

ATHLETIC TRAINERS' PERCEPTION OF INTERVAL/INTERMITTENT
TRAINING IN REHABILITATION

A THESIS

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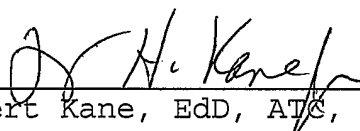
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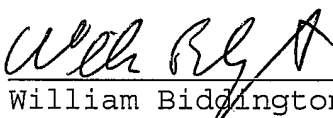
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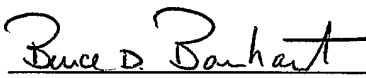
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INTRODUCTION

Various forms of high-and low-intensity intermittent and interval training techniques have been studied and documented to have some sort of effectiveness in general fitness training. The terms "interval" and "intermittent" have become synonymous¹ in that both have defined rest and work periods. What makes them different is that while interval training has "fixed" work and rest periods², intermittent training work and rest rates are more varied (i.e. a 10 second run at 100% intensity, then rest, followed by a 20 second run at 130% intensity)³. Both, however, have been shown to have beneficial effects on muscular strength gains^{4,5} and aerobic capacity^{3,6}.

But what about in rehabilitation? There is very little to no research that explores the effectiveness of interval/intermittent training methods in rehabilitation protocols or even if athletic trainers use interval/intermittent training methods in those protocols. Often the goals of rehabilitation include maintaining the athlete's current conditioning and returning the athlete is as good of condition as they were prior to injury. This

often means maintaining their current aerobic capacity (VO₂). Some goals also include muscular strength gains.

These two goals are benefits of interval/intermittent training methods. If the benefits of interval/intermittent training match the goals of rehabilitation then it makes sense that these training methods could be beneficial in rehabilitation. The purpose of this study is to discover if athletic trainers utilize interval/intermittent training methods in their rehabilitation protocols and if they do to, how do they use them.

METHODS

The primary purpose of this study was to discover if athletic trainers utilize interval or intermittent training in their rehabilitation protocols. This section includes the following subsections: research design, subjects, instruments, procedures, hypotheses, and data analysis.

Research Design

A descriptive design was used for this study. The independent variable was interval/intermittent training methods. The dependent variables were: athletic trainers' use of interval/intermittent training methods, how they used these methods (i.e. what kind of equipment did they use, what conditions they were treating using these methods, their goals for using interval/intermittent training methods, and what kind of timing/interval did they use), athletic trainers' perception of the benefits of interval/intermittent training in rehabilitation protocols, athletic trainers' familiarity of these training methods, and who used interval/intermittent training methods more-

athletic trainers' without additional certifications or athletic trainers with additional certifications (i.e. CSCS/CPT, PES, ACSM, EMT, etc.)

Subjects

Subjects included certified athletic trainers in District 2 of the National Athletic Trainers' Association (NATA), where N=952. District 2 encompasses athletic trainers located in Delaware, Pennsylvania, New Jersey, and New York. Informed consent was implied by the completion of the survey as well as stated prior to the start of the survey. The District 2 secretary distributed the survey via email with a cover letter (Appendix C1) and direct link to the survey (Appendix C2). The survey was completed online; this allowed for respondents' email addresses within District 2 to remain confidential.

Instrumentation

An original survey was created by the researcher to determine if athletic trainers are familiar with interval or intermittent training methods and if they utilize those methods in rehabilitation protocols. The survey consisted

of five questions (Appendix C2). One question asked demographic information to determine if athletic trainers are in a setting that allows them to perform rehabilitation protocols while another asks what other credentials the athletic trainer holds. The rest of the questions asked athletic trainer's opinions on interval/intermittent training in terms of rehabilitation: how familiar are they (athletic trainers) with interval/intermittent training methods, if athletic trainers believe these training methods could be beneficial in rehabilitation, if they have used it before in rehab, and if they think they would use interval/intermittent training methods in their rehab protocols in the future. Utilizing the online survey program, SurveyMonkey.com, the data obtained from the survey was automatically collected by Survey Monkey and placed into a spreadsheet format for further analysis.

Procedures

Prior to distribution of the survey, a review of the survey was conducted using a panel of five experts from California University of Pennsylvania. This panel reviewed the survey and provided suggestions for improvements. The panel included five certified athletic trainers from the

graduate athletic training program. The researcher then applied for and obtained Institutional Review Board (Appendix C3) approval at California University of Pennsylvania. Permission from the NATA District 2 secretary to distribute the survey was applied for and received (Appendix C4). The survey was distributed by District 2 officials to certified athletic trainers in District 2 of the National Athletic Trainers' Association (NATA) with a cover letter stating the risks, benefits, and what the purpose of the survey is, as well as informed consent. The researcher was not allowed access to the email list of athletic trainers within District 2, therefore, the surveys remained anonymous. Athletic trainers invited to complete the survey were given two weeks to complete the survey. A follow-up email (Appendix C5) was sent as a reminder for the athletic trainers at the beginning of the second week of the survey distribution period. It stated to athletic trainers that if they have already taken the survey, they do not need to take it again. After the two week period, the survey closed and Survey Monkey automatically calculated the results and placed them in a spread sheet that could be accessed in SPSS 16.0. Data analysis was performed after the two week distribution period.

Hypotheses

The following hypotheses are based off a review of the literature and the intuition of the researcher:

1. Certified Athletic Trainers will be shown to be vaguely familiar with interval/intermittent training methods.
2. The majority of certified athletic trainers will be shown to not use these training methods in their rehabilitation protocols.
3. Certified Athletic Trainers holding more than just the certification of an athletic trainer will be found to use these training methods in their rehabilitation protocols.
4. Certified Athletic Trainers holding a type of strength and conditioning credential will be found to use these interval/intermittent training methods.

Data Analysis

The level of significance was set as $\alpha \leq 0.05$.

Hypothesis 1: A 1 (athletic trainer response) X 4

(familiarity with interval/intermittent training methods-

Very Familiar, Vaguely-somewhat Familiar, Not Very Familiar, Interval-what?) Chi Square Goodness of Fit Test was used to determine the distribution of athletic trainers familiarity with interval/intermittent training methods.

Hypothesis 2: A descriptive analysis was performed to determine the percentage of athletic trainers who utilize interval/intermittent training methods in their rehabilitation protocols.

Hypothesis 3: A 2 (athletic trainer's use of interval/intermittent training methods in rehabilitation-yes/no) X 2 (athletic trainers' credentials- No Additional Credentials/ATC, Additional Credentials/ATC and other) Chi Square Test Of Independence was used to determine if athletic trainers with additional credentials were more likely to use interval/intermittent training methods.

Hypothesis 4: A 2 (athletic trainer's use of interval/intermittent training methods in rehabilitation-yes/no) X 2 (athletic trainers who have a fitness/strength and conditioning credential yes/no) Chi Square Test of Independence was used to determine if athletic trainers holding a type of strength and conditioning credential are

more likely to use interval/intermittent training methods in rehabilitation. If the athletic trainer held a credential from the ACSM, NSCA, or NASM or indicated that they held a personal training credential in the "other" category, then they were determined to have a "fitness/strength and conditioning credential".

RESULTS

The goal of this study was to determine if athletic trainers utilize interval/intermittent training techniques in rehabilitation and if they do, discover how they use these training techniques via survey. This section provides the results of the survey.

Demographic Information

Out of 952 surveys that were sent out, 131 certified athletic trainers responded, a 13.8% return. Of those certified athletic trainers that responded, 87% responded that they were in settings which allowed them to work with patients in terms of rehabilitation. The majority of those who responded work in a secondary (high school or middle school) setting at 37.12% or in a college setting at 32.6% of all responses. Other settings that the certified athletic trainers responded that they worked in included: academic appointments (program director/clinical instructor) at 4.54%, clinic (outpatient/Physical therapy/hospital) at 8.33%, professional sports at 3.79%,

clinical-high school at 5.30%, other clinical settings at 5.30%. Four athletic trainers responded that they worked in multiple settings (at 3.03%). The certified athletic trainers who responded had a mean of 11.6 ± 7.0 years of experience. Table 1 shows the distribution of athletic trainers' additional credentials.

Table 1. Distribution of Athletic Trainers' credentials

Credential	Frequency	Percentage
ACSM (CPT, HFS, CES, RCEP, CET, CIFT, PAPHS)	0	0%
NASM (PES, CES)	11	8.4%
NSCA (CSCS, CPT)	8	6.1%
PT/DPT	3	2.3%
PTA	2	1.5%
PA	1	0.8%
None	77	58.8%
Other	20	15.3%
More than 1 Additional Credential	9	6.9%

Hypothesis Testing

The following hypotheses were tested in this study. All hypotheses were tested with a level of significance set at $\alpha \leq 0.05$

Hypothesis 1: A 1 (athletic trainer response) X 4 (familiarity with interval/intermittent training methods-very familiar, vaguely-somewhat familiar, not very

familiar, interval-what?) Chi-Square goodness of fit test was used to determine the distribution of athletic trainers' familiarity with interval/intermittent training methods. A significant interaction was found ($X^2= 0.00$, $p < 0.05$) (see Table 2). 53.4% of athletic trainers that responded to the survey indicated that they were "vaguely-somewhat familiar" with interval/intermittent training methods.

Table 2. A 1 X 4 Chi Square Goodness of Fit Test to determine the distribution of athletic trainers' familiarity with interval/intermittent training methods.

Familiarity	Observed	Percentage	P Value
Very Familiar	43	32.8	0.00
Vaguely-Somewhat Familiar	70	53.4	
Not Very Familiar	15	11.6	
Interval-what?	3	2.2	

Hypothesis 2: A descriptive analysis was performed to determine the percentage of athletic trainers who utilize interval/intermittent training methods in their rehabilitations protocols. It was found that 44.3% of athletic trainers who responded to the survey have used interval/intermittent training methods in rehabilitation while 55.7% of athletic trainers did not. This supports the hypothesis two which stated that the majority of athletic trainers would not use interval/intermittent training methods in their rehabilitation protocols.

Hypothesis 3: A 2 (athletic trainer's use of interval/intermittent training methods in rehabilitation-yes/no) X 2 (Athletic Trainers' credentials- No Additional Credentials/ATC, Additional Credentials/ATC and other) Chi Square Test of Independence was used to determine if athletic trainers with additional credentials were more likely to use interval/intermittent training methods. No significant relationship was found ($X^2 = .069$, $p > 0.05$).

Hypothesis 4: A 2 (athletic trainer's use of interval/intermittent training methods in rehabilitation-yes/no) X 2 (athletic trainer's fitness/strength and conditioning credential- yes/no) Chi Square Test of Independence was used to determine if athletic trainers holding a type of strength and conditioning credential were more likely to use interval/intermittent training methods in rehabilitation. No significant relationship was found ($X^2 = .078$, $p > 0.05$).

Additional Findings

In addition to the hypothesis testing, athletic trainers were asked that if they used interval/intermittent training in their rehabilitation protocols to describe how

they used it. Appendix C6 lists the responses to these open-ended questions. Thirty-two point eight percent or 19 out of 58 athletic trainers mentioned that they used interval/intermittent training methods to rehabilitate ACL (anterior cruciate ligament) injuries. Other injuries that the athletic trainers responded that they treated using interval/intermittent training methods included: sprains, strains, stress fractures/stress reactions, anterior/lateral compartment syndrome, Achilles Tendon problems, hip labral tears, and shin splints (Appendix C6).

Most athletic trainers responded that the goal of the interval/intermittent training that they used were to "improve overall fitness", improve aerobic capacity, strength, endurance, and to prepare athletes to return to play. For goals that were not met, athletic trainers stated that it was due to poor patient compliance, pain, and no improvement in the patient/athlete's speed (Appendix C6).

Athletic trainers who utilized interval/intermittent training methods reported to use stationary bikes, treadmills, elliptical, slideboards, jump ropes, BOSU™, swiss/physio balls, tracks (400 m), medicine balls, weight machines, Pilates, swimming pools, Therabands™, plyo-boxes, Dynadisks™, kettlebells, versa climbers, BAPS board

(Biomechanical ankle platform system), etc (Appendix C6). The interval/intermittent training work: rest ratios that athletic trainers reported using were: 1:2 up to 1:5, 2:1 at 70% of HR max, fast/slow and high/low intensity, Tabata training (4 minutes of 20 seconds on/work followed by 10 seconds off/rest), and 3:1. Most did not specify the specific intensity/time interval/ rest: work/ work: rest ratio.

Athletic trainers were asked if they believed interval/intermittent training was beneficial and if so, why or why not. Of the athletic trainers who responded, 93.9% felt that these training methods are beneficial in rehabilitation protocols. The athletic trainers indicated which benefits they believed interval/intermittent training had on rehabilitation. Table 3 indicates the distribution of benefits of the athletic trainers' responses.

Table 3. Distribution of Benefits

Benefit	Frequency
Muscular Strength	70
Aerobic Capacity/VO2 Improvement	93
Balance/Coordination Improvement	46
Improved Proprioception	50
Muscular Endurance Improvement	94
Improved Speed	63
Improved Agility	54
Greater ROM	26
Improved Running/Walking Gait	26
Other	7

Athletic trainers also asked if they would ever use interval/intermittent training methods in their rehabilitation protocols in the future; 89.3% indicated that they would. They were asked to expand as to why they would or would not use the training methods; answers included, "they work", required limited amounts of time, it was more sport specific, and helped preventing de-conditioning of the athlete. A complete list of responses can be found in Appendix C6.

DISCUSSION

The following section included: 1) Discussion of Results, 2) Conclusions and 3) Recommendations.

Discussion of Results

This study focused on discovering if certified athletic trainers used interval/intermittent training methods in their rehabilitation protocols, and if they did, how. The primary findings of this study were that the majority of certified athletic trainers, at 55.7%, did not use interval training in their rehabilitation protocol. This supports hypothesis two.

In terms of hypothesis three, of the athletic trainers that did have an additional credential other than certified athletic trainer, 53.7% responded they did use interval/intermittent training while 46.3% did not. Of the athletic trainers that did not hold an additional credential, 37.7% did use interval/intermittent training while 62.3% did not. Of all athletic trainers that did respond to the survey, 22.1% of athletic trainers held an

additional credential and used interval training. Hypothesis three stated that certified athletic trainers holding more than just the certification of an athletic trainer will be found to use these training methods in their rehabilitation protocols. While this study did in fact find that 22.1% of athletic trainers that responded to the survey held an additional credential and used interval/intermittent training methods in rehabilitation, it is not considered to be significant given that $P=0.069$. It was also found that 22.1% of athletic trainers that responded to the survey did not have additional credentials but did use interval/intermittent training methods in rehabilitation. This is interesting because these results show that having an additional credential in general does not necessarily predict if the athletic trainer will use these training methods in rehabilitation.

In addition, this study found that of those athletic trainers that held a type of strength and conditioning credential, 58.6% responded that they do use these training methods in rehabilitation while 41.4 do not. Of the athletic trainers that do not hold a type of strength and conditioning credential, 40.2% responded that they do use these training methods while 59.8% do. Overall, 13% of all athletic trainers that responded both held a type of

strength and conditioning credential and used interval/intermittent training methods in rehabilitation. While this supports hypothesis three, it was not found to be significant because $P=.078$. It is important to note however that while the findings were found to not be significant, trends were still found. For example, 46.6% of all athletic trainers that responded to the survey did not hold a type of strength and conditioning credential and did not use interval/intermittent training methods. This makes sense because athletic trainers holding an additional strength and conditioning credential theoretically have more education in areas that include sport performance, improving fitness, strength training, etc., and interval/intermittent training methods fall into those areas, so those athletic trainers that do not have that additional credential are likely to not have that additional education and therefore would be less likely to use these training methods. It is also unexpected that this survey found that of all the athletic trainers that responded, the majority (at 31.3%) did not have an additional strength and conditioning credential but did use interval/intermittent training methods in their rehabilitation protocols. This means that having a type of strength and conditioning credential does not necessarily

predict whether an athletic trainer will or will not use these training methods.

The additional findings were especially interesting in this study. 32.8% of athletic trainers that responded to the question of what conditions they treated using interval/intermittent training responded that they treated ACL reconstruction surgery. When the researcher went back to the literature, there was no research indicating that ACL reconstruction surgery could benefit from this form of training method. Literature that indicated that interval/intermittent training showed benefits in gait training, or increase/improve ranges of motion was also very limited. There is some indication that interval training can be beneficial to sport specific proprioception. In a study using the Canadian Curling Team, Behm found that interval training was beneficial to decrease the proprioceptive fatigue the curlers experience during a game/match.⁷ Quite a few responses indicated that athletic trainers' have use interval/intermittent training in rehabilitation to help with the return to play process. This is supported by a study by Axe, Windley, and Snyder-Mackler. In their study, they found that interval throwing programs helped the return to play youth to college baseball players who suffered injuries.⁸

The data that was collected, though mostly insignificant, shows a need for further research. Interval/intermittent training methods can be a useful tool to athletic trainers who play an integral role in an athlete's rehabilitation process. It is important for athletic trainers to share ideas and methods so that rehabilitation never becomes stagnant.

Conclusions

After reviewing the results of the study, it is concluded that the majority of the surveyed athletic trainers are vaguely-somewhat familiar with interval/intermittent training methods. The majority of surveyed athletic trainers also did not utilize these training methods in their rehabilitation protocols.

While shown as insignificant, athletic trainers holding more than just the credential of an athletic trainer were found to utilize these training methods the same as those who do not have an additional credential. Athletic trainers who hold a type of strength and conditioning credential were not more likely to utilize these training methods than those athletic trainers who did not have the additional credential. However, those

athletic trainers that did not hold the additional strength and conditioning credential were less likely to utilize interval/intermittent training methods.

Recommendations

Further research recommendations for this study include determining if interval/intermittent training methods create beneficial effects in terms of gait training and improving joint ranges of motion. This would give valid support to those athletic trainers who responded to the survey indicating that these training methods benefited these areas of rehabilitation. Another possible area for additional research is to explore the validity that ACL reconstruction surgeries truly benefit from interval/intermittent training. It would also be beneficial to research the exact effects that interval/intermittent training has on proprioception and balance.

It is recommended that further education on the concepts of interval/intermittent training be introduced in entry level athletic training education programs and strength and conditioning classes.

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APPENDICES

APPENDIX A
Review of Literature

REVIEW OF LITERATURE

Introduction

Various strength and conditioning training techniques are used by active populations for a variety of reasons. These reasons, or goals, can vary from athletes wanting to improve performance to an untrained individual merely wanting to get in shape. Often, interval training or intermittent training techniques are used by active populations to achieve their goals. Research studies have documented the effectiveness of basic forms of interval¹⁻⁸ or intermittent⁹⁻¹⁵ training in areas of endurance and strength, however, research is limited in the use of interval/intermittent training methods in rehabilitation. The purpose of this review is to discuss the current research on interval and intermittent training methods and how they relate to rehabilitation. This will be accomplished by examining the research on interval training, intermittent training, and the effects each has on strength and aerobic capacity (VO₂).

Interval Training

Definition

Interval training can be defined as exercise that is performed during pre-determined amounts of time (fixed work rates), with set, or fixed, rest periods in between exercise bouts.^{1,2} For example, Berger et al. performed research using interval training methods. Subjects were divided into three groups: two training groups and one control group. One training group went through a continuous training program of 30 minute exercise bouts at 60% of their VO₂ peak. The other training group went through an interval training program of 20 one-minute exercise bouts at 90% of their VO₂ peak, each exercise bout separated by one-minute of rest. In this study, the defined fixed work rate for exercise was one minute and the fixed resting period was also one minute.

In an interval training study performed by Helgerud et al., four training groups were used, with two performing interval training. One interval training group had a fixed work and rest interval of 15 minutes each, while the second interval training group had a fixed work rate of 4 minutes and a fixed resting period of 3 minutes.³ It is the researcher's discretion to determine what the interval

resting and work rates will be. It is important to note that the difference between interval training and intermittent training is that interval training work and rest periods are consistent where as the training and rest periods during intermittent training can be varied. A more thorough definition of intermittent training will be discussed later.

Effects on VO₂

In past studies, interval training has been shown to improve aerobic capacity (VO₂). Using untrained, healthy subjects, Dolgener et al. found the average improvement in the 1 mile run was higher for the interval training group in their study. Both their control group and interval training group exercised 3 days/week for 50 minutes/day. The control group participated in a continuous exercise regimen while the interval training group participated in 220 yard runs at maximum speeds with 220 yard walks in between.⁴ In a separate study, it was stated that in well trained cyclists, increases or improvements in ventilation thresholds, time trials, VO₂ peaks, and resting levels of pulmonary ventilation were found with the use of varied types of interval training⁵.

Using moderately trained male athletes, Helgerud et al. found that the two interval training groups were shown to have greater improvements in VO₂ compared to the continuous training groups. One interval training group exercised at a 15/15 interval: 15 seconds of running at 90-95% of their heart rate max, followed by 15 seconds of walking (recovery). The other interval training group exercised at a 4-minute interval: 4 minutes of running at 90-95% of their heart rate max followed by 3 minutes of walking (recovery), done 4 times. In conclusion, it seems as though no matter how long the specific interval, interval training in general affects positively on VO₂.

Effects on Strength

While studies are limited, some research does support the idea that interval training can be used in resistive training resulting in improved strength gains. In a study by Burest et al., 12 untrained men were divided into two different interval groups. Group 1 exercised at a 1 minute rest interval while group 2 exercised at a 2.5 minute rest interval. Each group exercised for 10 weeks with both groups participating in a resistive training program that consisted of 3 sets. The intensity was set to where the third set resulted in failure. Initially, group 1 showed

greater improvements, but by the end of the 10 weeks of training the difference disappeared. Both groups showed similar decreases in fat-mass and increases in lean body mass. In another study, 20 firemen participated in a 10 week interval running and circuit weight training program⁷. Significant changes in body composition and strength were found which had the potential to decrease fire department recruitment dropout rates.

Increases in strength using interval training had not been limited to males. In a study by Hill-Haas et al, women were also found to improve in strength gains. 18 women were randomly assigned a group. Group one participated in a resistive training program with 20 second rest intervals, and group 2 participated in resistive training with 80 second rest intervals. The results showed greater improvements in strength in group one.⁸

While studies are limited in their scope of research in regards to strength gains and the use of interval training, there are a few studies that have shown basic improvements in untrained men and women. Further research is necessary to determine if interval training is effective for trained individuals or elite athletes.

Intermittent Training

Definition

Intermittent training is often interchanged with interval training⁹. Both are alike in that the actual configuration (intensity, mode, duration, etc) is to the researcher's discretion. There are no predefined boundaries or values to which intermittent or interval training are performed. Also, both consist of a rest period and a work period (time in which exercise is performed).

Though very similar in nature, intermittent training is more varied in its structure. While interval training consists of fixed work rates and resting intervals (specific "start" and "stop" times) intermittent training often has varied worked rates at varying intensities. For example, in a study by Nourry et al., the work rate consisted of run periods that lasted 10 or 20 seconds with intensities varying from 100% to 130% of the participant's maximum aerobic speed. The maximum aerobic speed was determined by a 20 meter shuttle run test that the participant ran prior to training¹⁰.

Intermittent training is also considered to be more sport-specific in nature compared to interval training. Sports like soccer and hockey, where athletes usually never

start and stop at specific times, are considered more intermittent in nature^{11,12}. For example, during a soccer game, it is not likely that a soccer player will run at 90% of their maximum aerobic capacity (or sprint) for one minute and jog (or rest) for two minutes and repeat that process (i.e. interval training). It is more likely that a soccer player may sprint for 30 seconds, stop for 10, jog for 20 seconds, and go back to a sprint for 15 seconds (i.e. intermittent training).

Effects on VO₂

Research has indicated that intermittent training can be effective in improving aerobic capacity (VO₂). Nourry et al. found that prepubescent childrens' pulmonary function was greatly improved in their intermittent test group as compared to their control, non-training group¹⁰. In a separate study, it was found that when subjects were put through a supra-maximal exercise regimen, VO₂ was improved as well and participants were able to exercise longer compared to the amount of time the participants were able to exercise prior to the exercise regiment¹³.

Effects on Strength

While there is not a lot of research indicating that strength is affected by intermittent training, it can be assumed that due to the similar characteristics between interval training and intermittent training, intermittent training may have similar effects on strength compared to interval training. In a systematic review on intensity, duration, and types of training that influenced strength gains, it was concluded that most studies of significance held that a frequency of 3 days/week with a wide range of intensities were all shown to produce increases in cross-sectional areas of muscle.¹⁴ Multiple sets of an exercise (more than 2) were also concluded to increase cross-sectional areas of muscle and therefore increase a subject's strength¹⁴. It can then be theorized that as long as the intermittent strength training consists of at least three days of training per week for at least two weeks and each exercise is performed with more than two sets at intensities closer to the subject's maximum repetition (1 RM), some sort of strength improvement will be made.

Overall Effectiveness of Interval/Intermittent Training

In general, interval/intermittent training has been found to be effective in improving sport performance¹⁶⁻¹⁸ as well as performance on the job^{7,19}. A study performed by Krusturp et al., indicated that sport specificity- training that closely resembles the actual sport- is important to improve performance. This was found especially important for sports like soccer; Krusturp et al. found that due to the high-intensity and intermittent nature of the sport, the training ought to reflect that same nature¹⁶.

Studies have also indicated that interval/intermittent training can be beneficial to other high-intensity or intermittent sports. For swimmers, interval training has shown to improve a swimmer's maximum aerobic speed¹⁷, overall work load, and VO₂¹⁷. Improvements in VO₂, ventilation thresholds, and time trials were found in well-trained cyclists who were put through an interval training program⁵.

Interval/intermittent training have also proved beneficial to the work force. As mentioned before, firemen who were put through an interval training regimen were found to have improved strength and body composition⁷. In a separate study by Marcinik et al., shipmen were divided

into two groups: group one consisted of a circuit/continuous running program while group two consisted of a circuit/interval running program. It was found that both improved the mens' fitness but in areas of certain muscular endurance, greater improvements were seen with the interval training program¹⁹.

Both interval training and intermittent training have been determined to be valid forms of training. Research has shown that both can produce desirable effects in regards to fitness and performance.

High Intensity versus Low Intensity Exercise

It is important to understand that different kinds of training can influence different kinds of changes, and therefore it is important to understand the kinds of changes that are trying to be influenced in this study. In terms of training, intensity can play a vital role in determining what kind of fitness is achieved (i.e. strength versus endurance). Studies vary their definitions as to what exactly determines an exercise as high or low intensity. One study determined a high intensity at 80-85% of the subject's VO₂ maximum and a low intensity at 45% of the subject's VO₂ maximum.²⁰ Other studies have determined

high-intensity exercise to be at 125-170% of a subject's VO₂ maximum^{13, 15} or 80-95% of a subject's heart rate maximum.³

No matter the specific definitions of high- and low-intensity exercise, it is generally agreed that high intensity exercise influences more of the body's anaerobic systems, and low-intensity exercise influences more of the body's aerobic energy systems.^{13, 15, 30} Research has also found that there is some cross over in regards to high- and low- intensity training. In a study performed by Tanaka and Swensen (1998), swimmers who performed a sport-specific resistive training (high intensity) program along with their swimming regimen (low intensity) were found to have improved their velocity in the water.²¹ The study also indicated that general resistive training in conjunction with aerobic training benefited performance with cyclists and runners.²¹

This crossover between anaerobic and aerobic energy systems is due to the fact that the body never shuts off one system completely when the other is being worked.^{22,23} Without going into an in-depth explanation into the physiology of the body and to put it simply, once the energy has been tapped out of the anaerobic energy system, the body then takes from the aerobic energy system or vice

versa.^{22,23,24} In this study, even though the training regiment is high-intensity in nature and therefore anaerobic, it is expected that there will be some cross over effect due to the mechanisms mentioned.

Interval/Intermittent Training and Rehabilitation

Interval or intermittent training methods are not well documented in rehabilitation protocols. This could be due to the fact that often, rehabilitation protocols are up to the health care practitioner's- physical therapists, athletic trainers, etc- imagination or creativity. This makes it hard to document all of the rehabilitation exercises or protocols that athletic trainers use, especially when often exercises that are documented are called different things in different regions.

While there remains little documentation or evidence of interval/intermittent training methods in rehabilitation protocols, there is some evidence that interval/intermittent training can prevent injuries.²⁵ In one study on Australian football players, it was found that those who had participated in an aerobic interval training program sustained fewer hamstring tears than those who did not.²⁶ In another study performed with soccer players,

researchers found that the intermittent nature of soccer causes an increase in fatigue in the hamstrings due to the constant changes in speed and that eccentric strength is not reacquired during the resting state of the half time interval.²⁷ It was therefore suggested that eccentric hamstring strength at high speeds along with resistance exercises in a fashion that would resemble soccer specific and game specific patterns (i.e. a type of intermittent training) should be a part of the conditioning program for soccer players.²⁷

It is logical to think that if there is evidence that states that interval/intermittent training can prevent injury, then interval/intermittent training can be beneficial in rehabilitation. So the question of this study is this: if interval/intermittent training methods have been shown to have beneficial effects in strength and endurance training as well as beneficial effects in the prevention of some types of injuries, could interval/intermittent training methods also be beneficial in the treatment (i.e. in the rehabilitation) of injuries?

Summary

Research has shown that interval/intermittent training methods can be effective in terms of muscular strength gains^{6,7,14} and improvements in aerobic capacity^{4,5,10}. However, there is little to no evidence that explores if interval/intermittent training methods have been used in rehabilitation protocols.

From an athletic trainer's point of view, it is often the goal of later stages of rehabilitation to make sure that the athlete is as strong as they (the athlete) were prior to the injury, if not stronger or in better shape. This means that muscular strength gains and improved aerobic capacity are often sought. If the goals of rehabilitation are the same as the beneficial effects of interval/intermittent training, why not use these training methods in rehabilitation? It is therefore the purpose of this study to discover if athletic trainers utilize interval or intermittent training in their rehabilitation protocols.

APPENDIX B

The Problem

THE PROBLEM

Statement of the Problem

Various forms of high-and low-intensity intermittent training techniques have been studied and documented to have some sort of effectiveness in general fitness training. But what about in rehabilitation? There is very little to no research that explores the effectiveness of interval/intermittent training methods in rehabilitation protocols or even if athletic trainers use interval/intermittent training methods in those protocols. Often the goal of a rehabilitation protocol is to increase range of motion, increase muscular strength/endurance, etc. Interval/intermittent training methods have been shown to have beneficial effects in terms of muscular strength gains^{6,7,14} and improvements in aerobic capacity^{4,5,10}. So if interval/intermittent training methods have already been shown to have improvements in the same goals as rehabilitation, why not use interval/intermittent training methods in those protocols? That is the purpose of this study: to discover if athletic trainers use interval/intermittent training methods in their rehabilitation protocols and if so, how.

Definition of Terms

To have a better understanding of this study, it is necessary to operationally define some terms. These terms are used throughout the study and will be defined as they pertain to this study:

1. Untrained: individuals who have are not currently or just started training for less than two months.
2. Rehabilitation Protocol: prescribed exercises given to a patient/client/athlete to improve neuromuscular function after an injury
3. Strength: the maximal force a muscle/muscle group can generate at a specified velocity.²²
4. Aerobic Capacity: also known as $VO_2 \text{ max}$ (maximal oxygen uptake); the greatest amount of oxygen that can be used at the cellular level of the body. It is the most accepted and widely used measure of cardio-respiratory fitness. ²²

Basic Assumptions

The following are basic assumptions that the researcher is making:

1. Readers of this study have a basic knowledge of exercise physiology and energy systems.

2. The subjects will answer honestly and to the best of their knowledge.
3. The survey will have face validity after review by a panel of experts.
4. Subjects will not receive outside help from any other individual or from an outside source on any question.

Limitations of the Study

The following are possible limitations of the study:

1. The response rate of the survey could be low due to busy schedules of the athletic trainers.
2. As with all anonymous surveys, answers may not be answered honestly by the subjects.
3. Incorrect names or email addresses of certified athletic trainers could be included in the list serve.

Significance of the Problem

Athletic trainers should have basic knowledge of interval/intermittent training methods, however, whether they use-or thought to use- these methods is the question. Athletic trainers are always in search of new or different ways to make their rehabilitation protocols creative and less monotonous. Based off the intuition of the researcher, it is believed that most athletic trainers have not thought

to use interval/intermittent training methods in later stages of rehabilitation.

It is important to explore why athletic trainers have chosen to not use these methods because using interval/intermittent training methods can be useful and beneficial to the athlete. It is also important to explore how athletic trainers do use these training methods because for some, especially those newly certified, it may never cross their minds that interval/intermittent training methods can be used in rehabilitation. To put it simply, it is important to share ideas, especially good ideas. An athletic trainer can never have too many options in terms of ideas for rehabilitation.

APPENDIX C

Additional Methods

APPENDIX C1
Cover Letter



California University of Pennsylvania

2/25/2010

Dear Fellow Certified Athletic Trainer:

My name is Erin Schneider and I am currently a graduate student at California University of Pennsylvania pursuing a Master of Science in Athletic Training. Part of the graduate study curriculum is to complete a research thesis through conducting research. I am conducting survey research to determine if athletic trainers use interval or intermittent training techniques in their rehabilitation protocols. The goal of the information provided in the survey is to share ideas as to how other athletic trainers have used interval/intermittent training methods in their rehabilitation protocols.

Certified athletic trainers' in the National Athletic Trainers' Association District 2 are being asked to participate; however, your participation is voluntary and you do have the right to choose not to participate. You also have the right to discontinue participation at any time during the survey completion process at which time your data will be discarded. The California University of Pennsylvania Institutional Review Board has reviewed and approved this project. The approval is effective 03/04/10 and expires 03/04/11.

All survey responses are anonymous and will be kept confidential, and informed consent to use the data collected will be assumed upon return of the survey. Aggregate survey responses will be housed in a password protected file on the CalU campus. Minimal risk is posed by participating as a subject in this study. I ask that you please take this survey at your earliest convenience as it will take approximately 15 minutes to complete. If you have any questions regarding this project, please feel free to contact the primary researcher, Erin Schneider at sch5405@calu.edu. You can also contact the faculty advisor for this research, Dr. Robert Kane ATC, PT at 724-938-4562 or kane@calu.edu. Thanks in advance for your participation. Please click the following link to access the survey <http://www.surveymonkey.com/s/athletictrainersperspective>.

Thank you for taking the time to take part in my thesis research. I greatly appreciate your time and effort put into this task.

Sincerely,

Erin Schneider ATC, CSCS
Primary Researcher
California University of Pennsylvania
250 University Ave
California, PA 15419
(571)228-0886
Sch5405@calu.edu

Appendix C2

Interval/Intermittent Training Method Survey

1. Informed Consent

33%

Purpose of this study: to discover athletic trainers' perception of interval/intermittent training methods in rehabilitation protocols.

Procedure: You will be asked to answer a series of questions regarding your opinion on interval/intermittent training methods. No identifying characteristics will be asked of you.

Duration: 10-15 minutes

Confidentiality: Your participation as well as the information you provide in the survey will be kept confidential. All answers to the survey will be anonymous in that identifiers will not be used in the data collected. Your confidentiality will be kept to the degree permitted by the technology used. No guarantees can be made regarding the interception of data sent via the Internet by any third parties.

Right to ask questions: Please contact Erin Schneider at (571)228-0886 or at sch5405@calu.edu or Dr. Robert Kane at kane@calu.edu or at (724)938-4562 with any questions or concerns regarding the study.

Participation: Participation is completely voluntary. If you wish to not finish, or not answer any of the questions, simply close the browser. There will be no penalty for discontinuing participation in the study and the information you did provide will be discarded.

Risks and Benefits: There is no anticipated risk nor benefit to you by participation in this study.

It is implied that if you click NEXT, you have read the above information and are agreeing to the informed consent. If you DO NOT wish to participate in the study, simply close out of the browser.

2. Survey

67%

*

1. Are you in a setting that allows you to work with (in terms of rehabilitation) patients/clients/athletes?

- Yes
 No

*

2. Indicate which kind of setting you PRIMARILY work in:

- Secondary School (high school/middle school)
 College/University
 Dual Appointment (clinical/teaching)
 Academic appointment (i.e. Program director/ clinical coordinator, professor, etc)
 Occupational /Industrial/ Business
 Clinic (Outpatient/Physical Therapy/ Hospital)
 Professional Sports
 Youth Sports
 Military
 Clinical-High School
 Other (please specify)

*

3. How long have you been a Certified Athletic Trainer (ATC)?

In years

*

4. What other certifications do you have?

- ACSM NASM PTA PA None
 (CPT, (PES, CSCS/CPTPT/DPT
 HFS, CES, CES)
 RCEP,
 CET,
 CIFT,
 PAPHS)

Other (please specify)

*

5. How would you rank your familiarity with interval/intermittent training?

- Very familiar
 Vaguely-somewhat familiar
 Not very Familiar
 Interval-what?

*

6. Do you feel that interval/intermittent training can be beneficial in a rehabilitation protocol?

- Yes
 No

7. If you said "yes" please indicate which you feel is a potential benefit (Mark all that apply):

- Muscular strength gains
 Aerobic Capacity/VO2 improvement
 Balance/Coordination improvement
 Improved proprioception
 Muscular endurance improvements
 Improved speed
 Improved agility
 Greater Ranges of Motion
 Improved Running/Walking Gait

Other (please specify)

*

8. Have you used interval or intermittent training in a rehabilitation protocol?

- Yes
 No

If you said "yes" please answer questions 9-15. If you said "no" please skip to question 16.

9. What injury/condition(s) were you treating?

10. For each injury/condition that you listed, what was the goal of the rehabilitation protocol that utilized interval/intermittent training? (i.e. improving aerobic capacity/fitness, increase strength, increase ROM etc.)

11. For each condition, did you achieve the stated goal?

- Yes
 No

12. For each condition/injury that you did NOT achieve the stated goal, please describe why the goal was not achieved:

13. What kind(s) of equipment did you utilize in each case? (i.e. bike, BOSU, treadmill, swiss ball, etc.)

14. What kind of interval/intermittent training technique did you use in each case? (i.e. rest: work interval, intensity: time interval, etc)

15. What were the specifics of your interval/intermittent training technique that are not already mentioned above?

*

16. Do you feel you would ever use interval/intermittent training methods in your rehab protocols in the future?

Yes

No

Why or Why not?



Prev

Next

Appendix C3

Institutional Review Board



California University
of Pennsylvania

Proposal Number

Date Received

PROTOCOL for Research
Involving Human Subjects

Institutional Review Board (IRB) approval is required before
beginning any research and/or data collection involving human subjects

(Reference IRB Policies and Procedures for clarification)

Project Title *Athletic Trainers' Perspective of Interval/Intermittent Training in Rehabilitation*

Researcher/Project Director *Erin Schneider*

Phone # *571-228-0886*

E-mail Address *sch5405@calu.edu*

Faculty Sponsor (if required) *Dr. Robert Kane*

Department *Health Science*

Project Dates *January 1, 2010* to *December 1, 2010*

Sponsoring Agent (if applicable) _____

Project to be Conducted at *California University of Pennsylvania, Herron Hall*

Project Purpose: *Thesis* *Research* *Class Project* *Other*

Keep a copy of this form for your records.

Please attach a typed, detailed summary of your project AND complete items 2 through 6.

1. *Provide an overview of your project-proposal describing what you plan to do and how you will go about doing it. Include any hypothesis(es) or research questions that might be involved and explain how the information you gather will be analyzed. For a complete list of what should be included in your summary, please refer to Appendix B of the IRB Policies and Procedures Manual.*

The purpose of this study is to discover if athletic trainers utilize interval/intermittent training methods in their rehabilitation protocols. Subjects will include certified athletic trainers in the National Athletic Trainers' Association District 2- PA, NJ, NY, and DE- where N=1000. The study will utilize a survey (attached) and it will be distributed electronically through Survey Monkey. The District 2 secretary will distribute the survey to the athletic trainers so that athletic trainers who participate will remain anonymous and confidential. In the distributing email, a cover letter (attached) is attached stating the purpose, risk, benefits, researcher contact information, a direct link to the survey, and other information pertaining to the study. Upon clicking on the link in that cover letter, the first page the subject will see is an informed consent (attached) that again states the risks, benefits, researcher information, the rights of the subject, etc. By clicking "next" and completing the survey, informed consent will be implied. The subject can also close out of the browser to exit out of the survey.

The following hypotheses will be addressed in the survey:

1. Certified Athletic Trainers will be shown to be vaguely familiar with interval/intermittent training methods
2. The majority of certified athletic trainers will be shown to not use these training methods in their rehabilitation protocols
3. Certified Athletic trainers holding more than just the certification of an athletic trainer will be found to use these training methods in their rehabilitation protocols
4. Certified Athletic Trainers holding more than just the certification of an athletic trainer will find more benefits in the usage of interval/intermittent training methods

The survey will address these hypotheses by asking if the Certified Athletic Trainer: what other certifications the subjects holds, if they use interval/intermittent training methods in their rehabilitation protocols, if they do, how have they used it, and if they find these training methods beneficial, and if so, what benefits. (The survey is attached).

2. *Section 46.11 of the Federal Regulations state that research proposals involving human subjects must satisfy certain requirements before the IRB can grant approval. You should describe in detail how the following requirements will be satisfied. Be sure to address each area separately.*
 - a. *How will you insure that any risks to subjects are minimized? If there are potential risks, describe what will be done to minimize these risks. If there are risks, describe why the risks to participants are reasonable in relation to the anticipated benefits.*

All subject responses will remain anonymous. All responses are the opinion of the subjects.

- b. *How will you insure that the selection of subjects is equitable? Take into account your purpose(s). Be sure you address research problems involving vulnerable populations such as children, prisoners, pregnant women, mentally disabled persons, and economically or educationally disadvantaged persons. If this is an in-class project describe how you will minimize the possibility that students will feel coerced.*

All subjects will be volunteers and over the age of 18. No vulnerable populations will be sought out.

- c. *How will you obtain informed consent from each participant or the subject's legally authorized representative and ensure that all consent forms are appropriately documented? Be sure to attach a copy of your consent form to the project summary.*

Each subject will be emailed with an informational cover letter stating the purpose, risks, and benefits of the study. By completing the survey, informed consent is implied, however the first page of the survey is an informed consent form where the purpose, who's asked to participate, the benefits, risks, researcher contact information, etc, is again stated and the subject is required to click "next" to continue on to the survey or close out of the browser to leave the survey.

- d. *Show that the research plan makes provisions to monitor the data collected to insure the safety of all subjects. This includes the privacy of subjects' responses and provisions for maintaining the security and confidentiality of the data.*

Data will be collected during the spring semester. Responses to the survey will be kept in a secure location that is only accessible to the researcher and research advisor.

3. *Check the appropriate box(es) that describe the subjects you plan to use.*

<input checked="" type="checkbox"/> <i>Adult volunteers</i>	<input type="checkbox"/> <i>Mentally Disabled People</i>
<input type="checkbox"/> <i>CAL University Students</i>	<input type="checkbox"/> <i>Economically Disadvantaged People</i>
<input type="checkbox"/> <i>Other Students</i>	<input type="checkbox"/> <i>Educationally Disadvantaged People</i>
<input type="checkbox"/> <i>Prisoners</i>	<input type="checkbox"/> <i>Fetuses or fetal material</i>
<input type="checkbox"/> <i>Pregnant Women</i>	<input type="checkbox"/> <i>Children Under 18</i>
<input type="checkbox"/> <i>Physically Handicapped People</i>	<input type="checkbox"/> <i>Neonates</i>

4. *Is remuneration involved in your project?* *Yes* or *No*. *If yes, Explain here.*
5. *Is this project part of a grant?* *Yes* or *No* *If yes, provide the following information:*
Title of the Grant Proposal _____
Name of the Funding Agency _____
Dates of the Project Period _____
6. *Does your project involve the debriefing of those who participated?* *Yes* or *No*

If Yes, explain the debriefing process here.

7. *If your project involves a questionnaire interview, ensure that it meets the requirements of Appendix ___ in the Policies and Procedures Manual.*

California University of Pennsylvania Institutional Review Board
Survey/Interview/Questionnaire Consent Checklist (v021209)

This form **MUST** accompany all IRB review requests

Does your research involve **ONLY** a survey, interview or questionnaire?

- YES**—Complete this form
- NO**—You **MUST** complete the “Informed Consent Checklist”—skip the remainder of this form

Does your survey/interview/questionnaire cover letter or explanatory statement include:

- (1) Statement about the general nature of the survey and how the data will be used?
- (2) Statement as to who the primary researcher is, including name, phone, and email address?
- (3) **FOR ALL STUDENTS:** Is the faculty advisor’s name and contact information provided?
- (4) Statement that participation is voluntary?
- (5) Statement that participation may be discontinued at any time without penalty and all data discarded?
- (6) Statement that the results are confidential?
- (7) Statement that results are anonymous?
- (8) Statement as to level of risk anticipated or that minimal risk is anticipated? (NOTE: If more than minimal risk is anticipated, a full consent form is required—and the Informed Consent Checklist must be completed)
- (9) Statement that returning the survey is an indication of consent to use the data?
- (10) Who to contact regarding the project and how to contact this person?
- (11) Statement as to where the results will be housed and how maintained? (unless otherwise approved by the IRB, must be a secure location on University premises)
- (12) Is there text equivalent to: “Approved by the California University of Pennsylvania Institutional Review Board. This approval is effective nn/nn/nn and expires mm/mm/mm”? (the actual dates will be specified in the approval notice from the IRB)?

(13) FOR ELECTRONIC/WEBSITE SURVEYS: Does the text of the cover letter or explanatory statement appear before any data is requested from the participant?

(14) FOR ELECTONIC/WEBSITE SURVEYS: Can the participant discontinue participation at any point in the process and all data is immediately discarded?

**California University of Pennsylvania Institutional Review Board
Informed Consent Checklist (v021209)**

This form **MUST** accompany all IRB review requests

Does your research involve **ONLY** a survey, interview, or questionnaire?

- YES**—DO NOT complete this form. You **MUST** complete the “Survey/Interview/Questionnaire Consent Checklist” instead.
- NO**—Complete the remainder of this form.

1. Introduction (check each)

- (1.1) Is there a statement that the study involves research?
- (1.2) Is there an explanation of the purpose of the research?

2. Is the participant. (check each)

- (2.1) Given an invitation to participate?
- (2.2) Told why he/she was selected.
- (2.3) Told the expected duration of the participation.
- (2.4) Informed that participation is voluntary?
- (2.5) Informed that all records are confidential?
- (2.6) Told that he/she may withdraw from the research at any time without penalty or loss of benefits?
- (2.7) 18 years of age or older? (if not, see Section #9, Special Considerations below)

3. Procedures (check each).

- (3.1) Are the procedures identified and explained?
- (3.2) Are the procedures that are being investigated clearly identified?
- (3.3) Are treatment conditions identified?

4. Risks and discomforts. (check each)

- (4.1) Are foreseeable risks or discomforts identified?
- (4.2) Is the likelihood of any risks or discomforts identified?
- (4.3) Is there a description of the steps that will be taken to minimize any risks or discomforts?
- (4.4) Is there an acknowledgement of potentially unforeseeable risks?
- (4.5) Is the participant informed about what treatment or follow up courses of action are available should there be some physical, emotional, or psychological harm?
- (4.6) Is there a description of the benefits, if any, to the participant or to others that may be reasonably expected from the research and an estimate of the likelihood of these benefits?
- (4.7) Is there a disclosure of any appropriate alternative procedures or courses of treatment that might be advantageous to the participant?

5. Records and documentation. (check each)

- (5.1) Is there a statement describing how records will be kept confidential?
- (5.2) Is there a statement as to where the records will be kept and that this is a secure location?
- (5.3) Is there a statement as to who will have access to the records?

6. For research involving more than minimal risk (check each),

- (6.1) Is there an explanation and description of any compensation and other medical or counseling treatments that are available if the participants are injured through participation?
- (6.2) Is there a statement where further information can be obtained regarding the treatments?
- (6.3) Is there information regarding who to contact in the event of research-related injury?

7. Contacts.(check each)

- (7.1) Is the participant given a list of contacts for answers to questions about the research and the participant's rights?
- (7.2) Is the principal researcher identified with name and phone number and email address?
- (7.3) FOR ALL STUDENTS: Is the faculty advisor's name and contact information provided?

8. General Considerations (check each)

- (8.1) Is there a statement indicating that the participant is making a decision whether or not to participate, and that his/her signature indicates that he/she has decided to participate having read and discussed the information in the informed consent?
- (8.2) Are all technical terms fully explained to the participant?
- (8.3) Is the informed consent written at a level that the participant can understand?
- (8.4) Is there text equivalent to: "Approved by the California University of Pennsylvania Institutional Review Board. This approval is effective nn/nn/nn and expires mm/mm/mm"? (the actual dates will be specified in the approval notice from the IRB)

9. Specific Considerations (check as appropriate)

- (9.1) If the participant is or may become pregnant is there a statement that the particular treatment or procedure may involve risks, foreseeable or currently unforeseeable, to the participant or to the embryo or fetus?
- (9.2) Is there a statement specifying the circumstances in which the participation may be terminated by the investigator without the participant's consent?
- (9.3) Are any costs to the participant clearly spelled out?
- (9.4) If the participant desires to withdraw from the research, are procedures for orderly termination spelled out?
- (9.5) Is there a statement that the Principal Investigator will inform the participant or any significant new findings developed during the research that may affect them and influence their willingness to continue participation?
- (9.6) Is the participant is less than 18 years of age? If so, a parent or guardian must sign the consent form and assent must be obtained from the child
 - Is the consent form written in such a manner that it is clear that the parent/guardian is giving permission for their child to participate?

- Is a child assent form being used?
- Does the assent form (if used) clearly indicate that the child can freely refuse to participate or discontinue participation at any time without penalty or coercion?
- (9.7) Are all consent and assent forms written at a level that the intended participant can understand? (generally, 8th grade level for adults, age-appropriate for children)

California University of Pennsylvania Institutional Review Board
Review Request Checklist (v021209)

This form **MUST** accompany all IRB review requests.
 Unless otherwise specified, **ALL** items must be present in your review request.

Have you:

(1.0) **FOR ALL STUDIES:** Completed **ALL** items on the Review Request Form?

Pay particular attention to:

(1.1) Names and email addresses of all investigators

(1.1.1) **FOR ALL STUDENTS:** use only your CalU email address)

(1.1.2) **FOR ALL STUDENTS:** Name and email address of your faculty research advisor

(1.2) Project dates (must be in the future—no studies will be approved which have already begun or scheduled to begin before final IRB approval—**NO EXCEPTIONS**)

(1.3) Answered completely and in detail, the questions in items 2a through 2d?

2a: **NOTE:** No studies can have zero risk, the lowest risk is “minimal risk”. If more than minimal risk is involved you **MUST**:

i. Delineate all anticipated risks in detail;

ii. Explain in detail how these risks will be minimized;

iii. Detail the procedures for dealing with adverse outcomes due to these risks.

iv. Cite peer reviewed references in support of your explanation.

2b. Complete all items.

2c. Describe informed consent procedures in detail.

2d. **NOTE:** to maintain security and confidentiality of data, all study records must be housed in a secure (locked) location **ON UNIVERSITY PREMISES**. The actual location (department, office, etc.) must be specified in your explanation and be listed on any consent forms or cover letters.

(1.4) Checked all appropriate boxes in Section 3? If participants under the age of 18 years are to be included (regardless of what the study involves) you **MUST**:

(1.4.1) Obtain informed consent from the parent or guardian—consent forms must be written so that it is clear that the parent/guardian is giving permission for their child to participate.

(1.4.2) Document how you will obtain assent from the child—This must be done in an age-appropriate manner. Regardless of whether the parent/guardian has given permission, a child is completely free to refuse to participate, so the investigator must document how the child indicated agreement to participate (“assent”).

- (1.5) Included all grant information in section 5?
- (1.6) Included ALL signatures?

- (2.0) FOR STUDIES INVOLVING MORE THAN JUST SURVEYS, INTERVIEWS, OR QUESTIONNAIRES:
 - (2.1) Attached a copy of all consent form(s)?
 - (2.2) FOR STUDIES INVOLVING INDIVIDUALS LESS THAN 18 YEARS OF AGE: attached a copy of all assent forms (if such a form is used)?
 - (2.3) Completed and attached a copy of the Consent Form Checklist? (as appropriate—see that checklist for instructions)
- (3.0) FOR STUDIES INVOLVING ONLY SURVEYS, INTERVIEWS, OR QUESTIONNAIRES:
 - (3.1) Attached a copy of the cover letter/information sheet?
 - (3.2) Completed and attached a copy of the Survey/Interview/Questionnaire Consent Checklist? (see that checklist for instructions)
 - (3.3) Attached a copy of the actual survey, interview, or questionnaire questions in their final form?

- (4.0) FOR ALL STUDENTS: Has your faculty research advisor:
 - (4.1) Thoroughly reviewed and approved your study?
 - (4.2) Thoroughly reviewed and approved your IRB paperwork? including:
 - (4.2.1) Review request form,
 - (4.2.2) All consent forms, (if used)
 - (4.2.3) All assent forms (if used)
 - (4.2.4) All Survey/Interview/Questionnaire cover letters (if used)
 - (4.2.5) All checklists
 - (4.3) IMPORTANT NOTE: Your advisor's signature on the review request form indicates that they have thoroughly reviewed your proposal and verified that it meets all IRB and University requirements.
- (5.0) Have you retained a copy of all submitted documentation for your records?

**Institutional Review Board
California University of Pennsylvania
Psychology Department LRC, Room 310
250 University Avenue
California, PA 15419
instreviewboard@cup.edu
instreviewboard@calu.edu
Robert Skwarecki, Ph.D., CCC-SLP, Chair**

Erin Schneider,

Please consider this email as official notification that your proposal titled “Athletic Trainers’ Perspective of Interval/Intermittent Training in Rehabilitation” (Proposal #09-064) has been approved by the California University of Pennsylvania Institutional Review Board as submitted.

The effective date of the approval is 3-4-2010 and the expiration date is 3-4-2011. These dates must appear on the consent form .

Please note that Federal Policy requires that you notify the IRB promptly regarding any of the following:

- (1) Any additions or changes in procedures you might wish for your study (additions or changes must be approved by the IRB before they are implemented)**
- (2) Any events that affect the safety or well-being of subjects**
- (3) Any modifications of your study or other responses that are necessitated by any events reported in (2).**
- (4) To continue your research beyond the approval expiration date of 3-4-2011 you must file additional information to be considered for continuing review. Please contact instreviewboard@calu.edu**

Please notify the Board when data collection is complete.

**Regards,
Robert Skwarecki, Ph.D., CCC-SLP
Chair, Institutional Review Board**

Appendix C4

NATA District 2 Survey Distribution Form

Survey List Request FormRequest Date: 3/8/2010 Date Needed: 3/12/2010

Check one

Member #: 1022276 (Required) Full Time Part Time Not a StudentName: Ann SchneiderMailing Address: 263 California Rd Apt 424City/State/Zip: Brownsville PA 15417Phone: (571) 228-0886 Fax: _____E-Mail Address: sch5405@calu.eduTitle of Study: Athletic Trainers' Perspective of Interval/IntermittentPurpose Statement: Training in Rehabilitation
to discover if athletic trainers utilize interval/
intermittent training methods in rehab.Institution where Research is Being Conducted: California University of Pennsylvania

Advisor's Signature (if applicable): _____ Date: _____

Funding Source of Study: N/A**** Please include a copy of your survey instrument, informed consent form, and documentation of approval from your Institutional Review Board (IRB).****** Student Members: If requesting email broadcast service from the National Office for your survey, you MUST provide the letter of announcement (in MS Word format) that you plan on using in the broadcast as well as your current email address.***Send this form to your District Secretary for processing. Please allow three to four weeks for delivery.*

Survey List Request Form

Purpose of Mailing List (check all that apply):

 Email Survey-Email broadcast service by National Office
(max. 1000 recipients available
to student members only) Is follow up Email Survey required? Survey (for non students)

- email addresses
 postal addresses

File format:

- Comma Delimited Text
 Excel

Work Settings:

- College/University
 Secondary School
 Clinic
 Hospital
 Professional Sports
 Industrial/Occupational/Corporate
 Business/Sales/Marketing
 Health/Fitness/Sports Clubs/
Performance Enhancement Clinics
 Amateur/Recreational/Youth Sports
 Military/Law Enforcement/Government
 Independent Contractor
 Other
 Unemployed

 All Member Types

- Certified
 Associate
 Retired Certified
 Certified Students
 Non-certified Students
 International Non-Certified
 Certified International

To select by geographical area, please select one:

- US only
 All Districts
 All members (Canada & International included)

To make a selection by State or District, check/circle below:

- | Districts | States |
|---------------------------------------|----------------------------|
| <input type="checkbox"/> 1 | CT, ME, MA, NH, RI, VT |
| <input checked="" type="checkbox"/> 2 | DE, NJ, NY, PA |
| <input type="checkbox"/> 3 | DC, MD, NC, SC, VA, WV |
| <input type="checkbox"/> 4 | IL, IN, MI, MN, OH, WI |
| <input type="checkbox"/> 5 | IA, KS, MO, NE, ND, OK, SD |
| <input type="checkbox"/> 6 | AR, TX |
| <input type="checkbox"/> 7 | AZ, CO, NM, UT, WY |
| <input type="checkbox"/> 8 | CA, NV, HI, Guam |
| <input type="checkbox"/> 9 | AL, FL, GA, KY, LA, MS, TN |
| <input type="checkbox"/> 10 | AK, ID, MT, OR, WA |

SURVEY LIST USE AGREEMENT

I certify that the requested NATA survey list will be utilized only for the study specified above. The list will not be duplicated, copied, or reproduced in any manner, but used one time only.

I agree that any broadcast email will not contain other recipients' email addresses in the "To:" or "Cc:" field, since the email addresses provided are not to be shared among the recipients.

To send a broadcast email from Microsoft Word, we have provided instructions in the members-only section of the NATA Website. Go to: https://www.nata.org/members1/documents/mass_email_instructions_for_nata.pdf.

Members agree to abide by policies and procedures of the NATA. Failure to abide by these requirements is a violation of such policies and may subject the user to sanctions by the NATA Ethics Committee.

Applicant Signature Erin Schneider Date 3/8/2010

Approved by (District Secretary) _____ Date _____

Appendix C5

Survey Follow-Up Email

Follow- Up Email

Dear Fellow Athletic Trainer:

My name is Erin Schneider and I am a graduate student at California University of Pennsylvania and this is a follow-up email for my survey titled "Athletic Trainers' Perspective of Interval/Intermittent Training Methods in Rehabilitation". If you have already taken the survey, thank you so much and please disregard this email. If you have not taken the survey, this is a kind reminder that the survey is still available for you to take until March 29, 2010. If you chose to take the survey, please follow the link:

<http://www.surveymonkey.com/s/athletictrainersperspective>.

If you have any questions about the study please feel free to contact me at (571)228-0886 or at sch5405@calu.edu.

Thank you for your time, and I hope you have a great day!

Sincerely,

Erin Schneider ATC, CSCS

California University of Pennsylvania

Graduate Student

Appendix C6
Open-Ended Question Results

Open Ended Question Results/Responses

The following are athletic trainers' answers/responses to the open-ended questions in the survey.

Question 9: Injury/Condition being Treated

Quadriciceps strain
 all injuries
 All types, mostly LE
 ACL post op
 acl repair
 Lower extremity injuries (sprains, stress reactions, overuse injuries)
 Grade 3 ankle sprain
 ACL Rehabilitation, Bilateral Anterior/Lateral Compartment Syndrome Repair
 Shin splints
 ACLs, Ankles, Achilles, Hip labral repairs
 lower extremity
 low back injuries
 Lower extremity; grade II muscle strain; ACL repair
 all
 Knee, ankle, Low back
 ACLR; Hamstring/Groin Injuries
 Knee Sprains, Muscle Strains, Most lower leg strains and sprains
 acl repair, post surgical
 post-op lower extremities
 lower leg stress fracture
 Muscle strains, ligament sprains
 lower extremity
 musculoskeletal injury--preparing for return-to-play after deconditioning
 Lower Extremity
 Strains/sprains, muscle imbalances
 sprains/strains
 muscles strains or sprains
 ACL Reconstruction, UCL Reconstruction, Instability of shoulder
 post surgical ACL
 Lower Leg Muscle Strain
 Fractures, post-ops (ACL, shoulder reconstructions), hamstrings strains
 knee injuries
 ACL reconstruction
 Ankle sprains, knee sprain, hamstring/quadriceps strains
 stress fractures
 ACL reconstruction, multidirectional shoulder

instability

Ankle Sprain/Strains; Thigh Strains.

Muscle strains/ACL rehab

any legs injury, upper body injuries

soft tissue injuries of upper and lower extremity

hamstring, quad

hamstring strain

Track/Running Injuries

ACL-R, ankle reconstruction, Arthroscopic knee

ankle sprains, muscle strains, knee ligament sprains,

shoulder sprains/strains

strains, general weakness

low back strain

upper and lower extremities

hamstring strains, post acl/r

ACL reconstruction

ankle and knee injuries

Lower Body...HS/quad/calf strains

Various Upper and Lower Extremity Conditions

ACL and MCL surgery

Acl reconstruction

acl, pcl, shoulder

musculoskeletal

Question 10: Goal of the Treatment

improve anaerobic and/or aerobic capacity/fitness, muscular strength and endurance

Improve overall fitness prior to sport specific activity

aerobic fitness

Return to play/work

Increased strength and agility

all of the above trying to get back to competition

Cross training for fitness/aerobic/endurance/strength

improving aerobic capacity, increase lower extremity strength

Improving aerobic capacity and increased muscular strength and speed

Improve fitness, speed

Improving fitness, promoting seamless return to sport

fitness to return from surgery, ACL sports spec. activities

increase strength, increase ROM

Gaining functional endurance, strength for RTP

maintain fitness

improve aerobic capacity, increase endurance

Improve overall fitness; break monotony of rehab; increase strength;

increase functionality

improving aerobic capacity

Build strength, maintain aerobic ability while rehabbing injury, increase ROM and flexibility

return to play training. endurance

increase fitness

improving CV endurance through gradual loading

increasing strength, proprioception
 general reconditioning, proprioception, coordination, balance
 improving aerobic capacity/fitness
 increase strength, proprioception, agility, CV
 Strengthening, proprioception and increased fitness
 increased strength, increased muscular endurance
 improving aerobic capacity
 Improving balance, coordination, proprioception, muscular strength and
 agility and speed
 increase conditioning, improve gait, increase muscular strength
 Improved Aerobic and increase muscle endurance
 all of the above
 aerobic, sport-specific activities
 Increase muscular strength/endurance
 Improve aerobic fitness, progress to sports specific training and return to
 full activity
 improving aerobic capacity/fitness
 increasing aerobic capacity
 prep for RTP.
 Increase strength, muscle endurance, proprioception
 improved fitness, strength
 Improve or maintain CV fitness, improve muscular endurance and coordination
 for quick changes in position or direction on the field or court.
 trp
 Increase strength and endurance
 Increase strength, endurance, better overall running gait, muscular and
 anaerobic improvements
 improving aerobic capacity and muscular endurance
 maintain/improve sport-specific muscular endurance demands in anticipation
 of return to play
 increased strength, endurance
 increase strength
 to progress fitness capacity as well as maintain body characteristics and
 transition
 increase strength and endurance
 Increase strength, speed, agility, confidence in knee
 improve aerobic capacity and return to play
 Return to sport prep
 Condition Dependent - Based on Individual Needs of the Patient
 strength and ROM
 increased strength, increase power, increases aerobic capacity
 improving aerobic capacity
 increased ROM, strength, endurance

Question 13: Equipment used

bike, treadmill, elliptical, slideboard, jump-rope, bosu, swiss ball, etc
 HR monitor, Bike, 400-meter track, swiss ball, medicine ball
 bike, treadmill
 Cardio, BOSU, Med Ball,
 bike, treadmill bosu cones

bike ,elliptical,bosu,fitter,rope weight eq and track
 Stationary bike/eliptical/treadmill/weight machines/bosu gym ball/ mat
 exercise/pilates ex.
 Bike
 Bike, Treadmill, synthetic turf, pool
 bike, elliptical
 Bike, Stairmaster, track, treadmill
 elliptical, bike, bosu, box
 UPE, swiss ball, weights, theraband
 Dynadisk, aquatic therapy, ellipticals, physioball
 Bike
 bike, treadmill, elliptical,
 Kettlebells, Bosu, Versaclimber, AirRunner, Slam Ball, SLide Board,
 Skiier, MEDicine Balls
 treadmill
 Mostly and exercise bike, sometimes a treadmill
 bike, running, elipitical, arm bike
 bosu, slide board, track
 treadmill
 bike, elliptical, BOSU
 Bosu, running
 bike, elliptical trainer, treadmill
 bike, treadmill, track
 BAPS, swiss ball, teadmll, bikes, ellipical
 BOSU, bike, swiss ball, airex balance pad
 treadmill, elliptical
 Treadmill, elliptical, BOSU, cones, tennis ball, physioball - athletes'
 own body
 track, elastic bands
 Cybex Arch Trainer, Eliptical, Treadmill
 Bike, EFX, Treadmill, plyo boxes, dynadiscs, Bosu ball, agility ladder,
 physioballs
 BOSU, swiss ball, therabands, etc
 Bike, Treadmill, Trampoline, Medicine Ball
 Bike, treadmill, track, gymnasium
 bike, treadmill, eilliptical, UBE
 upper body ergometer
 Treadmills, Stationary Bikes; Steppers
 bike, treadmill, balance equipment, hurdles
 bike, weights
 Bike, elliptical, treadmill, traditional playing surface, sport specific
 implements (i.e., tennis racket, etc)
 bike treadmill
 eliptical trainer, swiss ball, fitter, balance disk
 Bike, Treadmill
 bike, Elyptical, stairmaster
 Bike, Elliptical, treadmill, UBE, BOSU, Airex, Physio Ball, floor dots
 for plyometric training
 bike, eliptical, treadmill BOSU, swiss
 swiss ball
 step box, various other basic exercises
 bike, treadmill, track

bike, stairs, jump boxes, medicine ball, kettle bell,
 bike and running in the gym
 Bike, TM, running
 Variety - Cycle Ergometers, Treadmills, Balls, Bands, Walls, etc.
 bosu, Swiss ball, baps board, thera band
 mini trampoline, BOSU
 bike, elliptical, versaclimber
 treadmill, ball, weight equipment

Question 14: Interval/Intermittent Parameters

work:rest interval and/or intensity:time interval
 work:rest, intensity:time
 work/rest
 intensity : time
 time interval
 intensity and time
 intensity- time type of training
 2min hard 3min soft working at an intensity range of 4.5 being soft to 6.0
 being hard
 rest:work interval; intensity:time interval
 time interval and work interval
 mostly rest:work interval
 intensity, work load,
 Combination depending on athlete sport, function
 intensity/time interval
 intensity, speed, duration
 Time Interval, Intensity, Weights
 time and work interval
 1 1/2 minute easy, increase resistance and sprint for 1 minutes as hard and
 fast as they can go, then back to easy no resistance for 1 1/2 minutes and do
 that for a specified amount of time.
 work intervals
 rest/work, intensity levels
 fast walk/jog intervals
 intensity:time
 Ratios of 1:2 up to 1:5
 intensity:time intervals
 time interval
 Intensity/ time
 work interval, intensity, time interval
 intensity time interval
 time interval, changes in work and rest time as they progress
 2:1 work:rest, 70% max HR
 Fast/slow, high/Low intensity
 rest:work; intensity:time; max:moderate
 intensity, time
 Intensity & Rest
 rest:work, and intensity:time

varied but most intensity
 time interval
 Variation of Tabata protocol.
 time interval
 tabata- 4 min of 20s on/10s rest, and basic bike intervals, various work to rest intervals
 rest:work with varying intensities
 intensity
 timed intervals, speed variation, intensity variable
 Depends on the day and what was trying to achieve. 1:3, 1:1, or 1:2 depending on tolerance of athlete and injury
 intensity: time interval
 rest:work interval
 intensity over time interval, rest work
 time interval
 work/rest ratios
 all of the above
 depending on stage of rehab I used a combination
 rest:work, & Time with intensity increase
 Time Intervals and Work Intervals depending on status of patient and individual needs
 intensity time intervals
 10 seconds rest 30 seconds rest 3:1 rest:work ratio
 intensity time interval
 increase intensity, decrease rest

Question 16: Benefits of Interval/Intermittent Training in Rehab

Interval training has been effective pushing the athlete's ability to make gains in the specific parameter of training, either aerobic or anaerobic, strength or endurance. Plus most athletes are competitive by nature so this gives them the predefined "rules of the game" to pace and/or perform in the limited rehab domain. They also have the advantage of seeing objective gains with successive trials or sessions.

In order to better prepare that athlete for return to play activities. It's a very easy and useful technique to improve fitness.

I need to learn more about interval/intermittent training but if and when the time comes it could be a usefull tool to get athletes back to pre-injury levels of fitness sooner.

Different protocols may be more appropriate for a given population

They worked

I believe it is a valuable too in rehabilitation of any athletic injury.

I think in order to get athletes back to full capacity they also need rehab that correlates to their sport in intensity,work etc.

If I learned more about the specific protocol and reviewed some peer reviewed literature saying that this technique is beneficial...Good luck

with your research :)

I feel interval training would be beneficial in my rehab protocols, but I have not been in a situation where I believe it would have benefitted my athlete for the minimal rehabilitation that I have done up to this point.

if I perceived a need

My current job is more evaluation and case management, very little rehabilitation.

challenges keep them from boredom of rehab and promotes a more successful total recovery

Interval/intermittent training is a useful tool that can be utilized in a variety of ways throughout the rehabilitation process.

They work.

Rehab is just more than return to play. It is a means of making the athlete better than when they came in with an injury and that means all aspects not just strength and function but functional strength and functional capacity to perform at a better level than before. Interval training is an asset to be used with certain sports and a must for other sports.

my main goal is to get the athlete back to a stage that they can work out on their own. if I am understanding this survey correctly, I would allow the athlete to work out on a bike to make gains in ROM and mild aerobic conditioning in order to get the blood pumping. But any long term training should be on the athlete to do.

If indicated, I would have no qualms about using it!

I find that it is more interesting for the patient. Keeps the patient more engaged. Good results

Not sure what it is. So I don't know. Also working in a HS, time is limited for one on one rehab

Seems to be a great way to get the athlete back faster

I believe it gets the athlete ready to return to full activity faster because it keeps them aerobically fit plus works on all muscle fibers to keep them all up to speed during their down time.

If indicated and time allows

I am not familiar with it.

part of athletics

If I had a high performance athlete then yes I would, however clinical you are limited by time. Interval training is probably best suited for the strength and conditioning professionals post-rehab

I would use these methods for the above stated reasons. However, I would

use them toward the end of rehab in preparation for return to play.

a useful tool when creating programs

Benefits to the athletes and to create rehab programs where the athlete feels challenged.

I feel that they are effective in gradual loading of the musculoskeletal system; they allow the athlete to begin to trust their 'systems' again

It is part of real life, which makes it part of the final recovery.

Interval/intermittent training methods are helpful to regain conditioning after a period of inactivity.

I feel it is a good way to keep the athlete interested in their rehab and it creates muscle confusion which then helps them see results however working in thesecondary school setting I can say the one on one time needed to create interval training programs with specific athletes is not always practical.

I'm consistently adding new things to my rehab protocols. Once I learn more about interval/intermittent training methods I will be sure to implement it.

Presently, not a treating clinician, my role is almost purely administrative so I don't anticipate an opportunity

They are beneficial to meeting the goals.

Not familiar enough with it.

I'll continue using using the techniques

It is beneficial in that it will help to get the athlete back to play sooner by improving their aerobic capacity faster

It is an excellent way to restore agility and speed, balance and proprioception and muscular strength.

We utilize it to return to sport demands, structuring it specifically to each athlete's needs.
effective way of reconditioning athletes

When given the opportunity interval training can be very beneficial especially when looking to make quick improvements.

I would like to become more accustomed to using them

Past experiences, but it remains dependent on the injury

Interval training is a key component to building/returning to a specific aerobic activity level. It is especially important to sports that are more stop and go. Interval training is a great way to maintain fitness when injured.

I would need to learn more about it, and if it proved to be useful then I would definitely incorporate it.

it works

Not working in a setting where I would have the ability to use.

If I thought my patient needed it would have some benefit from it

important to prepare for return to play.

In rehabilitation, we must get the athlete back to full, game ready capacity as quickly as possible. It's also very time efficient way of training.

Because they help prevent an athlete from deconditioning and help an athlete to return gradually to sport specific skills at competition levels.

due to the gains you get from interval training

Feel that it can be beneficial

Time

Found it to be very beneficial progression to full return to athletics.

Athletes were very healthy in their return and had no additional issues

They help make the rehabilitation process more functional and/or sport-specific; can easily manipulate the intensity for the athlete to re-gain necessary weaknesses due to the injury and/or time-off due to injury

I don't really know much about it, so I would need to do alot more research on it before I used the methods in my rehab protocols

No longer in the sports medicine environment, but it is something I would like to have tried.

1. Rehab. was not a major component of the duties at last position. 2. have returned to school to persue new career

Yes it can be implemented easily for many types of injuries.

If the situation would occur that it would be practical and effective, I may use interval/intermittent training as part of the rehabilitation protocol.

If I was working with an athlete in a sport requiring significant power and strength in addition to overall endurance - attempting to recondition for RTP

would be good adjunct to functional progression back to dance, as demands of dance are largely intermittent in nature.

This style of training leads to a more sports specific result. The athlete can better guage his or her progress.

It helps the athletes build back up to game play

For Return to sport...& would be specific to each sport

I find it to be very useful if used properly. I also think it is a great way to rehab without potentially re-injury.

Because I think that it would benefit the athletes that I work with
It is something that can be time-consuming, but something I would consider
using especially in the later stages of rehabilitation. This is not
something that many athletic trainers have time for, especially in the high
school setting where many other demands are placed upon the athletic trainer
that are usually outside the scope of practice.

It is a tested method of increasing strength, endurance, ROM in the patients
I work with.

I believe they will make differences in performance

Limited space as of now.

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ABSTRACT

Title: Athletic Trainers' Perception of Interval/Intermittent Training in Rehabilitation

Researcher: Erin Schneider, ATC, CSCS, PES

Adviser: Robert Kane, EdD, ATC, PT

Date: May 2010

Research Type: Master's Thesis

Objective: Study to determine if athletic trainers utilize interval/intermittent training methods in their rehabilitation protocols, and if they do, how.

Setting: An email was sent out to certified athletic trainers in the NATA District 2 with a link to the survey to be completed on an internet based program at the athletic trainers own discretion.

Participants: 953 certified athletic trainers from the NATA District 2 were asked to volunteer their time and participate in the study. 131 athletic trainers responded to the survey.

Interventions: An original survey was created for this study. The survey was examined by a panel of experts to determine the validity of the survey. Then an IRB approved survey was sent to 5 certified athletic trainers to test its reliability. The survey was created on the web server 'Survey Monkey' and sent via email to the athletic trainers. A cover letter explaining the study was also uploaded with the survey.

Main Outcome Measures: The research hypotheses will be analyzed using chi-square goodness of fit test and chi-square test of independence at an alpha level of 0.05.

Results: A significant interaction was found in athletic trainers' familiarity with

interval/intermittent training methods. The majority- at 53.4%- were found to be vaguely-somewhat familiar. The majority of athletic trainers were also found to not use these training methods in their rehabilitation protocols at 55.7%. An insignificant relationship was found between athletic trainers' use of interval/intermittent training and whether athletic trainers held an additional credential where $X^2 = .069$, $p > 0.05$. An insignificant relationship was also found between athletic trainer's use of interval/intermittent training methods and whether the athletic trainers held a type of strength and conditioning credential where $X^2 = .078$, $p > 0.05$.

Conclusions: While the results of this study were statistically insignificant, trends were found. Holding an additional credential, or specifically a type of strength and conditioning credential, did not predict use of interval/intermittent training methods in rehabilitation protocols. Athletic trainers' familiarity with interval/intermittent training was found to be statistically significant indicating that while the majority of athletic trainers were found to be vaguely-somewhat familiar with these training methods, most of them did not utilize them in their rehabilitation protocols. Further research is necessary to determine if there is a relationship between interval/intermittent training and improving balance/coordination/proprioception, or if there is any validity that ACL reconstruction surgery truly benefits from these training methods due to the large responses in these two areas specifically.

Word Count: 393