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The difference in pain tolerance between NCAA Division 1-A male and female athletes

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The Difference in Pain Tolerance Between NCAA Division I-A Male and Female Athletes

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Chapter I

Introduction

In today's athletic world the time it takes an athlete to recover from an injury could affect not only the athlete's physical state but also their mental and emotional well-being. Many athletes depend on their athletic abilities to produce both livelihood and self-worth. Athletes rely heavily on athletic trainers and physicians to rehabilitate them and have them ready to play as soon as possible after an injury (Kotarba, 1983).

Some injuries are more difficult to tolerate than others due to the amount of pain that they can cause. The ability of an athlete to tolerate pain and their truthfulness when defining the amount of pain that they are feeling can aid them greatly during rehabilitation. Having a high pain tolerance may increase an athlete's recovery time (Fisher & Pen, 1994). According to a study done by Rosillo and Fogel (Melzack, 1985), if pain during

rehabilitation was disruptive or debilitating for an athlete the rehabilitation process was hindered. Whereas, if the amount of pain experienced during rehabilitation was low, the athlete had a higher rating of improvement during rehabilitation.

However, if an athlete is untruthful about the amount of pain they are experiencing during rehabilitation it could take them longer to recover. They will also have an increased risk of further injury to the affected area. Further injury can cause the athlete to need a longer period of time to recover causing an increase in physical, mental, and emotional hardship (Tajet-Foxell & Rose, 1995). If the medical staff has a better understanding of an athlete's pain tolerance they will be able to comprise the most efficient rehabilitation protocol for that athlete.

Purpose of the Study

The purpose of this study was to determine if there is a difference in pain tolerance between male and female NCAA Division I-A athletes. A better understanding of this difference may aid the athletic trainer in determining a proper rehabilitation protocol for a particular athlete.

Significance of the Study

This study is being conducted to determine the difference in pain tolerance between NCAA Division I-A male and female athletes. Having a better understanding of this difference may aid the athletic trainer in determining proper rehabilitation protocol for an athlete.

Hypothesis Studied

This study tested the following null-hypothesis: there will be no significant difference in pain tolerance between male and female NCAA Division I-A athletes.

Definitions

The following contains operational definitions and specific terminology used in this study:

Cryotherapy: The therapeutic application of any substance to the body that results in the withdrawal of heat from the body, thereby lowering tissue temperature.

Division I-A: A higher education institution that is a member of the National Collegiate Athletic Association and competes at their designated level of IA in football.

NCAA: National Collegiate Athletic Association. A private voluntary association of 900 members of higher education institutions sponsoring intercollegiate sports.

Pain: An unpleasant sensory and emotional experience arising from actual or potential tissue damage with sudden or slow onset of any intensity from mild to severe.

Pain Tolerance: The greatest intensity of noxious (harmful, damaging) stimulation an individual is able to tolerate.

Assumptions

1.During this study the subjects completed a questionnaire concerning allergies as well as contraindications to cold. It is assumed that each subject answered truthfully.

2.During this study each subject responded to the cold stimulus using a standardized pain scale. It is assumed that the subject completed the scale accurately without increasing or decreasing the amount of pain they are experiencing during the study.

3. It will be assumed that the number of subjects tested during this study was sufficient to establish a definite degree of external validity.

4. It is assumed that the pain theories used during this study are valid.

Limitations of the Study

1. This study did not represent all Division I-A sports. Therefore, the results are but generalizable to other sports.

2. The results of this study are not generalizable to NCAA athletes at other levels since the subject population included only NCAA Division I-A athletes.

3. The subjects were not differentiated by past experience with or previous number of ice immersion treatments. Therefore, adaptation may have had an affect on the results.

Chapter II

Review of the Literature

Injuries received during an athletic event are a normal and expected part of playing any sport. Some injuries are more difficult to tolerate than others due to the amount of pain that they can cause. The ability of an athlete to tolerate pain and their truthfulness when defining the amount of pain that they are feeling can aid them greatly during rehabilitation.

Pain and Pain Tolerance

There are many different ways to define the term pain. One possible definition is that pain is a specific sensation brought on by damage or the threat of damage (Bowsher, Frampton, & Wells, 1988). According to Meinhart and McCaffrey (1983) the definition of pain is as simple as, "whatever the experiencing person says it is, existing whenever he/she says it does". An operational definition found in Mosby's Medical Dictionary (1998) states that pain is an unpleasant sensory and emotional experience arising from actual or potential tissue damage with sudden or slow onset of any intensity from mild to severe.

There are two categories of pain, acute and chronic. Acute pain is short term and is usually associated with a well-defined cause. The trauma associated with acute pain is usually sudden and persists for a variable, short period of time and does not usually reoccur. Chronic pain differs in that it is generally not caused by a sudden trauma but by a slower onset over time. This type of pain will persist for long periods of time and will reoccur (Fisher & Pen, 1994).

There are two components of pain. One is the physical sensation which is first registered by the brain. The second is the psychological reaction to the sensation. The psychological reaction, in most cases, is the limiting factor in the continuation of activity associated with the feeling of pain (Davies & Hall, 1991).

According to Bowsher, Frampton, & Wells (1988), pain tolerance is defined as the greatest intensity of noxious (harmful, damaging) stimulation an individual can bear. Pain tolerance differs from person to person. It can even differ in the same person depending upon what type of condition they are under. Factors such as cultural background, motivation, and emotional significance of pain can alter ones tolerance levels.

Athlete's and Pain

A team's medical staff is responsible for conditioning, rehabilitating, and returning injured players as soon as possible. It can be difficult for an athletic trainer to know if an athlete is telling the truth about the level of pain they are experiencing. According to Kotarba, (1983) problems can arise when a critical audience starts to doubt statements of pain made by an athlete. A critical audience can include coaches, trainers, management, the press, and the public. They will accuse an athlete of verbally displaying a more agonizing level of suffering than actually exists. If the athlete is believed to be falsely claiming pain they are often discredited by others, including the medical staff. Some athletes falsely claim to have pain in order to be relieved of unbearable role expectations placed upon them. Another reason is to hopefully receive the secondary benefits that come with having severe pain. These benefits include the drugs that are given to decrease pain. Players can become physically addicted to these drugs needing them on a daily basis to function. They also use the drugs for recreational use instead of their intended purpose. The attention that an athlete receives while they are in pain is another benefit to exaggerating their level of pain. This attention comes

from the medical staff, coaches, and the press (Kotarba, 1983).

Some athletes with pain may not tell someone if they feel it will be critical or if the social and emotional costs from not telling far outweigh the perceived benefits from telling. These benefits include access to health care, sympathy, and help adjusting to everyday contingencies that may come with having the pain. The costs of pain disclosure can be overwhelming. Sometimes a critical audience elicits feelings of shame and guilt to the athlete. The sense of shame comes because they feel that if they are injured their talents are now thought of as being impaired. Feeling guilty about being injured or having pain is due to others blaming him/her for their pain problems. They feel as though they are letting down the team and that others see them as lazy or as having an inability to take the pain and pressure (Kotarba, 1983).

According to Kotarba (1983) a player's self-esteem can play a role in pain-tolerance. Often a player's perception of his/her athletic identity largely determines to what degree the injury or pain will limit their ability to play. If a player is secure within themselves and with their job they are more likely to reveal an injury or pain and be removed from play. They receive rehabilitation and resume

playing when the injury or pain has discontinued. An insecure player will not be as likely to reveal an injury or pain. If they do, they rely heavily on the team physicians and athletic trainers to get them back playing without missing any time. Their pain will not completely go away therefore, they will continue to play with discomfort. Furthermore, Rose and Tajet-Foxell(1995) conclude that some athletes such as professional ballet dancers are often reluctant to report their injuries for fear of losing the roles they have already been hired to play. Also they may fear being considered unreliable. The failure to report these injuries may result in additional compensatory injuries and increased severity of the original injury. If this occurs the athlete may need a longer period of time to recover.

Societies Role in Pain Tolerance

Society and sports culture can play a role in factoring an athlete's pain tolerance. According to Nixon (1996), both male and female athletes who have been seriously involved in sport at higher levels and for a longer time are likely to be more immersed in an athletic culture glorifying risk and minimizing pain and injury. Although in the male athletic culture, displaying toughness

is an important aspect of masculinization. Men are culturally conditioned to associate pain tolerance with masculinity while women are culturally conditioned to avoid pain (Fisher & Pen, 1994). Athletes, especially male, have a role cast upon them which dictates when and where it is acceptable for them to express feelings of pain (Starkey, 1993).

Prior Studies on the differences in Pain Tolerance

Prior studies on college athletes done by Nixon (1993 & 1996) show men and women did not significantly differ in sports pain tolerance, thresholds or likelihood of having played while hurt. Male and female athletes also show striking gender similarities in their willingness to expose themselves to physical risk and lack of reflection about the implications of playing with injury.

It has been found that athletes typically have a higher tolerance for pain than non-athletes (Davies & Hall, 1991). One possible reason for this may be that athletes have greater exposure to physical training and increased fitness. Athletes explore the relationship between extreme physical activity and pain experience in a way unlike and more often than the common person. These experiences give them a familiarity with the interface between physical

activity and the pain experience. This familiarity may give the athlete an understanding or perception of control over that interface (Rose & Tajet-Foxell, 1995).

Pain Tolerance and Rehabilitation

An athlete's ability to tolerate pain may determine the speed of their recovery (Fisher & Pen, 1994). Determining which gender may have a higher pain tolerance is one way to better understand the athlete being treated. Having a better understanding of the athlete's pain tolerance will aid in determining the proper rehabilitation protocol. This protocol can be modified as necessary.

Pain or the likelihood of pain can induce fear or feelings of perceived threat, which can decrease an athlete's pain tolerance during rehabilitation. This anticipation of pain, before a treatment, can interrupt or stop rehabilitation (Fisher & Pen, 1994). There are some techniques to aid in decreasing an athlete's fear of pain during rehabilitation. Discussing the possibility of pain, without talk of intensity, beforehand may decrease perceived fear and possibly increase tolerance (Knight, 1995). Another way to increase tolerance is to be sure the athlete has a high level of self-confidence in their ability to complete a task (Fisher & Pen, 1994). Giving

the athlete control of the treatment is another technique. This is done without really giving them total control. For example, ask the athlete if they can withstand a fifteen or a twenty-minute cryotherapy treatment (Knight, 1995).

According to Melzack (1985), Fogel and Rosillo conducted a study on improvements during rehabilitation compared with levels of pain. They reported males with high ratings of improvement in rehabilitation were associated more often with having low levels of pain. Females with low levels of reported pain had both high and low levels of improvement. With moderate improvements females reported high levels of pain.

In the above mentioned study the data shows that for both sexes pain generally acts in an overall fashion as a driving force to improve. However, the effects of pain as a drive were different in the sexes according to the subjects in this study. A persistent lack of drive may result eventually in a poor therapeutic outcome, particularly of a patients overall motivation for recovery is significantly reduced. In some female subjects pain appeared to be a hindering stimulus rather than a motivator for improvement. In these subjects low levels or a complete absence of pain appeared to allow them to direct their energies to improve during rehabilitation. For these

female subjects, when pain acted predominantly as a drive there was an overall therapeutic benefit from pain. Whereas, if the pain was disruptive or debilitating, the subjects were hindered therapeutically by its presence (Melzack, 1985).

Pain with Cryotherapy

When dealing with cryotherapy, especially ice water immersion treatments, pain is often experienced. The body part receiving the treatment will experience a series of sensations. Cold is the immediate sensation felt then within 5-60 seconds after immersion a deep aching pain will begin. After one minute of onset with cryotherapy, regardless of the application, the pain will begin to decrease followed by the pins and needles effect. With an ice water immersion numbness will occur after approximately nine minutes of immersion. The pain will continue in a cyclic fashion with continued immersion (Knight, 1995).

The possibility of tissue damage, due to the skin being exposed to such low temperatures, is often a concern when dealing with cryotherapy. Before tissue damage would occur skin would have to be cooled somewhere between -10 and -20 degrees Celsius. The skin can tolerate being frozen for four to seven minutes without experiencing

injury. Wilson and Goldman demonstrated that fingers often did not freeze when exposed to air temperatures of -10 to -15 degrees Celsius for periods of 45-60 minutes (Knight, 1995). Knight (1985) performed a study on twelve individuals and found that in all subjects no damaging effect was found following a 45-minute ice immersion in 1 degree Celsius ice water. Knight also found that immersion in 0-2 degrees Celsius ice water for 40-minutes did not result in injury. The normal temperature range used during an ice water immersion is 2-4 degrees Celsius.

An athlete may experience the sensation of pain while using certain therapeutic modalities, such as cryotherapy, during the rehabilitation process. Having a better understanding of an athlete's pain tolerance can aid in determining the proper rehabilitation protocol to return an athlete to play as soon as possible. The purpose of this study is to determine of there is a difference of pain tolerance between female and male athletes to aid in determining proper rehabilitation protocols.

Pain Scales

According to Jacox (1977), the Simple Descriptive Pain Scale is a standardized pain scale often used to determine an individual's level of pain. This pain scale reflects

the most basic approach to pain assessment and aids the researcher because of its ease in administration. Although like all pain scales of this type, there is a problem with words having different meanings for different people. This problem can be decreased by having the subject choose from a fewer number of categories. The Simple Descriptive Pain Scale offers only six categories with descriptive words including none, mild, moderate amount of pain, quite a lot of pain, very bad pain, and unbearable pain. These words are assigned a numerical value ranging from 0-5. Having a fewer number of choices gives a more reliable but less sensitive estimate of the level of pain being experienced by the subject (Jacox, 1977).

Chapter III

Research Design and Methodology

The following subjects, instrumentation, and procedures were used in this study to determine the difference in pain tolerance between NCAA Division IA male and female athletes.

Subjects:

The subjects for this study were twenty male and twenty female (N=40) NCAA Division I-A athletes between the ages of 18 and 23. The subjects were in good health and did not have an acute injury in the three weeks prior to testing. All subjects will have full confidentiality. They were assigned a number to reference data and only the examiner will have access to their names. The right to withdraw at any time for any reason without penalty was recognized throughout the entire study.

Instrumentation:

During this study a one-degree Celsius ice bath was used to decrease the temperature of the subject's hand in order to create the sensation of pain. The ice bath was measured with a digital thermometer to insure its

temperature. Time was kept on a digital *Timex Ironman* wrist watch. The subject's level of pain was measured using the Simple Descriptive Pain Scale (Appendix A)(2).

Procedure:

Prior to testing a short briefing between the examiner and the subject was held. During this briefing the subject filled out a questionnaire regarding their hypersensitivity and contraindications to cold (Appendix B). The subject also signed an informed consent agreement at this time (Appendix C). They were then taken to the testing site where they were seated and their entire non-dominant hand, up to their wrist at the radial styloid process, was submerged in a one-degree Celsius ice bath. The subjects kept their hand in an open position throughout the entire time of testing. After one minute of submersion the subject removed their hand from the ice bath and described the amount of pain they were feeling using the Simple Descriptive Pain Scale (Jacox, 1977). The subjects stayed in the testing area until the pain ended. Once the pain stopped they were released.

Chapter IV

Results

This study was done to determine the difference in pain tolerance between NCAA Division I-A male and female athletes.

Descriptive Data

A stratified random sample of 40 subjects (N=40), twenty healthy NCAA Division I-A male athletes and twenty healthy NCAA Division I-A female athletes, were acquired for this study. During the testing procedures, for reasons unrelated to the study, one male and one female subject withdrew from the study. Therefore, a sample of thirty-eight (N=38), nineteen male and nineteen female healthy NCAA Division I-A athletes, was used to determine the results of this study.

During this study the Simple Descriptive Pain Scale a standardized pain scale was used to determine the subject's pain tolerance. This scale has six levels of pain the subject could choose from to indicate their level of pain during the ice immersion. On this scale, anchor words such

as mild and moderate pain were assigned a numerical value to interpret the results (Jacox, 1977).

Analysis of Data

The pain scales of the NCAA Division I-A athletes were calculated using an Analysis of Variance Procedure (ANOVA). The analysis of variance, a standard t-test, was done using the Statistical Analysis System (SAS) computer program V6.03 (1998) for the IBM personal computer. The analysis showed the male athletes had a mean level of pain equal to 2.47. The female athletes showed to have a mean level of pain equal to 2.15.

General Findings

During the analysis a p-value of 0.4012 was found. This p-value is less than 0.05. This shows that there was no significant difference found during this study.

Null Hypothesis

Null Hypothesis: *There is no significant difference in pain tolerance between NCAA Division I-A male and female athletes.* Therefore, the null hypothesis in this study was failed to be rejected.

Chapter V

Discussion & Conclusion

The original purpose of this study was to determine if a difference in pain tolerance existed between NCAA Division I-A male and female athletes. The Null Hypothesis, which stated; there is no significant difference of pain tolerance between NCAA Division I-A male and female athletes, was failed to be rejected.

This finding disagrees with those of Davies and Hall (1991) who found men to have a higher tolerance for pain than women and agreed with the finding of Nixon (1996) who found no significant difference in pain tolerance between males and females. A possible reason for this difference in findings between this study and the study done by Davies and Hall (1991) may be the difference in subject type. Davies and Hall (1991) tested men and women whereas this study tested male and female athletes. According to the same study done by Davies and Hall (1991), athletes have a higher tolerance for pain than non-athletes.

Adaptation may be one possible influence on the finding in this study. According to Knight (1995), adaptation actually decreases the intensity of the pain during an ice immersion treatment. Most people adapt to the cold in the first or second session of ice immersion treatment and have little problem with pain after that (Knight, 1995).

Athletes also adapt to the temperature related discomfort associated with ice-water immersion. As the athlete is exposed to multiple immersion treatments, the reported level of discomfort is reduced (Starkey, 1993). It is uncommon for an athlete to even mention pain during an ice-water immersion treatment after having previously experienced at least one treatment (Knight, 1995).

The subjects in this study were not questioned on the number of previous ice-water immersions in which they had been exposed. It is possible that some of these athletes had been exposed to multiple ice-water immersions as it is, according to Knight (1995) one of the greatest rehabilitation techniques for acute joint sprains. Therefore, adaptation could have occurred and their level of pain would be less than what the level would be without previous exposure.

The difference in each individual definition and perception of pain is another possibility for the finding of this study. What one person perceives as a painful stimulus another may perceive as minor discomfort instead of painful. According to Starkey (1993) and Nixon (1996) these definitions can be culturally learned. Athletes, especially male, have a role cast upon them dictating when and where it is socially acceptable for them to show expressions of pain (Starkey, 1993).

These definitions can come from having experienced previous injury. A person's past experience will influence the pain perception of a current injury. If an injury or painful stimulus is potentially career threatening the pain reaction may be increased. Whereas, if an injury or painful stimulus is perceived as minor the athlete's pain reaction may be decreased (Starkey, 1993).

Practical Implications

In the researcher's opinion the finding of this study can be useful to an athletic trainer. Having a better understanding of an athlete's pain tolerance will aid the athletic trainer's approach during rehabilitation. Knowing that there is no significant difference in pain tolerance between NCAA Division IA male and female athletes allows

the athletic trainer to possibly determine the proper time, temperature, and level of difficulty at which a rehabilitation protocol should be set. Also the speed of recovery and amount of time necessary until the athlete can return to play can possibly be determined.

Future Research

This study failed to reject the Null-Hypothesis, which stated; there is no significant difference in pain tolerance between NCAA Division I-A male and female athletes. More research needs to be conducted considering the differences in pain tolerance between male and female athletes. A study conducted with the same basic methodology as this particular study but testing a larger number of subjects is recommended.

A possible study of interest may be to determine if there is a difference in pain tolerance between male and female athletes from different NCAA divisions. Including athletes from Divisions IA, IAA, IAAA, II, and III.

Another study of interest may be testing the pain tolerance of male and female athletes during rehabilitation for a common injury. Determine the amount of time it took the athlete to recover and return to play. Using these two findings, (pain tolerance and amount of time it took to

return to play) determine if an athlete with a higher pain tolerance was able to return to play faster than an athlete with a lower pain tolerance.

Determining if prior ice immersion treatments allow an athlete to have a higher tolerance for the pain induced by the treatment is another option for possible future research.

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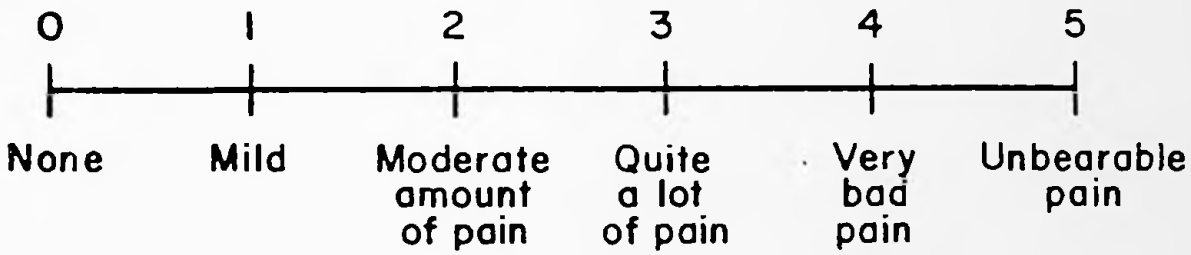
Appendix A

Gender_____

Number_____



Additional Comments:

Appendix B

#_____

Please read the following carefully and circle any conditions in which you have experienced. If you have any questions please ask me. Thank You.

Cold Hypersensitivity

Vasospastic Disorders

Cardiac Disorders

Circulation Problems

Uticaria

Raynaud's Disease

Hypothermia

Frostbite in Hand

Appendix C

Informed Consent Agreement

Project Title: The Difference in pain tolerance between male athletes and female athletes.

Purpose of the research: The purpose of this study is to determine the difference in pain tolerance between male and female athletes.

What you will do in this study: I will place my hand in a one degree Celsius ice bath. After one minute I will answer the pain scale.

Risks: I understand that if I have any hypersensitivity, allergies, or disease that contraindicates cold I may be at a risk for the respected side affects of my condition.

Confidentiality: The information obtained in this experiment will be kept confidential as the law and institutional policy allows. The information may be reviewed by appropriate Federal and State agencies as well as the Marshall University Institutional Review Board.

Voluntary Participation: My participation in this study is completely voluntary. There will be no penalty placed upon me for not participating.

Right to Withdraw: I have the right to withdraw from this study at anytime without penalty. I will inform the experimenter and leave the testing area.

Payment: I will receive no payment for participating in this study. In the event of injury or illness as direct result of participation in this research study, no compensation, financial or otherwise, will be available from the investigators or Marshall University.

Contact: If I have any questions, about this study, I may call Mollie K. Karabatsos at (304)529-1039 or Dr. R. Daniel Martin at (304)696-2412. If I have questions regarding my rights as a research subject, I may contact Dr. Henry Driscoll, IRB Chairperson, at 1542 Spring Valley Dr., Huntington, WV 25704 or phone (304)696-7320.

Initials_____

Agreement: I have read the consent form and understand the nature of this study. I agree to participate in the research study described above.

Signature: _____ **Date:** _____

Witness:_____ **Date:**_____

* You will receive a copy of this agreement for your records.

Abstract

How well an athlete tolerates pain may aid the athletic trainer in determining a proper rehabilitation protocol for the quickest recovery and return to play after an injury. The present investigation was conducted to determine if there is a difference in pain tolerance between NCAA Division I-A male and female athletes. The subjects consisted of nineteen healthy Division I-A male athletes and nineteen healthy Division I-A female athletes all between the ages of 18 and 23 (N=38). The subjects placed their hand, up to their styloid process, into a one - degree Celsius ice bath for one minute. After one minute the subject removed their hand and answered a pain scale. An analysis of variance (ANOVA) test was done using the SAS System on a personal computer to determine the difference in pain tolerance between the two groups. The data was presented as means and an alpha level of .05 was set. The ANOVA test revealed no statistically significant difference in pain tolerance when NCAA Division I-A male and female athletes are compared. Therefore, neither group showed a higher tolerance to pain when compared with the other.