. Patients suffering from chronic injuries tend to exhibit symptoms more directly associated with depression, while acute pain patients generally have higher anxiety levels (Craig, 1989). These symptoms associated with acute and chronic pain patients could occur during the initial phase of rehabilitation, which could alter the participant’s response to patient education.

According to the classifications of pain, acute pain is defined as persisting for less than three months, while chronic pain is defined as lasting over six months (Melzack & Wall, 1983; O’Hara, 1996). The initial questionnaire completed by the participants in this study included a question pertaining to the length of time they had been dealing with the injury. Within the control group, 50% of the participants were in the acute pain phase, 40% of the participants were in the chronic pain phase, and 10% did not report a time period. The experimental group had similar results, with 45% of the participants within the acute pain phase, 50% in the chronic pain phase, and 5% not reporting a time period. It is possible that results were affected in the study by the participant’s variability regarding acute versus chronic pain phases and the psychological differences associated with acute and chronic pain phases. However, post hoc analyses indicated that there was no difference in perceived pain or mood state between acute and chronic injury participants in either the pretest (p = .11) or posttest (p = .13) conditions. Within the literature, no studies have been performed to determine the effects of patient education with chronic versus acute pain as an independent variable.
**Effect of Cognitive Appraisal**

The second explanation for the results obtained in the present study deals with the possible influence of an athlete’s cognitive appraisal of his or her injury. According to the integrated model of psychological response to the sport injury and rehabilitation process, patient education could have an effect on pain perception or mood states, but this effect may be mediated by the injured athlete’s cognitive appraisal of the injury (Wiese-Bjornstal et al., 1998). Although this model was used to hypothesize that patient education could have an effect on pain perception and/or mood state, the mediation by cognitive appraisal was not a focus of this study. Therefore, it is possible that cognitive appraisal plays a significant role in how patient education affects an injured athlete’s pain perception and mood state.

Cognitive appraisal, with regards to an athletic injury, explains how the injured athlete interprets their injury. Cognitive appraisal can be affected by numerous factors, including cultural values, early experiences with previous pain and injury, and the meaning the individual attributes to the pain (Egan, 1987). This study did not control for the participant’s injury type or severity, nor did it control for whether the participant had suffered a previous injury to the same area or specific joint.

In the study performed by Johnston and Carroll (1998), the authors researched how previous injuries affected an injured athlete’s interpretation of a consultation with a medical professional. The results indicated that the injured athlete’s reactions to the information on injury severity provided by the medical professional was dependent on whether the athlete had sustained a previous injury. If an athlete had not sustained a prior injury, she/he felt relief and reassurance if the information given was similar to her or his own initial injury interpretation. If the information was not similar to her or his own appraisal of the situation before the
consultation, the athlete experienced shock and disbelief. However, if the athlete had previously sustained a similar injury, anxiety occurred when she/he were provided with the information regardless of how they interpreted their situation before the medical consultation. The injured athlete experienced anger, confusion, and anxiety when presented with information that was different than the previous recommendation concerning the injury diagnosis and treatment of her or his first experience with the injury. The authors concluded an injured athlete’s association with previous injuries and injury intensity may contribute to how he/she interprets the information provided by a medical professional. Since Egan (1987) stated that cognitive appraisal of an injury is affected by experiences with previous injury, it can be suggested that an athlete’s cognitive appraisal of the injury can influence how they are affected by patient education.

Some of the participants in this study had experienced a previous injury on the affected body part. In both the control and experimental groups, 40% of the participants experienced a previous injury to the affected body part while 60% had no previous injury to the affected body part. However, there was no question pertaining to whether the previous injury sustained was similar to the injury they were having assessed on that day. It is possible that mood state and pain perception of the participants who had a previous injury could have been affected by the previous experiences with that injury. In accordance with Johnston and Carroll (1998), these previous injuries could have had a profound affect on how patient education was interpreted and, therefore, could have altered the effects of patient education on mood state and pain perception. However, post hoc analyses indicated that there was no difference in perceived pain or mood state between participants who had previously injured the affected body part and those that did not in either the pretest ($p = .77$) or posttest ($p = .64$) conditions.
Another factor that is possibly related to the injured athlete’s cognitive appraisal of her/his injury is the severity of the injury. This includes the injured athlete’s own appraisal of the injury severity before the consultation with the physician as well as their interpretation of the information related to injury severity provided by the physician. In a study conducted by Smith et al. (1990), results indicated that severity of the injury affected mood disturbances associated with the injury. Specifically, the authors mentioned that higher mood disturbances were reported with more serious injuries. Similarly, Smith et al. (1993) reported that the severity of the injury was the only postinjury predictor of depression, a component of a patient’s mood state. If severity of the injury or the mood disturbances associated with it affected the injured athlete’s interpretation of their injury, this could possibly effect how patient education is perceived. Therefore, the injured athlete’s cognitive appraisal of the injury could influence the effects of the patient education.

Effect of the Patient and Practitioner Interaction

The last conclusion that will be discussed relates to the statistically significant difference for the main effect of time. This significant main effect was supported by a moderate effect size with 37.2% of the variance explained by the pretest and posttest condition. Specifically, the present pain index scores decreased ($p = .001$), showing a significant improvement in the injured athlete’s perception of the pain being experienced. The TMD score also decreased ($p = .004$), indicating an improved mood state.

The control group did not receive patient education between pre and posttest conditions, while the experimental group received patient education between pre and posttest conditions. The purpose of the control group was to compare against the intervention of patient education. The consultation with the doctor in the control group included previous history information and
assessment of the injury without any information regarding injury diagnosis or patient education. Based on the statistically significant main effect of time, it appears that simply consulting with a physician may affect both the MPQ PRI scores as well as the POMS TMD scores.

Melzack and Wall (1983) described patients who reported decreased pain or the complete cessation of pain when they received assurances from a qualified professional. The authors described two specific examples. First, a person who was suffering from abdominal pains ignored the pain until they learned of an individual who had stomach cancer. This may have caused the pain to worsen until they learned from a physician that there was no serious problem, after which the pain completely disappeared. In the second example, Melzack and Wall described a patient who was suffering from a severe toothache, where the symptoms completely disappeared after entering the dentist’s office. Melzack and Wall explained that often pain, such as in these examples, are a function of how the situation is construed by the patient. Specifically, when help is unavailable the patient fears the worse and the pain becomes intolerable. When they are able to get assistance the pain diminishes or even ceases all together. This reference is currently the only one concerning this topic within the literature.

Implications and Clinical Applications

It is important to acknowledge that investigations in this field are essential to both researchers and the medical professionals who directly impact the lives of athletes with an injury. Information from research regarding the effects of patient education should be provided to these professionals.

From a clinical standpoint, the results of this study are important as they may have an impact on how the medical profession views patient education. It is generally accepted that
health care practitioners view patient education as an important tool in effective rehabilitation. However, evidence supporting this view is scanty. The medical community should be better informed on how patient education may or may not affect the patient’s physical and psychological responses to injury because of the potential effects it could have on injured athlete and the subsequent rehabilitation.

Results of this study may be an initial step in providing insight for the appropriate use of patient education within the medical community. Suggestions on how these results can be used by medical professionals should be mentioned. Based on the main effect of time results, it appears there is some benefit simply in seeing a physician for a consultation regarding the injury. However, if medical professionals act with the knowledge that the educational information they provide to their patient will likely not affect the pain perception or mood state of the patient, the information they present or how the information is presented may be altered or omitted all together without concern for how it affects either of these variables. Alteration or omission of educational information to patients in a clinical setting should not be attempted until definitive information can be established.

Limitations and Recommendations for Future Research

Four limitations to this study could have affected the results and are outlined below. Future research in this field should work to build on this study and ensure these limitations are addressed. First, the lack of statistical power in the results indicated the sample size was not sufficient to detect an overall main effect for groups and the group by time interaction, thus leading to the possibility of a type II error.

Second, cognitive appraisal could be an important mediating factor for the effect of patient education on pain perception and mood states; however, the cognitive appraisal of the
injured participants was not a focus of this study. The Wiese-Bjornstal et al. (1998) model indicates that cognitive appraisal mediates the effects of personal and situational factors on the emotional responses of an injured athlete and may ultimately affect their recovery. The model lists six possible factors that could influence this cognitive appraisal, including goal adjustment, rate of perceived recovery, self-perceptions, beliefs and attributions, sense of loss or relief, and finally, cognitive coping. Therefore, based on these factors and the model, cognitive appraisal could play a more significant role regarding the effect of patient education on pain perception and mood states. Future studies should examine how the cognitive appraisal of the injured athlete affects their reactions to the patient education provided.

Third, variations with regards to injury type and severity may have to be controlled in future studies. This study’s design allowed for patients with a variety of injury types and severity to be participants. Differences in injury severity could have confounded the results. For example, an individual with a severe injury could interpret the injury more negatively than another patient with a less severe injury. Patient education may differentially affect pain perception and mood state based on differences in injury type and severity.

Fourth, the study was limited to the effect of patient education within the physicians consultation and while the participant was in the office. It is possible that after the patient had time to process the information, there may have been an affect of patient education on either pain perception or mood states. Future studies may continue the repeated measure design and follow-up with the participant after they have left the office, possibly days or weeks after the consultation.
Conclusion

This study was the first of its kind that examined the effects of patient education on pain perception and mood states. Results indicated that patient education did not significantly alter pain perception and mood states. Further research on the effects of patient education is necessary because this topic has important clinical applications within the medical community and for the patients they serve. Procedures for providing patient education are being implemented without any valid data to support the use of patient education. Results of this study provided additional information towards knowing the appropriate manner and when might be the optimal time to deliver patient education for the purpose of decreasing pain and improving mood states of injured athletes. Therefore, it is important to promote and advance research in this field until more definitive conclusions can be reached.
REFERENCES


APPENDIX A. SCRIPT FOR RECRUITING PARTICIPANTS

"I would like to invite you to participate in a research study conducted by myself, Jessica Price, a master's student in Developmental Kinesiology at Bowling Green State University. You were selected as a possible participant in this study because of your decision to seek medical advice regarding your present injury. May I inquire if you are over the age of 18? (If yes, continue). Was this injury incurred in a sporting and/or physical activity event? (If yes, continue). I hope to learn more about the impact of medical consultations on injured athletes.

Your participation will require you to complete 5 short questionnaires during your visit with our physician. The first questionnaire will take approximately 2 to 5 minutes to complete. The remaining two combinations of questionnaires will require about 5 to 10 minutes each to complete while you are waiting for the physician. Any information obtained for use in this study will remain confidential. Participation in this study is voluntary and your decision to participate or not to participate will have no impact on the care or services you receive at the Levy-Elliott Sports Medicine Clinic. Would you be interested in being a participant in the study?"

"If yes, will you please read this letter of consent carefully and sign. You are welcome to ask any questions before you sign it consenting to participation in the research experiment."
APPENDIX B. LETTER OF INFORMED CONSENT

Dear Prospective Participant,

You are invited to participate in a research study conducted by Jessica Price, a graduate student from Human Movement, Sport, and Leisure Studies at Bowling Green State University in Bowling Green, Ohio. This study will contribute to my completion of a Master’s of Education degree in Developmental Kinesiology. I hope to learn more about the impact of medical consultations on injured athletes. It is my intention to use this information to help health care providers make informed decisions regarding the management of athletic injuries. You were selected as a possible participant in this study because of your decision to seek medical advice regarding your present injury.

If you agree to participate, you will be required to fill out a demographic information sheet and two combinations of questionnaires over the course of your visit with the physician today while at the clinic. The demographic information sheet will take 2 to 5 minutes to complete, while the two questionnaires will require approximately 5 to 10 minutes each. Information obtained in this study will remain confidential through the use of coding procedures. Codes will be assigned to data collected and each individual participating will be referred to by their assigned code.

Your participation is voluntary and you may choose to withdraw from participation at any time without penalty. Decisions made concerning participation will not impact your visit to this clinic or by the physician in any way. It should be noted there are no foreseeable risks associated with participation in this study.

If you have any questions concerning this study, please feel free to contact Jessica Price at (419) 372-6900 or via email at priceja@bgnet.bgsu.edu at any time. You may also contact my advisor, Dr. David Stodden at (419) 372-6904 or dfstodd@bgnet.bgsu.edu. If you have questions about the conduct of this study or your rights as a research participant, you may contact the Chair of Bowling Green State University’s Human Subjects Review Board at (419) 372-7716 (hsrb@bgnet.bgsu.edu).

The Influence of an Injury-Related Patient Education on Pain Perception in Athletes

Your signature indicates that you have read and have been informed of the information provided above and that you agree to participate in the study. You will receive a copy of the above portion of this form to keep for your records.

Signature __________________________     Date ________________________

Print Name __________________________
APPENDIX C. DEMOGRAPHIC INFORMATION QUESTIONNAIRE

Please answer the following questions about yourself:

Gender:   M   F

Age:  ________________

Racial/Ethnic Group:   ____ Asian  
                        ____ Black  
                        ____ Caucasian  
                        ____ Native  
                        ____ Other, Please Specify, _____________________________

Have you injured this body part before?   YES  NO

When did the pain begin?          ___________ Months      _________ Days      _________ Hours

Briefly describe your injury: ______________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

In what sporting activity were you participating when your injury occurred? ________________

How long have you been participating in this particular sport? ___________________________

Have you taken any medication for this injury in the last 24 hours? If yes, what and when?
______________________________________________________________________________

What made you decide to seek medical advice regarding this injury? ______________________
______________________________________________________________________________

What are your expectations from this visit? __________________________________________
______________________________________________________________________________
______________________________________________________________________________

How long do you expect it will be before you can return to the sport and/or activity? ______
______________________________________________________________________________

List all of your previous sport-related injuries: ________________________________________
______________________________________________________________________________
### APPENDIX D. THE SHORT-FORM MCGILL PAIN QUESTIONNAIRE

<table>
<thead>
<tr>
<th>Pain Type</th>
<th>NONE</th>
<th>MILD</th>
<th>MOD</th>
<th>SEVERE</th>
</tr>
</thead>
<tbody>
<tr>
<td>THROBBING</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>SHOOTING</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>STABLING</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>SHARP</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>CRAMPING</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>GNAWING</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>HOT-BURNING</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>ACHING</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>HEAVY</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>TENDER</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>SPLITTING</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>TIRED-EXHAUSTING</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>SICKENING</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>FEARFUL</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
<tr>
<td>PUNISHING-CRUEL</td>
<td>0)</td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
</tr>
</tbody>
</table>

No Pain | Worst Pain Ever

PPI

0) NO PAIN
1) MILD
2) DISCOMFORTING
3) DISTRESSING
4) HORRIBLE
5) EXCRUCIATING
### APPENDIX E. DESCRIPTIVE STATISTICS FOR DEPENDENT VARIABLES

<table>
<thead>
<tr>
<th></th>
<th>Group</th>
<th>M</th>
<th>SD</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Pretest</th>
<th>Posttest</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pain Rating Index (MPQ)</strong></td>
<td>Control</td>
<td>9.40</td>
<td>7.80</td>
<td>6.93</td>
<td>6.07</td>
<td>20</td>
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<tr>
<td></td>
<td>Experimental</td>
<td>8.35</td>
<td>4.45</td>
<td>6.57</td>
<td>3.69</td>
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<tr>
<td><strong>Visual Analogue Scale (MPQ)</strong></td>
<td>Control</td>
<td>4.44</td>
<td>4.73</td>
<td>1.97</td>
<td>2.01</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>3.27</td>
<td>2.68</td>
<td>2.06</td>
<td>1.90</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Present Pain Intensity (MPQ)</strong></td>
<td>Control</td>
<td>1.45</td>
<td>1.50</td>
<td>1.05</td>
<td>0.95</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>1.35</td>
<td>1.20</td>
<td>0.93</td>
<td>0.89</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Mood Disturbance (POMS)</strong></td>
<td>Control</td>
<td>10.10</td>
<td>6.95</td>
<td>19.52</td>
<td>15.13</td>
<td>20</td>
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<td></td>
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<td>Experimental</td>
<td>6.45</td>
<td>-1.40</td>
<td>13.59</td>
<td>5.41</td>
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### APPENDIX F. GLOBAL MANOVA OMNIBUS RESULTS

<table>
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<tr>
<th>Effect</th>
<th>Test</th>
<th>Value</th>
<th>F</th>
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