THE RELATIONSHIP BETWEEN THE AMOUNT OF EDUCATIONAL TRAINING AND UTILIZATION OF JOINT MOBILIZATION IMPLEMENTED BY THE CERTIFIED ATHLETIC TRAINER

A THESIS

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THESIS APPROVAL

Graduate Athletic Training Education

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INTRODUCTION

Joint mobilization is a manual therapy technique used by athletic trainers (ATs) to control pain and increase range of motion at a joint.[1-2] Research shows that the use of joint mobilization is effective in decreasing pain and restoring joint motion and function.[3] Application of joint mobilization requires clinical decision making as well as precise clinical skills. Specifically, clinicians utilize different grades of mobilization based upon the desired clinical outcomes. A study done on osetoarthritic knee joints revealed that large amplitude anterior-to-posterior glides done on the tibiofemoral joint had immediate local and widespread hypoalgesic effects on the patient.[4] Conroy et al. studied primary shoulder impingement.[5] This study revealed that grade I and II mobilizations in combination with a comprehensive treatment plan decreased the patient's twenty-four hour pain and pain with the subacromical compression test.[5] A study examining patients with frozen shoulder discovered that end range mobilizations were more effective than mid-range mobilizations in increasing shoulder mobility.[6] In addition to making clinical judgments regarding grades of mobilization, clinicians also need to demonstrate accurate clinical skills. Factors such

as joint position and patient clinical position will have a significant impact on the effectiveness of joint mobilization. Since athletic trainers deal with both pain and hypomobility after injury is sustained a concrete understanding of joint mobilization needs to be implemented into undergraduate and graduate athletic training programs along with continuing education hours post board of certification.[7] Thus, athletic trainers utilizing joint mobilization must be appropriately trained both clinically and academically.

With positive outcomes on joint mobilization research, education on this manual therapy technique is extremely important. Prior to 1999 only some entry-level athletic training programs introduced joint mobilization at the undergraduate level.[7] However, joint mobilization has now been included in both the Third and Fourth Edition of the NATA Educational Competencies. Therefore, students enrolled in entry-level athletic training programs post 1999 have been exposed to joint mobilization.[8] Since joint mobilization is now a part of Performance Domain IV: Treatment, Rehabilitation, and Reconditioning, this manual therapy technique should be considered for use by practicing athletic trainers.[9]

Athletic trainers who want to stay current in the profession should seek additional training in joint mobilization. Such training could be obtained in graduate school in which academic coursework can reinforce the principles of joint mobilization, and encourage athletic trainers to use this rehabilitation tool on athletes suffering from pain and/or hypomobility.

Another way ATs can become more educated in the area of joint mobilization is by attending continuing education courses. It is important to understand where ATs stand on the use of joint mobilization; however, there is limited up-to-date research in this area as the only updated research done on ATs and joint mobilization education was in 1984.

In 1984 A Western States Survey of Certified Athletic Trainers' Use of Joint Mobilization in Treatment Programs was implemented in order to determine educational levels and use of this manual therapy in the clinical setting.[10] One would expect that the wider an ATs knowledge base on treatment protocols the faster and more efficient he or she will return the athlete to play. Reasoner gathered several different results from her survey:

1) ATs relied mainly on their colleagues as a primary education source when and if joint mobilization needed to be used.

2) Universities and sports medicine clinics reported the highest rate of joint mobilization use.

3) The majority of ATs participating in this survey used joint mobilization sparingly.[10]

With this information known, it is evident that joint mobilization education needs to be refined and implemented into undergraduate athletic training programs. There is no current research on the prevalence of joint mobilization use by ATs since it has been made a mandatory part of the curriculum. A survey sent out to physical therapists discovered entry-level physical therapy education programs were expanding their curriculum in order to enhance the treatment of joint dysfunction through the use of joint mobilization.[3]

Athletic training and physical therapy are two closely related professions; however, joint mobilization seems to be more prevalent in the physical therapy setting. Ben-Sorek et al. discovered that joint mobilization were becoming increasingly more popular between the years of 1970 and 1986.[3] The 1970 survey revealed entry level physical therapy education programs only taught joint

mobilization as a subunit within nine out of fifty-one programs;[11] while the 1986 survey showed an increasingly larger amount of physical therapy education programs teaching separate courses in joint mobilization, along with teaching joint mobilization as a subunit.[3] Joint mobilization is now mandatory in every physical therapy curriculum as depicted in the curricular guidelines in the Normative Model of Physical Therapy Education. Therefore, all physical therapy programs now teach joint mobilization.

Sorek et al. also studied whether or not physical therapists received instruction outside of the entry-level program, and compared the data to that of Volpe, the author of a similar study done in 1979. In both studies, continuing education was the instruction that was studied outside the entry-level.[3,12] Continuing education in joint mobilization did increase between the years of 1979 and 1986; thus, increasing the opportunities for physical therapists to utilize joint mobilization in the clinical setting.[3] Therefore, is seems reasonable that the more emphasis put on education the more likely physical therapists are to use joint mobilization.

Undergraduate and graduate athletic training programs need to incorporate more education on joint mobilization. Research shows that this manual therapy technique decreases

pain and improves range of motion and function, but is not routinely utilized within the clinical setting. Continuing education courses are one way for ATs to keep up with their skills on this manual therapy technique. With educational increases on joint mobilization, results may be seen on the use of this technique by the athletic trainer; similar to the increases seen in the study done on physical therapists.

Therefore, the purpose of this study is to develop a predictive model based on joint mobilization utilization. This model will predict the level of usage of joint mobilization based on the educational training of certified athletic trainers. Consequently, a predicted model will be developed through the use of a survey to determine if educational training levels predict joint mobilization utilization. If an effective model can be predicted it will affect undergraduate, graduate, and continuing education, which will enhance future athletic training curriculums. With an educational growth in joint mobilization student athletic trainers and certified athletic trainers will utilize this manual therapy technique more when treating pain and increasing range of motion.

METHODS

The primary purpose of this study was to develop a predictive model to determine if educational training levels predicted joint mobilization utilization. This model predicted the level of usage of joint mobilization based on the educational training of certified athletic trainers. The model that was developed will affect undergraduate, graduate, and continuing education, which will enhance future athletic training curriculums. The methods section describes how this research was carried out and includes the following: research design, subjects, instruments, procedures, hypotheses, and data analysis.

Research Design

A descriptive research design was used in conjunction with the Educational Predictor on Joint Mobilization Usage Survey (EPJMUS)(Appendix C6) to conduct this study. A predictive model was developed, which allowed the researcher to measure education that predicted joint mobilization usage in undergraduate, graduate, and continuing educational training. The researcher designed the majority of the survey; however, some survey questions

from the study “Joint Mobilization Education and Clinical Use in the United States” were also utilized.[3]

The variables that were tested in this survey are as follows: undergraduate training, graduate training, continuing education training (all independent variables), and utilization of joint mobilization (dependent variable). This model predicted the use of joint mobilization based on educational training received during undergraduate education, graduate education, and continuing education post certification.

Subjects

The subjects used in this research included Certified Athletic Trainers from the Mid-Atlantic Athletic Trainers’ Association (District 3). District 3 includes: South Carolina, North Carolina, Virginia, West Virginia, District of Columbia, and Maryland. The reasons the researcher chose to survey District 3 members are twofold:

1) This population was familiar with California University of Pennsylvania.

2) Sample of convenience.

The National Athletic Trainers’ Association (NATA) randomly selected 1,000 members within District 3. These

1,000 members were greeted with a cover letter (Appendix C9) written by the researcher introducing herself, and explaining the purpose of the study. The subjects then completed the survey online over the Internet, and informed consent by the athletic trainers was implied through their anonymous return of the survey. The Institutional Review Board at California University of Pennsylvania approved the study (Appendix C8), and each participant was assured that his or her responses would remain confidential.

Preliminary Research

Before any research was conducted, the researcher conducted a pilot study to ensure the instrument showed content validity and reliability. To determine validity, the survey was sent to a panel of six experts; three out of the six panelists responded to the researcher's request for feedback. The panel of experts included one athletic trainer (AT), one AT who was the chairperson for the Department of Athletic Training, and one AT who was the director of an accredited graduate athletic training program. The researcher chose these experts because of their extensive background in joint mobilization. The three panel members were provided with the survey (Appendix

C6), table of specifications (appendix C2), and cover letter (appendix C1) explaining the research and their role as a panel member. The cover letter asked the experts to answer five questions:

1) Are the items of this survey appropriate and related to the goal of the survey?

2) Are the items of this survey written in ways that are understandable to the target population of athletic trainers?

3) Are there any questions that should be excluded from the survey?

4) Are there any questions that should be added to the survey?

5) Do you have any other suggestions or comments that would improve the overall quality of this survey?

The panel of experts provided their feedback (Appendix C3) on the survey to make sure the instrument was measuring the specific variables of the study. After receiving their suggestions, changes to the survey were made in order to proceed with reliability testing.

Before the survey was sent to 1,000 certified athletic trainers, the researcher conducted a mini-study to discover the reliability of The Educational Predictor for Joint Mobilization Usage Survey. The survey was sent via e-mail

to 30 athletic trainers employed at California University of Pennsylvania and Elon University located in Elon, North Carolina. The researcher waited a week and a half before another e-mail was sent to the participants requesting that if they completed the survey once to please complete the survey one more time. After the participants completed the survey twice the researcher downloaded the data into excel, and grouped participants with the same IP address together. The subjects with the same IP address were the participants who completed the researcher's survey twice. Eleven out of thirty individuals completed the survey twice. After the researcher grouped and coded the data into excel the numbers were downloaded into SPSS where a Cronbach's alpha was run to show the reliability of certain survey questions (Table 1). Most statistical experts state that a coefficient of reliability is an alpha coefficient of 0.7 to 1.0. The reliability testing allowed the researcher to catch any errors in the experimental process.

Instruments

The researcher created the majority of the survey with some items derived from the research study "Joint Mobilization Education and Clinical Use in the United

States."[3] Demographics that were collected included the following: gender, years of experience as an athletic trainer, credentials, current occupation, and level of education. Additional items related to educational training in joint mobilization received during undergraduate level, graduate level, and continuing education courses were split into 3 sections within the survey.

Items 10-16 incorporated undergraduate educational training levels, while items 17-23 were strictly dedicated to graduate educational training levels, and items 24-26 included post Board of Certification continuing education courses. Items 28-30 were directed towards joint mobilization utilization such as: anatomical areas subjects have used, are most confident using, and use joint mobilization on most often.

The survey allowed the researcher to predict which independent variables had the greatest effect when predicting joint mobilization utilization. The independent variables included: hours spent learning joint mobilization theories and skill/techniques during undergraduate and graduate educational training, prevalence of joint mobilization utilization if participants had a graduate assistantship, and hours spent on continuing education in

courses that included joint mobilization. As subjects returned the survey their answers were coded into numbers that were made up by the researcher (Appendix C7). For example, an individual who spent 2 hours learning joint mobilization theories during undergraduate training received a 2. For open-ended questions that did not have a number in the answer choices the researcher came up with coded numbers. For example, participants were asked to report how many continuing education hours he or she had on joint mobilization. Therefore, someone how had 10 hours received a 10. The dependent variables include questions such as, anatomical areas that participants have used joint mobilization, anatomical structures participants feel most confident when using joint mobilization, and anatomical areas that participants use joint mobilization on the most. The subjects chose from 13 different joints on the body. Therefore, if subject one picked 6 joints he or she received a 6.

Procedures

The Institutional Review Board (IRB) at California University of Pennsylvania reviewed the study before it was sent to any participants. After approval from the IRB the

researcher requested a contact list form the NATA Research and Graduate Study Department. In this form the district of interest was specified, a cover letter was written, and the EPJMUS was sent ready to be completed using Survey Monkey. The form was then sent to the District 3 Secretary for processing. After approval from the District Secretary, NATA sent the survey to 1,000 participants. The survey was designed to be completed in less than twenty minutes.

Hypothesis

The following was the hypothesis examined in this research.

1. Certified athletic trainers with more knowledge and understanding on joint mobilization will be more inclined to use this manual therapy technique in their clinical setting.

Data Analysis

A step-wise regression analysis was used to develop a predictive model based on joint mobilization utilization. Regression can be used as a model for prediction when

trying to find significant relationships between two variables. The data was gathered and described using frequency tables, percentages, correlations, and other pertinent observations. The components that were run through the step-wise regression analysis were grouped into 2 sections: educational training and joint mobilization usage. The data was analyzed using SPSS version 16.0.

RESULTS

The following section will reveal pilot study testing, demographic data, and hypothesis testing obtained through the Educational Predictor for Joint Mobilization Usage Survey. The primary purpose of this original study was to develop a predictive model of joint mobilization utilization. This model will predict the level of usage of joint mobilization based on the educational training of certified athletic trainers.

Pilot Study Testing

Before the survey was sent to 1,000 certified athletic trainers, the researcher conducted a pilot study to discover the content validity and reliability of The Educational Predictor for Joint Mobilization Usage Survey. The survey demonstrated validity based on the comments and suggestions received from the panel of three experts (Appendix C3). A Cronbach's alpha was performed to show the reliability of certain survey questions. Most statistical experts state that a coefficient of reliability is an alpha coefficient of 0.7 to 1.0. The following table

(Table 1) shows the reliability of several survey questions tested in the pilot study.

Table 1. Reliability Testing of The Educational Predictor for Joint Mobilization Usage Survey

Questions	Alpha Level
Gender	1.000
How many years have you been BOC certified athletic trainer?	1.000
Which of the following did you attend in order to obtain your entry-level athletic training education?	1.000
In what year did you complete your entry-level athletic training education?	0.985
What is your highest level of education completed?	1.000
Was joint mobilization theory covered as part of a required course during your entry-level undergraduate athletic training education program?	0.671

Approximately how much time was spent learning the theories associated with joint mobilization in the required course(s)?	0.399
Were joint mobilization skills/techniques covered as part of a required course during your entry-level undergraduate athletic training education program?	0.624
Approximately how much time was spent learning joint mobilization skills/techniques in the required course(s)?	*
Were you encouraged to practice your joint mobilization skills during your clinical experience/clinical rotations?	0.81
Was joint mobilization covered during your graduate level education?	1.000
Was joint mobilization theory covered as part of a required course during your graduate education program?	0.607
Approximately how much time was spent learning the theories associated with joint mobilization in the required course(s)?	0.759

Were joint mobilization skills/techniques covered as part of a required course during your graduate education program?	0.607
Approximately how much time was spent learning the skills/ techniques in the required course(s)?	0.907
If you had a graduate assistantship while in graduate school how often did you use joint mobilization on your patients?	0.951
Have you taken a continuing education course post BOC certification that included joint mobilization?	1.000
Approximately how many continuing education contact hours (CEUs) have you have in courses that included joint mobilization?	1.000
Do you feel comfortable in assessing/determining when it is appropriate to use joint mobilization?	1.000

* Reliability could not be determined because one of the variables had zero variance

All but one of the survey questions run through the Cronbach alpha showed good to excellent reliability. The following question: Approximately how much time was spent learning the theories associated with joint mobilization in the required course(s) showed a reliability of 0.399. There could be a couple of different reasons as to why this number was lower than the others. When the researcher transferred the survey questions over to SurveyMonkey one of the question before this one accidently omitted; the question being: Was joint mobilization covered during your entry-level undergraduate athletic training education program? The researcher wants to point out this error because the same question on approximately how much time was spent learning the theories associated with joint mobilization was asked in terms of graduate education training, and the reliability came back to be 0.759. The researcher included the introduction question asking if the subjects had covered joint mobilization during their graduate level education. Another reason this question displayed a low reliability is the fact that the researcher asked a somewhat difficult question for each subject to think back on how many hours were actually spent reviewing joint mobilization theories. This could be a hard task for a subject that has not been enrolled in their

entry-level program for ten or more years. Therefore, the low reliability of this question needs to be taken into consideration when reading the following results.

Demographic Data

The Educational Predictor for Joint Mobilization Usage Survey was sent to 1,000 District 3 members, and 234 certified athletic trainers completed the survey. The following information will reveal demographic and descriptive data found within this study. Out of the 234 participants 43.6 percent were male and 56.4 percent were female. Participants were also asked to report when they completed their entry-level athletic training education program. The average year of completion was 1999.91 with the earliest year dating back to 1967 and the most recent year being 2008.

Participants in this study were asked to mark their highest level of education. Table 2 illustrates the frequency of individuals who received a bachelors, masters, and/or doctoral degree.

Table 2: Frequency of Highest Level of Education

Degree	Frequency	Percentage
Bachelors	78	33.3
Masters	142	60.7
Doctoral	14	6.0

Table 3 examines the type of doctoral degrees held by the participants in this study.

Table 3. Frequency of Different Types of Doctoral Degrees

Degree	Frequency	Percentage
None	218	93.2
DPT	5	2.1
EdD	3	1.3
PhD	6	2.6
Other	2	0.9

Table 4 shows how many subjects possess other credentials other than ATC. The researcher's survey showed that none of the subjects who participated in this study were a Medical Doctor, Occupational Therapist Assistant, Doctor of Osteopathic Medicine, Doctor of Chiropractic, or Registered Nurse.

Table 4. Frequency of Credentials

Credentials	Frequency	Percentage
Physical Therapist	12	5.1
Physical Therapist Assistant	5	2.1
Occupational Therapist	1	0.4
Certified Strength and Conditioning Specialist	30	12.7
Performance Enhancement Specialist	14	5.9
Emergency Medical Technician	23	9.7
Teacher Certification	41	17.3
None	112	47.3

The next two tables illustrate the subject’s current place of employment (Table 5) and current employment position (Table 6).

Table 5. Frequency of Play of Employment

Place of Employment	Frequency	Percentage
University/College-Academic	19	8.0
University/College-Clinical	63	26.6
University/College-Academic/Clinical	31	13.1
Professional Sports	9	3.8
Industrial	3	1.3
Military	6	2.5
Secondary Schools	82	34.6
Out-patient clinic	33	13.9
Hospital (In-patient Clinic)	6	2.5

Table 6. Current Employment Position

Employment Position	Frequency	Percentage
Academic Faculty	48	20.3
Clinical Faulty	21	8.9
Clinical Staff	111	46.8
Other	86	36.3

The following tables reveal response frequency to yes or no questions based on undergraduate joint mobilization educational training. Table 7 reports whether or not joint mobilization was covered during the subjects' entry-level undergraduate athletic training education program (UATEP). Table 8 concentrates on joint mobilization theory while table 9 examines joint mobilization skills/techniques. Subjects were also asked if they were encouraged to use joint mobilization in their undergraduate clinical setting (Table 10), and if they have used joint mobilization since the completion of their entry-level undergraduate education program (Table 11).

Table 7. Coverage of Joint Mobilization During UATEP

Responses	Frequency	Percentage
Yes	168	71.8
No	66	28.2

Individuals who represent “No” in table 7 were not included in the frequencies of tables 8 and 9.

Table 8. Coverage of Joint Mobilization Theory During UATEP

Responses	Frequency	Percentage
Yes	144	61.5
No	24	10.1

Table 9. Coverage of Joint Mobilization Skills/Techniques During UATEP

Responses	Frequency	Percentage
Yes	152	65.0
No	16	6.8

Table 10. Encouragement to Practice Joint Mobilization

Responses	Frequency	Percentage
Yes	132	56.4
No	102	43.6

Table 11. Joint Mobilization Usage Since Completion of UATEP

Responses	Frequency	Percentage
Yes	191	81.6
No	43	18.4

Forty-three participants stating that they did not use joint mobilization since they completed their entry-level undergraduate education program. Therefore, table 12 examines why these participants have not used joint mobilization since then.

Table 12. Why Participants Have Not Used Joint Mobilization Since UATEP

Responses	Frequency	Percentage
Not confident enough in your own skill level	26	11.0
Afraid of causing permanent injury	3	1.3
To time consuming	9	3.8
Do not believe it is an effective treatment	3	1.3
Prefer other manual therapies	8	3.4
Lack of knowledge in area(never had instruction)	9	3.8
Lack of knowledge in area(insufficient instruction)	16	6.8
Lack of skill in area(never had instruction of skill)	5	2.1

Lack of skill in area(insufficient instruction of skill)	19	8.0
Lack of sufficient time to do techniques effectively	218	92.0
Do not perceive the need for it in my patient population	18	7.6

The following tables will examine response frequency to yes or no questions based on graduate joint mobilization educational training. The graduate portion of the survey investigated the same areas as undergraduate educational training: coverage of joint mobilization (Table 13), joint mobilization theory (Table 14), and joint mobilization skills/techniques (Table 15).

Table 13. Coverage of Joint Mobilization During Graduate School

Responses	**Frequency**	**Percentage**
Yes	88	37.6
No	109	46.6
Did Not Attend	37	15.8

Individuals who represent “No” or “Did Not Attend” in table 13 were not included in the frequencies of tables 14 and 15.

Table 14. Coverage of Joint Mobilization Theory During Graduate School

Responses	Frequency	Percentage
Yes	75	32.1
No	13	5.6

Table 15. Coverage of Joint Mobilization Skills/Techniques During Graduate School

Responses	Frequency	Percentage
Yes	75	32.1
No	13	5.6

Continuing Education (CEU) is the last educational training area examined in this survey. Table 16 will reveal if the subjects have ever taken a formal CEU course(s) on joint mobilization post BOC certification,

while table 17 will show the area of concentration of the course(s).

Table 16. Continuing Education Course on Joint Mobilization

Responses	Frequency	Percentage
Yes	62	26.5
No	172	73.5

Individuals who represent “No” in table 16 were not included in the frequencies of table 17.

Table 17. Anatomical Areas Covered During the CEU Course(s)

Responses	Frequency	Percentage
Extremities	27	11.5
Spine	4	1.7
Both	34	14.5

Table 18 illustrates several different clinicians who adopted different techniques of joint mobilization.

Participants in this study were asked to choose which of the following technique they used most often.

Table 18. Frequency of Techniques of Joint Mobilization

Clinicians	Frequency	Percentage
Cyriax	99	41.8
Kaltenborn	46	19.4
Maitland	140	59.1
Paris	7	3.0
Mennel	35	14.8
Unknown	56	23.6

Participants in the survey were asked general questions on joint mobilization such as: if they thought joint mobilization was a helpful rehabilitation (rehab) tool (Table 19), the purpose of joint mobilization (Table 20), and if they were comfortable assessing/determining when to use joint mobilization (Table 21).

Table 19. Is Joint Mobilization a Helpful Rehab Tool

Responses	Frequency	Percentage
Yes	227	97.0
No	7	3.0

Table 20. When is Joint Mobilization Most Helpful

Responses	Frequency	Percentage
Increase ROM	71	30.3
Decrease Pain	1	.4
Increase Function	6	2.5
All of the Above	156	66.7

Table 21. Comfortable Assessing/Determining When to Use Joint Mobilization

Responses	Frequency	Percentage
Yes	178	76.1
No	56	23.9

The last table (Table 22) examines the frequency rates on the reasons why participants in this survey have not taken a CEU course on joint mobilization.

Table 22. Reasons for Not Taking a CEU Course on Joint Mobilization

Responses	Frequency	Percentage
Timing or scheduling conflict	103	43.5
Costs too much	76	32.1
Do not perceive a need for it in my patient population	21	8.9
Not interested in it	23	9.7
Believe that I am adequately prepared/ trained in joint mobilization from athletic training education	18	7.6

Hypothesis Testing

The Educational Predictor on Joint Mobilization Usage Survey was divided into 4 main sections: 1) Undergraduate Educational Training, 2) Graduate Educational Training, 3) Continuing Education Contact Hours (CEUs), and 4) Joint Mobilization Usage. Undergraduate educational training (independent variable) included the amount of time spent learning joint mobilization theories (ugthyhrs) and the amount of time spent learning joint mobilization skills (ugskillh). Graduate educational training (independent variable) also included the amount of time spent learning joint mobilization theories (grthehrs) and skills (grskillh) along with how often participants used joint mobilization during graduate school if they had a graduate assistant position (gaassist). Continuing education training (independent variable) included the amount of contact hours participants had (ceuhours). Joint mobilization usage (dependent variable) was defined in three different ways: on which anatomical areas have participants used joint mobilization (usejtmob), on which anatomical areas do participants feel most confident using joint mobilization (conjtmob), and on which anatomical areas do participants use joint mobilization the most

(dousejtm). The following hypothesis was investigated by this study.

Hypothesis 1: Certified athletic trainers with more knowledge and understanding on joint mobilization will be more inclined to use this manual therapy technique in their clinical setting.

Conclusion: Three different stepwise regression analyses were run to determine which independent variables affected joint mobilization usage. Table 23 illustrates to the readers the descriptive statistics of the first stepwise regression analysis.

Table 23: Descriptive Statistics for the First Stepwise

Variables	Mean	Std. Deviation	N
Usejtmob ($\hat{Y}_1$)	4.7	3.19	234
Ugthyhrs (X_1)	1.8	1.83	234
Ugskillh (X_2)	1.9	1.78	234
Grthehrs (X_3)	1.0	1.62	234
Grskillh (X_4)	1.1	1.70	234
Gaassist (X_5)	2.6	1.42	234
Ceuhours (X_6)	4.5	11.69	234

The first dependent variable the researcher examined was usejtmob ($\hat{Y}_1$). Usejtmob is short for the following: on what anatomical areas have the participants of this study used joint mobilization.

Statistically significant correlations are seen between several of the independent variables to the dependent variable. Table 24 examines these significant correlations. The top portion of the table indentifies correlation matrixes while the bottom portion of the table identifies significant correlation

Table 24: Correlations for First Stepwise

	Variables	usejtmob	Ugthyhrs	Ugskillh	Grthehrs	Grskillh	Gaassist	Ceuhours
Pearson Correlation	Usejtmob($\hat{Y}_1$)	1.000						
	Ugthyhrs(X_1)	-0.043	1.000					
	Ugskillh(X_2)	-0.044	0.87	1.000				
	Grthehrs(X_3)	0.334	0.131	0.087	1.000			
	Grskillh(X_4)	0.389	0.094	0.081	0.851	1.000		
	Gaassist(X_5)	0.309	0.13	0.085	0.305	0.343	1.000	
	Ceuhours(X_6)	0.39	-0.25	-0.271	0.129	0.096	-0.090	1.000
Sig. (1-tailed)	usejtmob($\hat{Y}_1$)	.						
	Ugthyhrs(X_1)	0.255	.					
	Ugskillh(X_2)	0.252	.000	.				
	Grthehrs(X_3)	.000	0.023	0.092	.			
	Grskillh(X_4)	.000	0.076	0.11	.000	.		
	Gaassist(X_5)	.000	0.023	0.097	.000	.00	.	
	Ceuhours(X_6)	.000	.000	.000	0.025	0.071	0.084	.

Table 24 shows the reader that the amount of time spent learning joint mobilization theories (grthehrs X_3) and skills (grskillh X_4) in graduate school, along with how often participants used joint mobilization during graduate school if they had a graduate assistant position (gaassist X_5), and the amount of contact hours participants had in joint mobilization continuing education (ceuhours X_6). All of the above variables showed significance when predicting on what anatomical areas have the participants used joint mobilization (usejtmob $\hat{Y}_1$). However, grthehrs (X_3) and grskillh (X_4) show such similar significance that grthehrs (X_3) was not included in the model because it would not make the model any more significant.

Table 25 reports the variables included in the stepwise regression, exclusion criteria, and inclusion criteria SPSS used to determine which variables were significant.

Table 25: Variables Entered/Removed for First Stepwise

Model	Variables Entered	Variables Removed	Method
1	Ceuhours (X_6)	-	Stepwise(Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-Remove >=.100)
2	Grskillh (X_4)	-	Stepwise(Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >=.100)
3	Gaassist (X_5)	-	Stepwise(Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >=.100)

Table 26 views the actual predictive model. Model 1 includes ceuhours (X_6) only, while model 2 includes ceuhours (X_6) and grskillh (X_4), and model 3 includes ceuhours (X_6), grskillh (X_4), and gaassist (X_5).

Table 26: Model Summary: First Predictive Model

Model	R	R Square
1	.390	.152
2	.526	.277
3	.577	.332

Model 1: Ceuhours
Model 2: Ceuhours, Grskillh
Model 3: Ceuhours, Grskillh, Gaassist

Table 26 shows the predictive model, while table 27 suggests to the reader that there is statistical significance within all three models. Table 27 only reports Model 3. The following ANOVA results in a p-value of equal to or less than .000. Therefore, based on the traditional p-value of .05 the results are held to be significant.

Table 27: ANOVA Regression for Model 3: First Predictive Model

Model	Sum of Squares	df	Mean Square	F	Sig
3 Regression	789.188	3	263.063	38.177	.000
3 Residual	1584.850	230	6.891		
3 Total	2374.038	233			

In order to predict on what anatomical areas athletic trainers have used joint mobilization on, the following equations must be understood: $\hat{Y}_1 = a + bX_6 + bX_4 + bX_5$, $\hat{Y}_1$ = predictive joint mobilization usage, a = the constant (intersection of where the line hits the y-axis, b = the slope of the line, X_6 = ceuhours, X_4 = grskillh, and X_5 = gaassist.

Table 28 illustrates this predictive equation in more depth.

Table 28: The Predictive Model: Anatomical Areas Athletic Trainers Have Used Joint Mobilization based on their Educational Training

	Unstandardized Coefficient	
Model 3	**B**	**Std Error**
Constant	2.2	0.38
Ceuhours(X_6)	.11	0.02
Grskillh(X_4)	.50	0.11
Gaassist(X_5)	.57	0.13

Conclusion: The second dependent variable the researcher examined was conjtmob ($\hat{Y}_2$). Conjtmob is short for the following: on what anatomical areas did the participants of this study you feel most confident when using joint mobilization. Table 29 shows the readers the descriptive statistics of the second stepwise regression analysis.

Table 29: Descriptive Statistics for the Second Stepwise

Variables	**Mean**	**Std. Deviation**	**N**
Conjtmob($\hat{Y}_2$)	3.6	2.66	234
Ugthyhrs(X_1)	1.8	1.82	234
Ugskillh(X_2)	1.9	1.78	234
Grthehrs(X_3)	1.0	1.62	234
Grskillh(X_4)	1.1	1.70	234
Gaassist(X_5)	2.6	1.42	234
Ceuhours(X_6)	4.5	11.69	234

Statistically significant correlations are seen between several of the independent variables to the

dependent variable. Table 30 examines these significant correlations. The top portion of the table indentifies correlation matrixes while the bottom portion of the table identifies significant correlations.

Table 30: Correlations for Second Stepwise

	Variables	conjtmob	Ugthyhrs	Ugskillh	Grthehrs	Grskillh	Gaassist	Ceuhours
Pearson Correlation	Conjtmob($\hat{Y}_2$)	1.000						
	Ugthyhrs(X_1)	-0.093	1.000					
	Ugskillh(X_2)	-0.094	0.870	1.000				
	Grthehrs(X_3)	0.189	0.131	0.087	1.000			
	Grskillh(X_4)	0.225	0.094	0.081	0.851	1.000		
	Gaassist(X_5)	0.263	0.130	0.085	0.305	0.343	1.000	
	Ceuhours(X_6)	0.374	-0.250	-0.271	0.129	0.096	-0.090	1.000
Sig. (1-tailed)	Conjtmob($\hat{Y}_2$)	.						
	Ugthyhrs(X_1)	0.078	.					
	Ugskillh(X_2)	0.075	.000	.				
	Grthehrs(X_3)	0.002	0.023	0.092	.			
	Grskillh(X_4)	.000	0.076	0.110	.000	.		
	Gaassist(X_5)	.000	0.023	0.097	.000	.000	.	
	Ceuhours(X_6)	.000	.000	.000	0.025	0.071	0.084	.

Table 30 shows the reader that participants that had a graduate assistantship during graduate school and used joint mobilization (gaassist X_5), and the amount of contact hours participants had in joint mobilization continuing education (ceuhours X_6) show significant correlations when predicting on what anatomical structures participants felt most confident when using joint mobilization (conjtmob $\hat{Y}_2$).

Table 31 reports the variables included in the stepwise regression, exclusion criteria, and inclusion criteria SPSS used to determine which variables were significant.

Table 31: Variables Entered/Removed for Second Stepwise

Model	Variables Entered	Variables Removed	Method
1	Ceuhours(X_6)	-	Stepwise(Criteria: Probability-of-F-to-enter <= .050, Probabiilty –of-F-to Remove >=.100)
2	Gaassist(X_5)	-	Stepwise(Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-Remove >=.100)

Table 32 views the actual predictive model. Model 1 includes ceuhours (X_6) only while model 2 includes ceuhours (X_6) and gaassist (X_5).

Table 32: Model Summary: Second Predictive Model

Model	R	R Square
1	.374	.140
2	.478	.228

Model 1: Ceuhours
Model 2: Ceuhours, Gaassist

Table 32 shows the predictive model, while table 33 demonstrates to the reader there is statistical significance within both models. Table 33 only reports Model 2. The following ANOVA results in a p-value of equal to or less than .000. Therefore, based on the traditional p-value of .05 the results are held to be significant.

Table 33: ANOVA Regression for Model 2: Second Predictive Model

Model	Sum of Squares	df	Mean Square	F	Sig
2 Regression	375.473	2	187.737	32.204	.000
2 Residual	1267.911	231	5.489		
2 Total	1643.385	233			

In order to predict on what anatomical areas athletic trainers feel most confident using joint mobilization the following equations must be understood: $\hat{Y}_2 = a + bX_6 + bX_5$, $\hat{Y}_2$ = predictive joint mobilization usage, a = the constant (intersection of where the line hits the y-axis, b = the slope of the line, X_6 = ceuhours, and X_5 = gaassist.

Table 34 illustrates this predictive equation in more depth.

Table 34: The Predictive Model: Anatomical Areas Athletic Trainers Feel Most Confident When Using Joint Mobilization Based on their Educational Training

	Unstandardized Coefficient	
Model 2	**B**	**Std Error**
Constant	1.7	0.34
Ceuhours(X_6)	.09	0.01
Gaassist(X_5)	.56	0.11

Conclusion: The third dependent variable the researcher examined was dousejtm ($\hat{Y}_3$). Dousejtm is short for the following: on what anatomical areas do the participants use joint mobilization most. Table 35 illustrates to the readers the descriptive statistics of the third stepwise regression analysis.

Table 35: Descriptive Statistics for the Third Stepwise

Variables	Mean	Std. Deviation	N
Dousejtm($\hat{Y}_3$)	2.5	1.99	234
Ugthyhrs(X_1)	1.8	1.83	234
Ugskillh(X_2)	1.9	1.78	234
Grthehrs(X_3)	1.0	1.62	234
Grskillh(X_4)	1.1	1.70	234
Gaassist(X_5)	2.6	1.42	234
Ceuhours(X_6)	4.5	11.69	234

Statistically significant correlations are seen between several of the independent variables to the dependent variable. Table 36 examines these significant correlations. The top portion

of the table indentifies correlation matrixes while the bottom portion of the table identifies significant correlations.

Table 36: Correlations for Third Stepwise

	Variables	Dousejtm	Ugthyhrs	Ugskillh	Grthehrs	Grskillh	Gaassist	Ceuhours
Pearson Correlation	Dousejtm($\hat{Y}_3$)	1.000						
	Ugthyhrs(X_1)	-0.060	1.000					
	Ugskillh(X_2)	-0.074	0.870	1.000				
	Grthehrs(X_3)	0.179	0.131	0.087	1.000			
	Grskillh(X_4)	0.218	0.094	0.081	0.851	1.000		
	Gaassist(X_5)	0.177	0.130	0.085	0.305	0.343	1.000	
	Ceuhours(X_6)	0.410	-0.250	-0.271	0.129	0.096	-0.090	1.000
Sig. (1-tailed)	Dousejtm($\hat{Y}_3$)	.						
	Ugthyhrs(X_1)	0.180	.					
	Ugskillh(X_2)	0.128	.000	.				
	Grthehrs(X_3)	0.003	0.023	0.092	.			
	Grskillh(X_4)	.000	0.076	0.110	.000	.		
	Gaassist(X_5)	.003	0.023	0.097	.000	.000	.	
	Ceuhours(X_6)	.000	.000	.000	0.025	0.071	0.084	.

Table 36 shows the reader that participants that had a graduate assistantship during graduate school and used joint mobilization (gaassist X_5), and the amount of contact hours participants had in joint mobilization continuing education (ceuhours X_6) show significant correlations when predicting on what anatomical structures participants use joint mobilization on the most (dousejtm $\hat{Y}_3$).

Table 37 reports the variables included in the stepwise regression, exclusion criteria, and inclusion criteria SPSS used to determine which variables were significant.

Table 37: Variables Entered/Removed for Third Stepwise

Model	Variables Entered	Variables Removed	Method
1	Ceuhours(X_6)	-	Stepwise(Criteria: Probability-of-F-to-enter <= .050, Probability-to-F-t0-Remove >=.100)
2	Gaassist(X_5)	-	Stepwise(Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-Remove >=.100)

Table 38 views the actual predictive model. Model 1 includes ceuhours (X_6) only while model 2 includes ceuhours (X_6) and gaassist (X_5).

Table 38: Model Summary: Third Predictive Model

Model	R	R Square
1	.410	.168
2	.463	.214

Model 1: Ceuhours
Model 2: Ceuhours, Gaassist

Table 38 shows the predictive model, while table 39 substantiates to the reader there is statistical significance within both models. Table 39 only reports Model 2. The following ANOVA results in a p-value of equal to or less than .000. Therefore, based on the traditional p-value of .05 the results are held to be significant.

Table 39: ANOVA Regression for Model 2: Third Predictive Model

Model	Sum of Squares	df	Mean Square	F	Sig
2 Regression	155.122	1	98.870	31.432	.000
2 Residual	726.606	231	3.145		
2 Total	924.346	233			

In order to predict on what anatomical areas athletic trainers use joint mobilization on the most the following equations must be understood: $\hat{Y}_3 = a + bX_6 + bX_5$, $\hat{Y}_3$ = predictive joint mobilization usage, a = the constant (intersection of where the line hits the y-axis, b = the slope of the line, X_6 = ceuhours, and X_5 = gaassist. Table 40 gives more details to this predictive equation.

Table 40: The Predictive Model: Anatomical Areas Athletic Trainers Use Joint Mobilization on the Most Based on Their Educational Training

	Unstandardized Coefficient	
Model 2	**B**	**Std Error**
Constant	1.3	0.25
Ceuhours(X_6)	.07	0.01
Gaassist(X_5)	.30	0.82

DISCUSSION

The discussion section will be divided into three subsections: 1) Discussion of the Results, 2) Implications to the Profession, and 3) Recommendations for Future Research.

Discussion of the Results

The purpose of this study was to create a predictive model through the use of a survey to determine if educational training levels predict joint mobilization utilization. Joint mobilization is a manual therapy used on individuals suffering from pain or hypomobility.[1-2] Previous research has shown that joint mobilization is effective in decreasing pain and restoring joint motion and function.[3] Since 1999 athletic training students enrolled in entry-level athletic training programs have been exposed to joint mobilization.[8] However, there is no current research on the prevalence of joint mobilization use by athletic trainers since it has now been made a mandatory part of the curriculum. Therefore, research on whether or not undergraduate, graduate, and/or continuing educational training affects the use of joint mobilization is essential

in order to discover the level of usage of this manual therapy technique. Consequently, the researcher believes that certified athletic trainers with more knowledge and understanding on joint mobilization will be more inclined to use this manual therapy technique in their clinical setting.

This research study found that educational training does in fact play a role in the use of joint mobilization. Joint mobilization was defined three different ways: 1) On which anatomical areas have you used joint mobilization (usejtmob $\hat{Y}_1$), 2) On which anatomical structures do you feel most confident when using joint mobilization (conjtmob $\hat{Y}_2$), and 3) On which anatomical structures do you use joint mobilization most (dousejtm $\hat{Y}_3$)? Each one of these variables was analyzed individually via a stepwise regression.

The first predictive model is shown in Table 26. This predictive model is made up of the following variable: (Table 26) continuing education hours (ceuhours X_6), hours spent learning skills/techniques in graduate school (grskillh X_4), and how often joint mobilization were used if participants had a graduate assistantship (gaassist X_5). Table 26 introduces the predictive model, while Table 27 verifies for the readers that these three variables are

statistically significant when predicting usejtmob ($\hat{Y}_1$). Usejtmob is short for the following: on what anatomical areas have the participants of this study used joint mobilization.

If the researcher were to plot model 1 (refer to Table 26) on a graph usejtmob ($\hat{Y}_1$) would be the y-axis while Ceuhours (X_6) would be the x-axis. Since 62 out of the 234 participants (refer to Table 16) had taken a CEU on joint mobilization there would be 62 dots ranging from 0-100. An ascending line would then run through this plotted data acting as a predictive line. Therefore, “r” in Table 26 is the correlation of the line to the data set, while “r square” in table 26 is the percent of variability that is explained by the line. Thus, 15% of variability in the use of joint mobilization is predicted by ceuhours (X_6).

In order to predict anatomical areas athletic trainers have used joint mobilization on, the following predictive equation must be understood: $\hat{Y}_1 = a + bX_6 + bX_4 + bX_5$. Since Model 3 showed statistical significance in three variables the equation was broken down as follows (numbers are derived from Table 28):

$\hat{Y}_1 = 2.2 + .11(\text{ceuhours}) + .50(\text{grskillh}) + .57(\text{Gaassist})$.

Participants in this survey were asked an open-ended question on how many hours they thought they received on

joint mobilization continuing education. Participants who covered joint mobilization in graduate school were asked to mark approximately how much time was spent learning joint mobilization skills/techniques; subjects could choose 1 hour, 2 hours, 3 hours, more than 3 hours, or unknown.

Subjects were also asked if they had a graduate assistantship in graduate school how often they would use joint mobilization; participants could choose from the following: did not have a graduate assistantship, never, limited, moderately, often, or very often. The researcher coded these responses as follows: did not have a graduate assistantship = 1 never = 2, limited = 3, moderately = 4, often = 5, and very often = 6. Therefore, a participant who completed this survey and had 6 hours of CEU training, 2 hours of skills/techniques training, and used joint mobilization moderately will have an equation that looks like this (numbers derived from Table 28):

$\hat{Y}_1 = 2.2 + .11(6) + .50\ (3) + .57(4)$

↓

$\hat{Y}_1 = 2.2 + .66 + 1.5 + 2.28$

↓

$\hat{Y}_1 = 6.6$

Thus, 6.6 is the predicted amount of joint mobilization usage with a subject who has had 6 hours of CEU training, 3

hours of graduate skill training, and used joint mobilization moderately on their athletes while they were a graduate assistant.

It is evident that ceuhours (X_6) by itself was the most statistically significant independent variable; however, the most important variable in model 3 was gaassist (X_5) because it shows the largest coefficient of .57 seen in Table 28. With this information known an individual who has used joint mobilization uses this manual therapy because he or she was very hands-on during their graduate assistantship. The researcher believes this is an accurate result because graduate assistantships require hands-on-learning, compared to a continuing education course that might not give the participant active interaction needed to advance joint mobilization skills.

Hours spent learning skills and techniques in graduate school also played a significant role in joint mobilization utilization. The researcher thinks students that go to graduate school in athletic training may not attend to necessarily learn new ways of doing things, but instead wish to perfect skills and techniques taught in undergraduate education. Joint mobilization is just one example of this. The researcher thought that undergraduate education would have played the most significant role on

joint mobilization use; however, as the results of this study were revealed, it does make sense that graduate education plays a statistically significant role because skills are being improved and refined. Not only are manual therapy skills being practiced in the classroom, but the student has the opportunity to apply and perform the skills on their athletes in the clinic.

The second predictive model is shown in Table 32, and states that ceuhours (X_6) and gaassist (X_5) show statistical significance (Table 33) when predicting on what anatomical structures participants felt most confident when using joint mobilization (conjtmob $\hat{Y}_2$). If the researcher were to plot model 1 (refer to Table 32) on a graph conjtmob ($\hat{Y}_2$) would be the y-axis while ceuhours (X_6) would be the x-axis. An ascending line would then run through this plotted data acting as a predictive line. Therefore, “r” in Table 32 is the correlation of the line to the data set, while “r square” in Table 32 is the percent of variability that is explained by the line. Thus, 14% of variability in the areas individuals feel most confident using joint mobilization is predicted by ceuhours.

In order to predict joint mobilization utilization and how confident individuals are when using joint mobilization the following predictive equation must be understood:

$\hat{Y}_2 = a + bX_6 + bX_5$. Since Model 2 showed statistical significance in two variables the equation was broken down as follows (numbers are derived from Table 34):

$\hat{Y}_2 = 1.7 + .09(\text{ceuhours}) + .56(\text{Gaassist})$.

With this information known, a participant who completed this survey and had 6 hours of CEU training and used joint mobilization moderately will have an equation that looks like this:

$\hat{Y}_2 = 1.7 + .09(6) + .56(4)$

↓

$\hat{Y}_2 = 1.7 + .54 + 2.24$

↓

$\hat{Y}_2 = 4.5$

Thus, 4.5 is the predicted amount of joint mobilization usage with a subject who has had 6 hours of CEU training and used joint mobilization moderately on their athletes while they were a graduate assistant.

Similar to the first predictive model discussed ceuhours (X_6) and gaassist (X_5) showed statistical significance when predicting conjtmob ($\hat{Y}_2$). Again, ceuhours (X_6) shows the most significance while gaassist (X_5) shows the most importance with a larger coefficient of .56 seen in Table 28. The researcher believes the gaassist (X_5) is more important than the ceuhours (X_6) because more hands-on-

learning takes place with a graduate assistantship compared to a continuing education course.

The third predictive model is shown in Table 38, and states that ceuhours (X_6) and gaassist (X_5) show statistical significance (Table 39) when predicting on what anatomical structures participants use joint mobilization most often (dousejtm $\hat{Y}_3$). If the researcher were to plot model 1 (refer to Table 38) on a graph dousejtm ($\hat{Y}_3$) would be the y-axis while ceuhours (X_6) would be the x-axis. An ascending line would then run through this plotted data acting as a predictive line. Therefore "r" in Table 38 is the correlation of the line to the data set, while "r square" in Table 38 is the percent of variability that is explained by the line. Thus, 16% of variability on the anatomical areas that participants use joint mobilization most is predicted by ceuhours (X_6). Therefore, to increase the amount of different joints participants use joint mobilization, individuals need to attend continuing education conferences on this manual therapy technique.

In order to predict anatomical areas athletic trainers use joint mobilization on most often the following predictive equation must be understood: $\hat{Y}_3 = a + bX_6 + bX_5$. Since Model 2 showed statistical significance in two

variables the equation was broken down as follows (numbers are derived from Table 40):

$\hat{Y}_3$ = 1.3 +.07(ceuhours) + .30(Gaassist).

With this information known, a participant who completed this survey and had 20 hours of CEU training and used joint mobilization often will have an equation that looks like this:

$\hat{Y}_3$ = 1.3 +.07(20) + .30(5)

↓

$\hat{Y}_3$ = 1.3 + 1.4 + 1.5

↓

$\hat{Y}_3$ = 4.2

Thus, 4.2 is the predicted amount of joint mobilization usage with a subject who has had 20 hours of CEU training and used joint mobilization often on their athletes while they were a graduate assistant.

Similar to the second predictive model discussed ceuhours (X_6) and gaassist (X_5) showed statistical significance when predicting dousejtm ($\hat{Y}_3$). Again, ceuhours (X_6) shows the most significance while gaassist (X_5) shows the most importance with a larger coefficient of .30 seen in table 28. The researcher believes the gaassist (X_5) is more important than the ceuhours (X_6) because more hands-on-

learning takes place with a graduate assistantship compared to a continuing education course.

Implications to the Profession

With a predictive model constructed on the level of usage of joint mobilization the researcher wants to discuss several ways the athletic training profession can implement this information into entry-level curriculums and post continuing education courses. This research studied six variables to predict joint mobilization utilization, and three of the variables showed significance. This leaves the researcher with educational areas that need to be improved upon in order for joint mobilization to be used more readily in the clinical setting. The researcher's study showed that time spent learning theories, skill, and techniques on joint mobilization during undergraduate educational training had no affect on the level of usage for this manual therapy. Therefore, undergraduate curriculums need to spend more time educating athletic training students on joint mobilization, and then emphasizing techniques learned in the classroom in the clinical setting. One of the best ways to perfect joint mobilization is to actually practice the technique. Hence,

why gaassist (X_5) showed the most importance when predicting joint mobilization use.

This research can also be useful to individuals who have already gained their bachelor and masters degrees. A person in this situation who already has their degrees, but wants to be proficient in using joint mobilization may take continuing education courses. As the predictive model shows ceuhours (X_6) is the most statistically significant variable when predicting joint mobilization use. Therefore, instead of suggesting this person go back to graduate school to learn joint mobilization skills and techniques; the suggestion of continuing education should be discussed. This implication can be made because the predictive model states that continuing education affects joint mobilization utilization.

Recommendations for Future Research

Based on the results of this study, the following suggestions for future research will be made. The researcher's survey tested the following areas of undergraduate education in relation to joint mobilization: how much time the spent learning the theories and skill behind joint mobilization, and if participants were

encouraged to use joint mobilization during their clinical experiences/rotations. This research found that undergraduate education had no effect on joint mobilization utilization. Therefore, there needs to be research done on how undergraduate athletic training programs teach, implement, and reinforce joint mobilizations into their programs. This study showed a lack of undergraduate training when it came to predicting joint mobilization utilization. Thus, ways to increase joint mobilization education in the classroom and the clinic in undergraduate programs needs to be researched.

Secondly, there is a need for future research to discover what an acceptable level for the $\hat{Y}$ variable would be. Thus, what number ($\hat{Y}$ variable) is going to make someone proficient at using joint mobilization? If a standard number for the $\hat{Y}$ variable is found then athletic trainers looking for professionals that are competent in joint mobilization can use this predictive model to calculate how proficient someone is in using joint mobilization, or how many continuing education hours someone needs to become proficient with this manual therapy. For example, the researcher believes if a subject's $\hat{Y}$ variable is equal to or higher than 10 he or she is proficient at using joint mobilization. The subject

used joint mobilization often during his or her graduate assistantship but does not have any continuing education hours on this manual therapy technique. Therefore, with the help of this predictive model this subject could calculate how many continuing education hours he or she needed to receive a $\hat{Y}$ variable of 10 of higher making him or her proficient at using joint mobilization.

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APPENDICES

APPENDIX A

Review of Literature

REVIEW OF THE LITERATURE

Joint mobilization is a manual therapy technique used by athletic trainers when pain needs to be decreased and range of motion needs to be increased. Understanding the anatomical positioning of a joint is important when implementing these techniques. Standard protocols on joint mobilization have been implemented into rehabilitation plans based off clinicians such as Maitland, Kaltenborn, Cyriax, Mennel, and Paris. Depending on the treatment goals of the patient each one of these clinician's protocols for joint mobilization should be considered before executing the manual therapy. Research shows that joint mobilization does work when wanting to decrease pain and/or increase range of motion;[1] however, these techniques seem limited throughout the clinical setting. Thus, the purpose of this literature review is to: describe joint mobilization, describe the principles behind joint mobilization, describe the effects of joint mobilization, and review the education on joint mobilization in the clinical setting.

Joint Mobilization

The musculoskeletal system includes the body's joints, muscles, and bones. This system works as one to allow for everyday movement, and provides the human body with protection from outside forces. In order for joints to move appropriately in everyday activity small motions must occur at the joints. When these small movements at the joint become restricted, range of motion needs to be restored in order to perform daily activities of living.[2]

Joint mobilizations are just one clinical rehabilitation tool that can be used by certified athletic trainers to restore range of motion.[2] When a joint suffers a severe amount of trauma certain degrees of range of motion are usually lost; this is known as hypomobility. A decrease in range of motion can be caused by edema formation, pain after injury, and capsular restrictions. Joint mobilization not only work on restoring loss of motion, but decreasing pain as well.[3-4]

Joint Biomechanics

It is important to understand the biomechanics of a joint before discussing how joint mobilization works. Joint motions are a combination or both: physiological and

accessory movements.[3] Physiological joint motions include movements such as flexion, extension, abduction, adduction, and rotation; the patient can control these motions.[3-4] Accessory joint motions cannot be controlled by the patient and are commonly referred to as arthrokinematics.[4] Arthrokinematics refers to the way bones move within the joint space.[3] Five different movements can occur within all joints: roll, slide, spin, compression, and distraction. "Roll occurs when a new point of one surface meets a new point of the opposing surface."[3] For example, when a pen is rolled on the table each part of the pen will come in contact with the surface of the table. "Slide occurs when one point of one surface contacts new points on the opposing surface."[3] For example, a pen will come in contact with multiple surfaces of the table, but the table will only contact one part of the pen. "Spin occurs when one bone rotates around a stationary axis."[3] For example, spinning a pen on the surface of a table. Compression is when the joint space decreases, while distraction increases the joint space.[3] Understanding joint arthrokinematics is essential when learning the purposes behind joint mobilization and how it works.

Joint Mobilization and Range of Motion Physiology

As previously stated joint mobilization is used to increase range of motion. There are numerous articles on the impact joint mobilization plays on range of motion, and how this manual therapy technique has been known to benefit patients with hypomobility. Hypomobility can result in a decrease in joint function resulting in other joints overcompensating for the trauma.[5] When there is a decrease in range of motion there is a concurrent decrease in capsular mobility.[5] All joints are surrounded by a joint capsule.[5] The joint capsule protects the joint from outside forces and supplies the joint with synovial fluid, which lubricates the entire joint, joint surfaces, and provides nutrition to the joint.[5] When outside forces are applied to the joint, stretching of the capsule occurs which in turn will decrease the amount of hypomobility. Not only is hypomobility addressed with this manual therapy, but joint mobilization also inhibits pain receptors within the joint, which in turn will decrease overall pain.

Joint Mobilization and Pain Physiology

Pain can be a debilitating symptom of trauma when an athlete or patient is trying to recover from an injury. Most often an athletic trainer's primary goal is to decrease pain levels, which will allow for progressive treatment. If an athlete is pain-free, he or she will have more incentive to move forward in his or her rehabilitation process. There are many different techniques that can be used to decrease pain, and joint mobilization is just one option. Joint mobilization activates joint mechanoreceptors.[4] There are three different sensory mechanoreceptors found in the joint or around the joint that are sensitive to specific joint motions when joint mobilization is utilized.[4] Ruffini endings, Pacinian corpuscles, and Golgi ligament endings are all mechanorecptors which transmit information to the central nervous system via Type I, Type II, and Type III nerves.[4]

Ruffini endings are located in the superficial part of the joint capsule. This particular mechanorecptor can be found in all joint capsules within the body.[4] Ruffini endings are sensitive to stretch within the capsule, and have a low activation threshold.[4] Therefore, when small amplitude joint motions are administered Ruffini endings are stimulated.[4]

Pacinian corpuscles are located within joint capsules and fat pads.[4] They adapt rapidly to deep pressure, stretch, and vibration of high frequencies.[4] Thus, these mechanorecptors react to a rapid increase of tension in the joint capsule.[4]

Golgi ligament endings are found within collateral ligaments. These mechanorecptors transmit information on ligament tension during active or passive stretching to the central nervous system.[4] Golgi ligament endings have a high activation threshold; therefore, only being activated at the end-range of motion during joint mobilization.[4]

Activation of mechanoreceptors prevent nociceptors from becoming stimulated thus interrupting the pain stimulus from the spinal cord to the brain stem.[4] Nociceptors are free nerve endings found in the joint capsule that generate pain impulses. When small amplitude joint movements are applied to a joint the stimulation of nociceptors becomes decreased, thus decreasing the perception of pain.[4] Now that the physiology behind range of motion and pain has been reviewed it is essential that basic principles of joint mobilizations be discussed in order to understand how they are used.

Principles of Joint Mobilization

To understand the full premise behind joint mobilization it is imperative to understand the principles, and the clinicians who influenced the teaching of this manual therapy. There are several different clinicians who developed and refined the idea of joint mobilization. One of the most common joint mobilization techniques is that of Maitland's Five-Grade Mobilization System.[6] Freddy Kaltehnborn, James Cyriax, James Mennell, and Stanley Paris also contributed to the teachings and findings of joint mobilization.[3-4] Athletic trainers must determine which technique is the best in regards to treating the patient depending on the goals of the overall treatment.[5] Each clinician uses the same overall principle with different uses of accessory glides incorporated into the joint movements.[4,6]

James Cyriax's theory involved the search for the particular tissue that is causing the problem.[4] Once that tissue is identified Cyriax utilized strong passive movements in order to restore ROM.[4] James Mennell's theory emphasized the importance of normal joint function. He concluded that in order for full joint motion to occur small accessory movements are necessary.[3] Mennell's

mobilization techniques are more specific to the extremities instead of the spine.[3] Stanley Paris has a more diverse approach to arthrokinematics which incorporated both chiropractic and osteopathic techniques.[3] Paris's general rule with his patients was that his or her pain level would not be a guide for treatment protocols.[3] The last two clinicians, Maitland and Kaltenborn, divide their joint mobilization into five or three grades of movement.

Grades of Joint Mobilization

Since one of the common grades of joint mobilization come from Maitland it is important to review the principles behind his five-grade system of joint motions.[6] Maitland incorporates various degrees of amplitude on joint tissue causing mechanoreceptors to be stimulated and joint capsules to become stretched. Grade I is used to decrease pain and involves small amplitude motions at the beginning of the range of motion.[3,5] Grade II is also used to decrease pain and involves large amplitude motions applied midway through the full range of motion.[3,5] Grade III is used to increase range of motion and involves large amplitude motions applied at the end of range of motion.[3,5] Grade IV is used to increase range of motion and involves small amplitude motions applied at the end of range of

motion.[3,5] Grade V mobilizations are beyond the scope of certified athletic trainers and require manipulation of the joint beyond its normal range of motion.[3,5]

Kaltenborn, another clinician, uses a three-grade joint mobilization system. These grades incorporate traction and glide.[5] A Grade I movement involves distraction of a joint, a Grade II movement combines distraction and joint glides, and lastly, a Grade III movement utilizes joint traction and stretching to increase the joint capsule and surrounding structures that limit range of motion.[5] Both Maitland and Kaltenborn's treatments are effective, but all the research present in this literature review will be based on Maitland's five-grade mobilization techniques. No matter which clinician's technique is used during the rehabilitation process there are two rules that have to be understood before applying joint mobilization to a patient: the concave-convex rule and the convex-concave rule.

The Concave-Convex Rule and the Convex-Concave Rule

Once the grades of mobilization are established treatment is enforced through the rule depending on the surface of the joint being manipulated. In order for joint mobilization to be utilized this fundamental concept needs

to be understood. The concave-convex rule is as follows: when there is a concave surface moving on a convex surface the swing of the bone and the glide of the joint move in the same direction.[3,5] The convex-concave rule is as follows: when there is a convex surface moving on a concave surface the swing of the bone and the glide of the joint move in opposite directions.[3,5] This concept is more easily understood when an example is provided. A patient is suffering from adhesive capsulitis and shoulder abduction is very limited. Through the use of joint mobilization shoulder abduction can be increased. The convex-concave rule needs to be implemented in this situation. The convex surface would be the humeral head and the concave surface would be the glenoid fossa. Since there is a convex surface moving on a concave surface an inferior glide needs to be performed on the joint. Not only does a clinician need to understand the above rule in order to administer the joint mobilization, but also he or she always needs to be aware of the joint positioning before joint mobilization techniques are implemented.[5]

Positioning of the Joint During Mobilization

There are two positions a joint can be in: close-packed position and loose-pack position. A close-packed

position is when the joint and articular surfaces are compressed and congruent with one another such as: the glenohumeral joint as it reaches full abduction and external rotation.[3] Thus, the surrounding ligaments and the actual capsule are tight. If the ligaments and capsule are taut then traction of the joint is not easily obtained.[3] Joints suffering from hypomobility should not initially be mobilized in a close-packed position. A loose-packed position is any position that is not close-packed.[3] Therefore, the joint capsule and surrounding ligaments are lax, and the surfaces are not congruent.[3] This is known as the joint's resting position, and early joint mobilization techniques should be performed in this position. For example, the glenohumeral joint is resting at fifty-five degrees shoulder flexion with twenty to thirty degrees of horizontal abduction; while the closed packed position is full abduction with full lateral rotation.[3] It is not only important to position the joint correctly but the patient's overall body position needs to be considered upon delivery or this manual therapy.

Positioning of the Patient/Clinician During Mobilization

Stevenson et al. discuss the importance of four cardinal principles before administering joint

mobilization.[7] The first is positioning of the patient and the clinician.[7] The purpose of proper positioning is to minimize all discomfort. The athletic trainer always needs to make sure the patient is in the optimal position for delivery, comfort, and safety.[7] Minimal strain on the patient and the clinician is very important. Stabilization is the second principle and refers to both the patient's extremity segments and the control of the extremity the athletic trainer has while performing the joint mobilization.[7] It is only when stabilization is administered that effective treatment will be achieved. The third principle is mobilization, and this incorporates the importance of understanding the concave-convex rule.[7] When performing a joint mobilization one bone at the joint needs to remain stable to achieve true arthrokinematic results. For example, if there is a lack of knee extension the femur can be held stable while the tibia receives anterior glides, or the tibia can be held stable while the femur receives posterior glides. Lastly, comfort needs to be incorporated into a joint mobilization regime.[7] If maximum comfort is achieved then this manual therapy technique will be easily administered and little stress will be put on the patient and the athletic trainer.

Effects of Joint Mobilizations

With the above information known, one has to actually wonder if joint mobilization is effective when decreasing pain and increasing range of motion. There is research that supports the effectiveness of joint mobilization and the role it plays in the clinic. Joint mobilization can be performed on any joint in the body, but the most common areas joint mobilization are used on are the knee and shoulder;[5] however, there are research articles that discuss the use of this manual therapy on the ankle, low back, cervical spine, and hip.

The Effect Joint Mobilization Has on Pain

Non-specific low back pain in the athletic population is very common, and athletic trainers are always looking for ways to decrease the athlete's pain level. Hanrahan et al. examined the effects Grade I and II joint mobilizations had on low back dysfunction, and found that these type of graded joint motions decreased patient's pain in the short-term stages of back pain.[8] The joint mobilization group in this study received ice and stretching as well.

Conroy et al. found similar results in their study; however, it was geared toward primary shoulder impingement.[9] This study combined joint mobilization with a comprehensive treatment plan that incorporated hot packs, active range of motion, physiologic stretching, muscle stretching, and patient education. Grade I and II mobilization were applied and if these grades became less painful Grades III and IV were applied. In the end, the combination of joint mobilization and rehabilitation decreased the patient's twenty-four hour pain and pain with the subacromial compression test.[9]

Another study done on nonspecific low back pain took posterior-to-anterior mobilization and the press-up exercise, and examined the effects those two interventions had on pain when patients performed standing extension and lumbar extension.[10] Grades I and II mobilizations were used prior to grades III and IV. Both interventions decreased the average pain with standing extension, but no significant evidence was found to which method worked better.[10]

Mackawan et al. did a study on Thai massage verses joint mobilization on subjects with nonspecific low back pain.[11] Grade II mobilization was used at the level of L2-L5, or Thai massage was given to the surrounding low back

muscles for five minutes. In the end the study determined that both interventions decreased the patient's pain; however, Thai massage was more beneficial.[11]

Lastly, Moss et al. did a study on osteoarthritic knee joints and the effect large amplitude joint motions have on pain.[12] Anterior-to-posterior glides were done on the tibiofemoral joint, and the authors of the study found that this mobilization had immediate local and widespread hypoalgesic effects on the patient.[12]

Joint mobilizations may be a manual therapy technique that can be used to decrease pain. When joint mobilizations are added into comprehensive treatment plans they have a better overall effect than just being used by themselves to decrease pain.[9] Evidence shows joint mobilizations alone help to decrease pain; however, other techniques may be just as beneficial.

The Effect Joint Mobilization Has on Range of Motion

Joint mobilization is more commonly seen in the clinic when range of motion is restricted.[5] A study discussed earlier by Conroy et al. on joint mobilizations as a component of comprehensive treatment for primary shoulder impingement syndrome not only looked at pain but mobility as well.[9] This research revealed that joint mobilization

may not be as effective at increasing mobility; however Grade I and II mobilizations were implemented into the research protocol,[9] and according to Maitland, these are to relieve pain not increase range of motion.

Another study was done on the effects proprioceptive neuromuscular facilitation stretching and joint mobilization had on increasing posterior shoulder mobility.[13] Grade III and IV posterior glenohumeral joint mobilizations were provided, and Goldman et al. discovered that both treatment protocols were equally effective in increasing posterior shoulder mobility. Vermeulen et al. discovered that high grade mobilization techniques (Grade III and IV) were more effective at increasing mobility in patients with adhesive capsulitis than low-grade mobilization techniques (Grade I and II).[14] These results should make sense because Grade III and IV joint mobilization are specifically used to increase range of motion.[3]

Another study on adhesive capsulitis syndrome done by Yang et al. determined that end-range mobilization where more effective in increasing mobility than mid-range mobilization.[15]

Lastly, McNair et al. examined Grade III mobilization on the cervical spine in one patient suffering from acute

neck pain.[16] The patient made improvements in flexion, extension, left rotation, and left lateral rotation range of motion. This study revealed that Grade III mobilization techniques do work when increasing range of motion, however, the sample size is small so reliability is definitely questioned.[16]

The literature does provide evidence that joint mobilization works in decreasing pain and increasing range of motion. However, there are limited studies actually done by certified athletic trainers on joint mobilization in comparison to other research. Therefore, it is important to explore when athletic trainers were introduced to this manual therapy, and teaching methods behind joint mobilization.

Education about Joint Mobilization

Athletic trainers (ATs) have an extensive background in rehabilitation.[17] Mangus et al. reported that twenty-one percent of certified athletic trainers work in a rehabilitation setting; working closely with physical therapists.[5] However, there seems to be a lack of time spent educating athletic training students and certified athletic trainers (ATCs) on joint mobilization. Since ATs come in

contact with athletes that present with signs and symptoms of pain and lack of joint motion after injury it is important for them to be familiar with different treatment protocols used to address the pathology. ATs are constantly submerging themselves in the literature in order to learn new ways and methods for enhancing patient outcomes; joint mobilization is one technique that can do this.[5] Prior to 1999 only some entry-level athletic training programs introduced joint mobilization at the undergraduate level.[5] However, joint mobilization has now been included in both the third and fourth edition of the NATA educational competencies.[18] Therefore, students enrolled in entry-level athletic training programs post 1999 have been exposed to joint mobilization.[18] Since joint mobilization is now a part of Performance Domain IV: Treatment, Rehabilitation, and Reconditioning, this manual therapy technique should be considered for use by practicing athletic trainers.[19]

Athletic trainers that want to stay current in the profession should seek additional training in joint mobilization. Such training could be obtained through continuing education credits or in graduate school in which academic coursework can reinforce the principles of joint mobilization, and encourage athletic trainers to use this

rehabilitation tool on athletes suffering from pain and/or hypomobility. It is important to understand where ATs stand on the use of joint mobilization; however, there is limited research in this area.

Athletic Training Education on Joint Mobilization

In 1984 a "Western States Survey of Certified Athletic Trainers' Use of Joint Mobilization in Treatment Programs"[20] was implemented in order to determine the education and use of this manual therapy in the clinical setting.[20] The wider an ATs knowledge base on treatment protocols the faster and more efficient he or she will return the athlete to play. Reasoner gathered several different results from her survey: ATs relied mainly on their colleagues as a primary education source when and if joint mobilization needed to be used, seventy-two percent of ATs used joint mobilization reference sources more than once a month, universities and sports medicine clinics reported the highest rate of joint mobilization use, the majority of ATs participating in this survey used joint mobilization sparingly, and lastly, ATs that underwent formal education in joint mobilization used it more frequently compared with those who had less formal education.[20]

With this information known it is evident that joint mobilization education needs to be refined and implemented into undergraduate athletic training programs. It is apparent through this research that a lack of education is prevalent in the utilization of joint mobilization by the ATC. Athletic training curriculums need to spend more time educating future professionals on this manual therapy technique. A survey sent out to physical therapists discovered entry-level physical therapy education programs are expanding their curriculum in order to enhance the treatment of joint dysfunction through the use of joint mobilization.[1]

Physical Therapy Education on Joint Mobilization

Athletic training and physical therapy are two closely related professions; however, joint mobilization seems to be more prevalent in the physical therapy setting. Ben-Sorek et al. discovered that joint mobilizations were becoming increasingly more popular between the years of 1970 and 1986.[1] Therefore, more education was emphasized on this manual therapy technique during entry-level physical therapy education. From the 1970 survey, fifty-one entry-level physical therapy education programs were reviewed, none of which had a separate course offered in joint

mobilization; however, joint mobilization was taught as a subunit in nine of the programs.[21] In the 1986 survey thirty-seven percent of physical therapy education programs taught a separate course in joint mobilization, while sixty percent offered joint mobilization as a subunit.[1] Therefore, joint mobilizations implemented into entry-level programs have expanded from 1970 to 1986,[1] and according to Normative Model of Physical Therapy Education, joint mobilization should be included in all physical therapy curriculums.

Sorek et al. also studied whether or not physical therapists received instruction outside of the entry-level program, and compared the data to that of Volpe, the author of a similar study done in 1979. In both studies, continuing education was the instruction that was studied outside the entry-level.[1,22] Continuing education in joint mobilization did increase between these years; thus, increasing the opportunities for physical therapists to utilize joint mobilization in the clinical setting.[1] The more emphasis put on education the more likely physical therapists are to use joint mobilization.

If undergraduate and graduate athletic training programs took the time to incorporate joint mobilization as a more important subunit of therapeutic exercise this

manual therapy would be used more readily in the clinical setting. Education on joint mobilization plays an important role in the use of the manual therapy. Research showed that the more education ATs had on the technique the more inclined they are to use it.[20]

Summary

Joint Mobilization is a manual therapy technique that can be used to decrease pain or increase range of motion. This technique should be strongly considered for a rehabilitation plan during bouts of pain or hypomobility. Research shows that joint mobilization is effective, and with proper training this manual therapy can be easily incorporated during the rehabilitation phase of treatment.

With the latest research done in 1984 on the use of joint mobilization implemented by athletic trainers,[20] there is a need for updated research to determine if educational training predicts the use of joint mobilization. When the 1984 research was done joint mobilization was only implemented in some entry-level athletic training programs.[5] However, as of 1999, it was required that entry-level education programs teach athletic trainers this manual therapy.[18] With educational increases on joint mobilization,

results may be seen on the use of this technique by the athletic trainer; similar to the increases seen in the study done on physical therapists.[1]

Discussing these studies builds an argument that joint mobilization can be used to increase range of motion and/or decrease pain. With evidence known that this manual therapy technique does work athletic trainers need to become fully educated on the indications, contraindications, theories, use, and principles of joint mobilization. Once these basic principles are formed athletic trainers can begin to use this manual therapy on their patients. Joint mobilization is a manual therapy that will enhance rehabilitation protocols, which in turn will improve patient outcomes.

APPENDIX B

The Problem

Statement of the Problem

For the past ten years joint mobilization has been incorporated into undergraduate entry-level athletic training curriculums. Thus, knowledge on this rehabilitation technique should be utilized within the clinical setting. However, there is minimal research on joint mobilization implemented by the athletic trainer in comparison to physical therapists. Therefore, the purpose of this study was to develop a predicted model based on joint mobilization utilization. A survey was used to measure athletic trainer's undergraduate, graduate, and continuing education experiences on joint mobilization. The survey also examined the utilization of this manual therapy. Therefore, if an effective model can be predicted it will affect undergraduate, graduate, and continuing education to enhance future athletic training curriculums.

Definition of Terms

The following definitions are provided, for clarification:

1) Joint Mobilization – A manual therapy technique used to control pain and/or increase range of motion at a joint.

2) Utilization of Joint Mobilization – Items 28-30 on The Educational Predictor of Joint Mobilization Usage Survey (EPJMUS) that measure anatomical areas of use confidence levels, and frequency.
3) Undergraduate Education Training – Incorporated hours spent learning the theories, skills, and techniques of joint mobilization. Items 10-16 on the survey are dedicated to undergraduate educational training.
4) Graduate Education – Incorporated hours spent learning the theories, skills, and techniques of joint mobilization. Also included frequency on use if a graduate assistantship was obtained during graduate school. Questions 17-23 on the survey are dedicated to graduate educational training.
5) Continuing Education – Incorporated post BOC certification continuing education courses on joint mobilization, the number of course hours, and what the course covered. Items 24-256 on the survey are dedicated to continuing education.

Basic Assumptions

The following assumptions were made in regards to this study:

1) All survey questions were answered honestly, correctly, and to the best of the ability of the athletic trainer.
2) The sample obtained for this research was a representation of the population.
3) All athletic trainers who graduated after 1999, will have been formally educated on joint mobilization techniques, since joint mobilization was included in both the third and fourth edition of the NATA educational competencies.
4) Athletic trainers who graduated before 1999 may or may not have had any formal training in joint mobilization as part of their entry-level education.

Limitation of the Study

The following statement reflects the potential limitation of the study:

1) The subjects participating in the survey were volunteers who represent enthusiastic individuals within the athletic training profession.

Delimitation of the Study

The following statement reflects the potential delimitation of the study:

1) Only District 3 members with a valid e-mail address were surveyed.

Significance of the Study

Joint mobilization has been part of the entry-level education program since 1999, prior to 1999 athletic trainers may not have had formal education on joint mobilization. Since joint mobilization has been incorporated into both the third and fourth edition of the NATA educational competencies, athletic trainers should be proficient with using this manual therapy. However, there is minimal research on joint mobilization implemented by the certified athletic trainer in comparison to physical therapists. Since research shows this manual therapy technique works toward decreasing pain and increasing range of motion there is a need to investigate the amount of educational training athletic trainers receive. Therefore, a predicted model was developed through the use of a survey to determine if educational training levels predicted joint mobilization utilization.

APPENDIX C

Additional Methods

APPENDIX C1

Panel of Experts Cover Letter

October 24, 2008

Dear _____:

My name is Natalie Myers and I am currently a graduate student at California University of Pennsylvania pursuing a master's degree in Athletic Training. Part of the graduate study curriculum is to fulfill the thesis requirement through conducting research; mine will be survey research, and I am working with my Thesis Chair, Dr. Linda Platt Meyer to investigate my research question. The purpose of my study is to develop a predicted model, which will allow me to predict the usage of joint mobilization based on the educational training of athletic trainers. Thus, based on undergraduate, graduate, and continuing education a prediction will be made on the use of joint mobilization techniques implemented by certified athletic trainers.

I would like to know if you would be willing to serve as a member of my panel of experts to assess the content validity of my survey. You have been chosen based on your expertise in joint mobilization techniques and/or survey research. Your knowledge and experience within the profession would greatly enhance the quality of this survey. Once I receive your thoughts and suggestions on how to improve upon this instrument I will make revisions and create the final survey. The final survey will be distributed to certified athletic trainers within District 3. Your responses would be greatly appreciated, and would make for an overall better study. All responses that I obtain back from this panel of experts will remain confidential.

I have attached the table of specifications and survey questions to this e-mail. Please answer the following questions and if possible submit your responses within 10 days. If you have any additional comments please provide them to me using the track changes feature. You may return this survey back to me via an e-mail attachment. If you have any questions, please feel free to contact me at mye8558@cup.edu.

Goal of the Survey: To determine whether certified athletic trainers with more educational training in joint mobilization techniques will use this manual therapy technique more so compared to those with less educational training in joint mobilization.

1. Are the items of this survey appropriate and related to the goal of the survey?
2. Are the items of this survey written in a way that are understandable to the target population of athletic trainers?
3. Are there any questions that should be excluded from the survey?
4. Are there any questions that should be added to the survey?
5. Do you have any other suggestions or comments that would improve the overall quality of this survey?

Thank you and I greatly appreciate your time and effort put into this task.

Sincerely,
Natalie Myers, ATC
California University of Pennsylvania

APPENDIX C2

Table of Specifications

Table of Specifications

Demographic Data	
Gender	1
Years of experience as an AT	2
Level of Education	3
Other Credentials	4
Current position and setting of work	5-6
Undergraduate education on joint mobilization	
Formal education in lecture	7-8
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Time spent learning joint mobilization	12-13
If GA, how often did you use joint mobilization	14-15
Continuing education hours spent on joint mobilization	
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Course Coverage	18
Use of joint mobilization	
Joint mobilization techniques	19
Specific areas of use	20
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Reasons for not using joint mobilization	26
Reasons for not taking courses on joint mobilization	27

APPENDIX C3

Feedback from Panel Members

Comments from Panel Member 1

1. Gender:
_____Male _____Female

2. How many years of experience do you have as a certified athletic trainer? _____ 1 _____2 _____3 _____4 _____5 _____6 _____7 _____8 _____9 _____10 _____10+

Comment [BVL1]: I would just have them fill in a blank – want all of the specifics (important for correlational statistics later (as you shouldn't group everyone with 10+ years together)

3. What is your highest level of education?
_____Bachelors Degree _____Masters Degree _____ Doctoral Degree

Comment [BVL2]: Do you want to differentiate between type of degree (DPT, EdD, PhD, etc)?

4. Mark all credentials that you possess.
_____DPT _____PTA _____PT _____CSCS _____PES _____Other

Comment [BVL3]: Need a fill in for other

5. In which type of setting do you currently work? (Check all that apply)
_____Out-patient clinic _____University/College _____Professional Sports _____Industrial _____Military _____ Secondary Schools _____Hospital (In-patient clinic) _____Other

Comment [BVL4]: Need a fill in for other

6. What is your current employment position? (Check all that apply)
_____Academic Professor _____Certified Athletic Trainer _____Head Athletic Trainer _____Clinical Athletic Training Instructor _____Assistant Athletic Trainer _____Associate Athletic Trainer _____Other

Comment [BVL5]: Same as above; maybe you also want to write the question as "what is your current employment position specifically as it relates to athletic training", as some folks are ADs as well.

7. Was joint mobilization formally covered in your undergraduate athletic training education program?
_____ Yes _____No

Comment [BVL6]: I'm not sure I like this question as it appears. "formally covered" to me means classroom/didactic education – if that is what you mean too, and I think you do, then I would write that. Just a thought.

If you answered "No" to question 7, skip to question 10.

8. If "Yes" to question 7, how much time was spent learning joint mobilization in formal undergraduate education session?

_____1 lecture session _____2 lecture sessions
_____3 lecture sessions _____More than 3 lecture sessions
_____Unknown

Comment [BVL7]: What constitutes a lecture session? May be best recorded in time (minutes) as many programs have a lecture session that lasts 3 hours.

9. If "Yes" to question 7, how much time was spent learning joint mobilization in undergraduate laboratory?
_____1 lab session _____2 lab sessions
_____3 lab sessions _____More than 3 lab sessions
_____Unknown

Comment [BVL8]: Same as above

10. Was joint mobilization reviewed by your clinical instructor during your undergraduate clinical education?
_____Yes _____No

Comment [BVL9]: If yes, then I would think you would want to know how much, or which specific JMs were reviewed.

If you answered "No" to question 10, skip to question 12

11. Approximately how much time was spent using joint mobilization in your clinical setting?
_____1 hour per week _____2 hours per week _____3 hours per week _____5 hours per week _____5 or more hours per week

Comment [BVL10]: Again, we have found that we want the participant to fill in the blank instead of checking a box.

12. Was joint mobilization formally covered during your graduate level education?
_____ Yes _____No

If you answered "No" to question 12, skip to question 14

13. If "Yes" to question 12, how much time was spent learning joint mobilization in graduate level classes?

Comment [BVL11]: Again, put time in minutes instead of lecture sessions

_____1 lecture session _____2 lecture sessions
_____3 lecture sessions _____More than 3 lecture sessions
_____Unknown

14. If you had a graduate assistantship while in graduate school did you use joint mobilization on your athletes?
_____Yes _____No

If you answered "No" to question 14, skip to question 16

15. If "Yes" to question 14, how often would you use joint mobilization on your athletes?

Comment [BVL12]: Should say for your patients; How often in reference to what (weekly, per condition, etc?

_____Limited _____Moderately _____Often _____Very often

16. Have you learned joint mobilization in a continuing education course post BOC certification?
_____Yes _____No

If you answered "No" to question 16, skip to question 19

17. If "Yes" to question 16, approximately how many continuing education hours have you had in joint mobilization?

Comment [BVL13]: Again have them give you the hours with a number they provide

_____1 _____2 _____3 _____4 _____5 _____6 _____7 _____8 _____9 _____10 _____10+

18. What did the course(s) cover? (Select only one)
_____Extremities _____Spine _____Both

19. What techniques of joint mobilization do you most often use? (Check all that apply)
_____Cyriax _____Kaltenborn _____Maitland _____Paris _____Mennel
_____Unknown

20. On which anatomical areas have you used joint mobilization? (Check all that apply)
_____Digits _____Hand _____Wrist _____Forearm _____Elbow _____Shoulder
_____Hip _____Knee _____Ankle _____Foot _____Cervical Spine _____
Thoracic Spine _____ Lumbar Spine

21. On which anatomical structures do you feel most confident when using joint mobilization? (Check all that apply)
_____Digits _____Hand _____Wrist _____Forearm _____Elbow _____Shoulder
_____Hip _____Knee _____Ankle _____Foot _____Cervical Spine _____
Thoracic Spine _____ Lumbar Spine

Comment [BVL14]: Good question

22. On what anatomical structures do you use joint mobilization most?
_____Digits _____Hand _____Wrist _____Forearm _____Elbow _____Shoulder
_____Hip _____Knee _____Ankle _____Foot _____Cervical Spine _____
Thoracic Spine _____ Lumbar Spine

23. To what end do you perceive joint mobilization to be most helpful?
_____Increase range of motion _____Decrease pain

24. How often do you use joint mobilization when an increase in range of motion is desired?
_____Never _____Limited _____Moderately _____Often _____Very often

25. How often do you use joint mobilization when pain needs to be decreased?
_____Never _____Limited _____Moderately _____Often _____Very often

26. If you do not use joint mobilization, what is (are) your reason(s). (Check all that apply)
_____Not confident enough in your own skill level
_____Afraid of causing permanent injury
_____Do not believe it does any good
_____Prefer other manual therapies
_____Prefer other modalities
_____Lack of knowledge in area (never had instruction)
_____Do not perceive the need for it in my patient population
_____Other (Specify)_____

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27. If you have not taken a course on joint mobilization, what is(are) your reason(s) (check all that apply)
_____Timing or scheduling conflict
_____Costs too much
_____Do not perceive a need for it in my patient population
_____Not interested in it
_____Other (Specify)_____

Comments from Panel Member 2

1. Gender:
_____Male _____Female

2. How many years of experience do you have as a certified athletic trainer?
_____1_____2_____3_____4_____5_____6_____7_____8_____9_____10
_____10+

3. What is your highest level of education?
_____Bachelors Degree _____Masters Degree _____ Doctoral Degree

4. Mark all credentials that you possess.
_____DPT _____PTA _____PT _____CSCS _____PES _____Other

5. In which type of setting do you currently work? (Check all that apply)
_____Out-patient clinic _____University/College _____Professional Sports
_____Industrial _____Military _____ Secondary Schools _____Hospital (In-patient clinic) _____Other

6. What is your current employment position? (Check all that apply)
_____Academic Professor _____Certified Athletic Trainer _____Head Athletic Trainer
_____Clinical Athletic Training Instructor _____Assistant Athletic Trainer
_____Associate Athletic Trainer _____Other

7. Was joint mobilization formally covered in your undergraduate athletic training education program?
_____ Yes _____No

If you answered "No" to question 7, skip to question 10.

8. If "Yes" to question 7, how much time was spent learning joint mobilization in formal undergraduate education session?

_____1 lecture session _____2 lecture sessions
_____3 lecture sessions _____More than 3 lecture sessions
_____Unknown

9. If "Yes" to question 7, how much time was spent learning joint mobilization in undergraduate laboratory?
_____1 lab session _____2 lab sessions
_____3 lab sessions _____More than 3 lab sessions
_____Unknown

10. Was joint mobilization reviewed by your clinical instructor(s) during your undergraduate clinical education?
_____Yes _____No

Comment [v15]: I do not understand why you have this many options. It sems somewhat arbitrary. Are you trying to determine, if it exists, a time within the last 10 years where education and usage of joint mobs changed? To me this seems like it should be clustered more into groups. For example 1-3, 4-6, 6-10, and 10+. Just a thought.

Comment [v16]: I would be interested in specification if they choose "other". This is the same for every other question that has "other". Are you at all interested in separating out the credentials of ATC, LAT, or CAT (Canadian Athletic Therapist)?

Comment [v17]: This is a difficult question. May work better to just have them write in their job title. Technically my title is Athletic Trainer, so I would have to choose other. Another thing to think about is to just distinguish between ATCs that are in academics vs. clinical. It makes sense to me that clinical ATCs would probably utilize joint mobs more often. Perhaps the question should only have three answers. 1 Academic 2. Clinical 3. Dual Appointment

Comment [v18]: Either before or after this I would add the question. "Did you graduate from an accredited undergraduate athletic training education program?"

If you answered "No" to question 10, skip to question 12

11. Approximately how much time was spent using joint mobilization in your clinical setting?
_____1 hour per week _____2 hours per week _____3 hours per week _____5 hours per week _____5 or more hours per week

12. Was joint mobilization formally covered during your graduate level education?
_____ Yes _____No

If you answered "No" to question 12, skip to question 14

13. If "Yes" to question 12, how much time was spent learning joint mobilization in graduate level classes?

_____1 lecture session _____2 lecture sessions
_____3 lecture sessions _____More than 3 lecture sessions
_____Unknown

14. If you had a graduate assistantship while in graduate school did you use joint mobilization on your athletes?
_____Yes _____No

If you answered "No" to question 14, skip to question 16

15. If "Yes" to question 14, how often would you use joint mobilization on your athletes?
_____Limited _____Moderately _____Often _____Very often

16. Have you learned joint mobilization in a continuing education course post BOC certification?
_____Yes _____No

If you answered "No" to question 16, skip to question 19

17. If "Yes" to question 16, approximately how many continuing education hours have you had in joint mobilization?
_____1 _____2 _____3 _____4 _____5 _____6 _____7 _____8 _____ 9 _____10 _____ 10+

18. What did the course(s) cover? (Select only one)
_____Extremities _____Spine _____Both

19. What techniques of joint mobilization do you most often use? (Check all that apply)
_____Cyriax _____Kaltenborn _____Maitland _____Paris _____Mennel _____Unknown

Comment [v19]: During undergraduate education or currently? I realize this is covered in the table of specifications but some people don't read directions. I would make this more clear within the survey

Comment [v20]: Perhaps a question on whether or not their graduate education was related to athletic training. Just a thought. Might be interesting to see if ATC are getting more/less joint mob instruction outside of athletic training master's programs. I am thinking mostly here of people who go undergrad AT and then go on to PT school.

Comment [v21]: Perhaps a question on any research done on the topic. There may be a sub group of people filling this out that have not gone to a formal con ed course but that have researched the topically extensively. I am in this group.

Comment [v22]: I would add other to this. The one I am thinking most of is Mulligan joint mobs. Maybe just add the Mulligan option and not other.

20. On which anatomical areas have you used joint mobilization? (Check all that apply)
_____Digits _____Hand _____Wrist _____Forearm _____Elbow _____Shoulder
_____Hip _____Knee _____Ankle _____Foot _____Cervical Spine _____
Thoracic Spine _____ Lumbar Spine

21. On which anatomical structures do you feel most confident when using joint mobilization? (Check all that apply)
_____Digits _____Hand _____Wrist _____Forearm _____Elbow _____Shoulder
_____Hip _____Knee _____Ankle _____Foot _____Cervical Spine _____
Thoracic Spine _____ Lumbar Spine

22. On what anatomical structures do you use joint mobilization most?
_____Digits _____Hand _____Wrist _____Forearm _____Elbow _____Shoulder
_____Hip _____Knee _____Ankle _____Foot _____Cervical Spine _____
Thoracic Spine _____ Lumbar Spine

23. To what end do you perceive joint mobilization to be most helpful?
_____Increase range of motion _____Decrease pain

Comment [v23]: I would add a question prior to this on whether or not the clinician things joint mobs are helpful at all and to what degree. Then ask for what purpose. We did a survey of our ACIs here at BU two years ago and found that most ATCs thought joint mobs were useful but rarely used them.

24. How often do you use joint mobilization when an increase in range of motion is desired?
_____Never _____Limited _____Moderately _____Often _____Very often

25. How often do you use joint mobilization when pain needs to be decreased?
_____Never _____Limited _____Moderately _____Often _____Very often

Comment [v24]: Perhaps a question regarding if the clinician is comfortable in assessing/determining when joint mobilizations are even indicated? These goals are commonly desired however treatment should be based upon indication, not desire.

26. If you do not use joint mobilization, what is (are) your reason(s). (Check all that apply)
_____Not confident enough in your own skill level
_____Afraid of causing permanent injury
_____Do not believe it does any good
_____Prefer other manual therapies
_____Prefer other modalities
_____Lack of knowledge in area (never had instruction)
_____Do not perceive the need for it in my patient population
_____Other (Specify)_____

27. If you have not taken a course on joint mobilization, what is(are) your reason(s) (check all that apply)
_____Timing or scheduling conflict
_____Costs too much
_____Do not perceive a need for it in my patient population
_____Not interested in it
_____Other (Specify)_____

Comments from Panel Member 3

1. Gender:
_____Male _____Female

2. How many years ~~of experience do you have as a~~have you been a BOC~~-~~certified athletic trainer?
_____1 _____2 _____3 _____4 _____5 _____6 _____7 _____8 _____9 _____10 _____10+

3. What is your highest level of education completed?
_____Bachelors Degree _____Masters Degree _____ Doctoral Degree

4. ~~Mark~~ In addition to the ATC credential, please check below all other professional credentials that you possess.
_____~~DPT~~ _____PTA _____PT _____~~CSCS _____PES~~OT, OTA, DO, OMT, DC, MD _____Other

5. In which type of clinical setting do you currently work? (Check all that apply)
_____Out-patient clinic_____University/College_____Professional Sports
_____Industrial _____Military _____ Secondary Schools _____Hospital (In-patient clinic) _____Other

6. What is your current employment position? (Check all that apply)
_____Academic ~~Professor~~ Faculty _____~~Certified Athletic Trainer _____Head Athletic Trainer _____Clinical Athletic Training Instructor _____Assistant Athletic Trainer _____Associate Athletic Trainer _____Other~~Clinical Faculty _____Clinical Staff
_____Other

6.5 In what year did you complete your entry-level Athletic Training Education? Get real number here, because will influence which version of the NATA Educational Competencies he/she was under and whether they would have had to have had training in JMs.

7. Was joint mobilization ~~formally theory~~ covered as part of a required course during ~~in~~ your ~~undergraduate~~ entry-level (i.e. undergraduate or entry-level graduate) athletic training education program?
_____ Yes _____No

7.5. Were joint mobilization **skills** covered as part of a required course during your entry-level (i.e. undergraduate or entry-level graduate) athletic training education program?
_____Yes _____No

7.75. What were the professional credentials of the person(s) who taught your joint mobilization skills?
_____PTA _____PT _____ATC, OT, OTA, DO, OMT, DC, MD _____Other

Comment [t25]: Need to be sure that you give an introduction to your survey, its purpose, and your appreciation for their participation. Also should include time that it will take to complete the survey as well as deadline for submission and how it should be returned. Finally, give them the directions as to how to fill out the survey correctly and any operational definitions that you need for terms included in the survey.

Comment [t26]: Years of experience can be very subjective; years certified is not.

Comment [t27]: Consider allowing them to put in the exact number of years, rather than 10 years and then "or more" which causes you to lose real data.

Comment [t28]: This is a degree not a professional credential.

Comment [t29]: Suggest that you use the NATA settings for membership so you can correlate data with that info later.

Comment [t30]: Consider Univ/College – Academic, Univ/coll – clinical, Univ/coll-academic/clinical

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If you answered "No" to question 7, skip to question 10.

8. If "Yes" to question 7, how much time was spent learning the theories associated with joint mobilization ~~informal undergraduate education session~~in a required course(s)?

_____1 ~~lecture session~~hour _____2 ~~lecture sessions~~ hours
_____3 ~~lecture sessions~~hours _____More than 3 ~~lecture sessions~~hours
_____Unknown

9. If "Yes" to question 7, how much time was spent learning joint mobilization techniques in a required course(s) ~~in undergraduate laboratory~~?
_____1 hour _____2 hours
_____3 hours _____More than 3 hours
_____Unknown ~~_____1 lab session _____2 lab sessions~~
~~_____3 lab sessions _____More than 3 lab sessions~~
~~_____Unknown~~

10. ~~Was joint mobilization reviewed by your clinical instructor during your undergraduate clinical education?~~
~~_____Yes _____No~~Were you required to practice your joint mobilization skills during your clinical experiences/clinical rotations? Yes or NO

11. Have you used your joint mobilization techniques since you completed your entry-level education as an athletic trainer? Yes or NO

_____If NO, why not? Check all those that apply below)
_____Not confident enough in my own skill level
_____Afraid of causing permanent injury
_____Do not believe it is an effective treatment
_____Prefer other manual therapies
_____Prefer other modalities
_____Lack of knowledge in area (never had instruction)
_____Lack of knowledge in area (insufficient instruction)
_____Lack of skill in area (never had instruction of skill)
_____Lack of skill in area (insufficient instruction of skill)
_____Lack of sufficient time to do technique effectively
_____Do not perceive the need for it in my patient population
_____Other
(Specify)_____

If you answered "No" to question 10, skip to question 12

Comment [t31]: Sessions can vary in length from ATEP to ATEP, so best to go with universal time units.

Comment [t32]: Can use the indent technique or block shading to indicate the If and then (If Yes or if No) sections.

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11. Approximately how much time was spent using joint mobilization in your clinical setting?

~~_____1 hour per week _____2 hours per week _____3 hours per week _____5 hours per week _____5 or more hours per week~~

12. Was joint mobilization formally covered during your graduate level education?

_____ Yes _____No_____ Did not attend graduate school

If you answered "No" to question 12, skip to question 14

~~13. If "Yes" to question 12, how much time was spent learning joint mobilization in graduate level classes?~~

~~_____~~

~~_____1 lecture session _____2 lecture sessions~~
~~_____3 lecture sessions _____More than 3 lecture sessions~~
~~_____Unknown~~

Use same questions as used under entry-level section.

14. If you had a graduate assistantship while in graduate school did you use joint mobilization on your athletes?

_____Yes _____No

If you answered "No" to question 14, skip to question 16

~~15. If "Yes" to question 14, how often would you use joint mobilization on your athletes?~~

~~_____Limited _____Moderately _____Often _____Very often~~

16. Have ~~you learned joint mobilization in a~~you taken a continuing education course (i.e. post BOC certification) that included joint mobilizations?

_____Yes _____No

If you answered "No" to question 16,skip to question 19

17. If "Yes" to question 16, approximately how many continuing education contact hours (CEUs) have you had in courses that included joint mobilization?

_____1 _____2 _____3 _____4 _____5 _____6 _____7 _____8 _____9 _____10 _____ 10+

18. What did the course(s) cover? (Select only one)

_____Extremities _____Spine _____Both

19. What techniques of joint mobilization do you most often use? (Check all that apply)_____Cyriax _____Kaltenborn _____Maitland _____Paris _____Mennel _____Unknown

Comment [t33]: No clinician can really answer this question well or accurately. Suggest you take another tact such as When patients present with conditions appropriate for use of joint mobilizations, I use joint mobilizations – Always, sometimes, seldom, never

Comment [t34]: Use same questions as developed for use during the clinical experiences/rotations.

Comment [t35]: Do you care what type of course it was and/or who sponsored it?? Or why they took it??

Comment [t36]: Old timers like me will find this question very difficult to complete....Is this really important?

Comment [t37]: What if they took more than one course? How about asking the question more generally, did the formal (CEU) courses include – then check all that apply?

Comment [t38]: Suggest that in addition to the names, you include a summary of the technique – e.g. Kaltenborn – sustained mobilizations; Maitland – oscillating mobs, etc.

20. On which anatomical areas have you used joint mobilization? (Check all that apply)
_____Digits _____Hand _____Wrist _____Forearm _____Elbow _____Shoulder
_____Hip _____Knee _____Ankle _____Foot _____Cervical Spine _____
Thoracic Spine _____ Lumbar Spine

21. On which anatomical structures do you feel most confident when using joint mobilization? (Check all that apply)
_____Digits _____Hand _____Wrist _____Forearm _____Elbow _____Shoulder
_____Hip _____Knee _____Ankle _____Foot _____Cervical Spine _____
Thoracic Spine _____ Lumbar Spine

22. On what anatomical structures do you use joint mobilization most?
_____Digits _____Hand _____Wrist _____Forearm _____Elbow _____Shoulder
_____Hip _____Knee _____Ankle _____Foot _____Cervical Spine _____
Thoracic Spine _____ Lumbar Spine

23. To what end do you perceive joint mobilization to be most helpful?
_____Increase range of motion _____Decrease pain _____ increase function

24. How often do you use joint mobilization when an increase in range of motion is desired?
_____Never _____Limited _____Moderately _____Often _____Very often

25. How often do you use joint mobilization when pain needs to be decreased?
_____Never _____Limited _____Moderately _____Often _____Very often

Comment [t39]: These questions are so reliant upon the patient populations, the amount of pain and disability of the patient(s), the facilities in which they work. And much more...

26. If you do not use joint mobilization, what is (are) your reason(s). (Check all that apply)
_____Not confident enough in your own skill level
_____Afraid of causing permanent injury
_____Do not believe it does any good
_____Prefer other manual therapies
_____Prefer other modalities
_____Lack of knowledge in area (never had instruction)
_____Do not perceive the need for it in my patient population
_____Other (Specify)_____

27. If you have not taken a formal CEU course on joint mobilization, what is(are) your reason(s) (check all that apply)
_____Timing or scheduling conflict
_____Costs too much
_____Do not perceive a need for it in my patient population
_____Not interested in it
_____Believe that I am adequately prepared/trained in joint mobilization from AT education
_____Other (Specify)_____

APPENDIX C4

Reliability Cover Letter

January 7, 2009

Dear Fellow Certified Athletic Trainer:

My name is Natalie Myers and I am currently a graduate student at California University of Pennsylvania pursing a master's degree in Athletic Training. Part of the graduate study curriculum is to fulfill the thesis requirement through conducting research. I am conducting survey research to determine if educational training predicts joint mobilization usage. Educational training is defined as undergraduate education, graduate education, and continuing education hours and/or courses. If an effective model can be predicted it will affect undergraduate, graduate, and continuing education. Therefore, future curriculums can spend more time incorporating the theories, skills, and techniques of joint mobilization into their programs.

Before I conduct my final survey research I am asking a small group of members to complete my survey so I can assess its reliability. The final survey will be distributed to certified athletic trainers within District 3. Your responses would be greatly appreciated, and would make for an overall better study.

The California University of Pennsylvania Institutional Review Board has approved the educational predictor on joint mobilization usage survey. Please click the following link to access the survey http://www.surveymonkey.com/s.aspx?sm=cARgeiJPYgogYM7BD9_2baQA_3d_3d.

All surveys will be kept confidential, and informed consent will be assumed upon return of the survey. I ask that you please take this survey at your earliest convenience returning it no later than January 23rd. If you have any questions, please feel free to contact me at mye8558@cup.edu or 757-870-2564.

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

Sincerely,
Natalie Myers, ATC
California University of Pennsylvania

APPENDIX C5

Follow-up Reliability Cover Letter

January 19, 2009

Dear Fellow Certified Athletic Trainer:

I want to again thank everyone who participated in my survey research; however, I have one more favor to ask of you. I have to inform you that a necessity of my survey's legitimacy mandates participants to complete the survey one more time. In order to gain the best results from this reliability testing I need you to complete my survey so I can compare the consistency of your answers to my questions. Therefore, those of you who already completed my survey once, can you please complete it again. Before I can conduct my true data analysis I need to secure the reliability of my instrument.

Again, you may access my survey by clicking the following link: http://www.surveymonkey.com/s.aspx?sm=cARgeiJPYgogYM7BD9_2baQA_3d_3d. I ask that you please take this survey at your earliest convenience returning it no later than January 26th, 2009. If you have any questions, please feel free to contact me at mye8558@cup.edu or 757-870-2564.

I know it is a busy time, and I truly appreciate all the effort you have put into helping me conduct my thesis research.

Sincerely,

Natalie Myers, ATC
California University of Pennsylvania

APPENDIX C6

Educational Predictor for Joint Mobilization Usage Survey

Educational Predictor on Joint Mobilization Usage Survey

1. Gender:
_____Male _____Female

2. How many years have you been a BOC certified athletic trainer? _____

3. Which of the following did you attend in order to obtain your entry-level athletic training education?
_____Accredited/approved program _____Internship program _____Other (Please specify)

4. In what year did you complete your entry-level athletic training education? _____

5. What is your highest level of education completed?
_____Bachelors Degree _____Masters Degree _____ Doctoral Degree

6. If you obtained a doctoral degree what type of degree did you receive?
_____None _____DPT _____EdD _____PhD _____Other (Please specify)_____

7. In addition to the ATC credential, please check below all other professional credentials that you possess
_____PT _____PTA _____MD _____OT _____OTA _____ DO _____DC _____CSCS _____PES _____EMT _____RN _____Teacher Certification _____None _____Other (Please specify) _____

8. In which type(s) of clinical setting do you currently work? (Check all that apply)
_____University/College – Academic
_____University/College-Clinical _____University/College – Academic/Clinical _____Professional Sports
_____Industrial _____Military _____ Secondary Schools
_____Out-patient clinic _____Hospital (In-patient clinic) _____Other (Please specify) _____

9. What is your current employment position? (Check all that apply)
_____Academic Faculty _____Clinical Faculty _____Clinical Staff _____Other (Please specify) _____

10. Was joint mobilization covered during your entry-level undergraduate athletic training education program?
_____Yes _____No

If you answered "No" to question 10, skip to question 15

11. Was joint mobilization theory covered as part of a required course during your entry-level undergraduate athletic training education program?
_____Yes _____No

If you answered "No" to question 11, skip to question 13

12. Approximately how much time was spent learning the theories associated with joint mobilization in the required course(s)?
_____1 hour _____2 hours _____3 hours _____More than 3 hours _____Unknown

13. Were joint mobilization skills/techniques covered as part of a required course during your entry-level undergraduate athletic training education program?
_____Yes _____No

If you answered "No" to question 13, skip to question 15

14. Approximately how much time was spent learning joint mobilization skills/techniques in the required course(s)?
_____1 hour _____2 hours _____3 hours _____More than 3 hours _____Unknown

15. Were you encouraged to practice your joint mobilization skills during your clinical experiences/clinical rotations?
_____Yes _____No

16. Have you used joint mobilization techniques since you completed your entry-level undergraduate education as an athletic trainer?
_____Yes _____No

If NO, why not? Check all those that apply below.
_____Not confident enough in your own skill level
_____Afraid of causing permanent injury
_____To time consuming
_____Do not believe it is an effective treatment
_____Prefer other manual therapies

_____Prefer other modalities
_____Lack of knowledge in area (never had instruction)
_____Lack of knowledge in area (insufficient instruction)
_____Lack of skill in area (never had instruction of skill)
_____Lack of skill in area (insufficient instruction of skill)
_____Lack of sufficient time to do techniques effectively
_____Do not perceive the need for it in my patient population
_____Other (Please specify)
_____

17. Was joint mobilization covered during your graduate level education?
_____Yes _____No _____Did not attend graduate school

If you answered "No" or did not attend graduate school to question 17, skip to question 23

18. In what discipline did you receive your masters degree? _____

19. Was joint mobilization theory covered as part of a required course during your graduate education program?
_____Yes _____No

If you answered "No" to question 19, skip to question 21

20. Approximately how much time was spent learning the theories associated with joint mobilization in the required course(s)?
_____1 hour _____2 hours _____3 hours _____More than 3 hours _____Unknown

21. Were joint mobilization skills/techniques covered as part of a required course during your graduate education program?
_____Yes _____No

If you answered "No" to question 21, skip to question 23

22. Approximately how much time was spent learning joint mobilization skills/techniques in the required course(s)?
_____1 hour _____2 hours _____3 hours _____More than 3 hours _____Unknown

23. If you had a graduate assistantship while in graduate school how often did you use joint mobilization on your patients?
_____Did not have a graduate assistantship _____Never
_____Limited _____Moderately _____Often _____Very often

24. Have you taken a continuing education course post BOC certification that included joint mobilization?
_____Yes _____No

If you answered "No" to question 24, skip to question 27

25. Approximately how many continuing education contact hours (CEUs) have you had in courses that included joint mobilization? _____

26. What did the formal (CEU) course(s) include? (Select only one)
_____Extremities _____Spine _____Both

27. What techniques of joint mobilization do you most often use? (Check all that apply) _____Cyriax – passive mobilization _____Kaltenborn – sustained mobilization _____Maitland – oscillating mobilization _____Paris – based on chiropractic care _____Mennel – small accessory mobilization _____Unknown

28. On which anatomical areas **have you used** joint mobilization? (Check all that apply)
_____Digits _____Hand _____Wrist _____Forearm
_____Elbow _____Shoulder _____Hip _____ Knee
_____Ankle _____Foot _____Cervical Spine _____ Thoracic Spine _____ Lumbar Spine

29. On which anatomical structures **do you feel most confident** when using joint mobilization? (Check all that apply)
_____Digits _____Hand _____Wrist _____Forearm
_____Elbow _____Shoulder _____Hip _____ Knee
_____Ankle _____Foot _____Cervical Spine _____ Thoracic Spine _____ Lumbar Spine

30. On what anatomical structures **do you use** joint mobilization most?
_____Digits _____Hand _____Wrist _____Forearm
_____Elbow _____Shoulder _____Hip _____ Knee
_____Ankle _____Foot _____Cervical Spine _____ Thoracic Spine _____ Lumbar Spine

31. Do you think joint mobilization is a helpful rehabilitation tool?
_____Yes _____No

32. To what end do you perceive joint mobilization to be most helpful?
_____Increase range of motion _____Decrease pain
_____Increase function _____All of the above

33. Do you feel comfortable in assessing/determining when it is appropriate to use joint mobilization?
_____Yes _____No

34. If you have not taken a formal CEU course on joint mobilization, what is(are) your reason(s) (check all that apply)
_____Timing or scheduling conflict
_____Costs too much
_____Do not perceive a need for it in my patient population
_____Not interested in it
_____Believe that I am adequately prepared/trained in joint mobilization from athletic training education
_____Other
(Specify)_____
___

APPENDIX C7

Educational Predictor for Joint Mobilization Usage Survey: Coded Data

Educational Predictor on Joint Mobilization Usage Survey:
Coded Data

Gender 1. Gender:
___**1**___Male ___**2**___Female

BOCYEARS 2. How many years have you been a BOC certified athletic trainer? _____

Educate 3. Which of the following did you attend in order to obtain your entry-level athletic training education?
___**1**___Accredited/approved program ___**2**___Internship program _____**3**_____Other (Please specify)

Entryed 4. In what year did you complete your entry-level athletic training education? _____

Highed 5. What is your highest level of education completed?
___**1**__Bachelors Degree ___**2**___Masters Degree ___**3**___ Doctoral Degree

Docdegre 6. If you obtained a doctoral degree what type of degree did you receive?
___**1**___None ___**2**___DPT ___**3**___EdD ___**4**___PhD ___**5**___Other (Please specify)_____

Credent 7. In addition to the ATC credential, please check below all other professional credentials that you possess
___**1**___PT ____**2**__PTA ___**3**___MD ___**4**___OT __**5**___OTA ___**6**___ DO ___**7**___DC __**8**____CSCS ___**9**___PES ___**10**___EMT ___**11**___RN ___**12**___Teacher Certification ____**13**__None ___**14**___Other (Please specify) _____

Currwork 8. In which type(s) of clinical setting do you currently work? (Check all that apply)
__**1**____University/College – Academic
__**2**____University/College-Clinical
___**3**___University/College – Academic/Clinical
___**4**__Professional Sports __**5**____Industrial ___**6**___Military ____**7**__ Secondary Schools ____**8**__Out-patient clinic
___**9**___Hospital (In-patient clinic) ___**10**___Other (Please specify) _____

Curwork1 9. What is your current employment position? (Check all that apply)
__**1**____Academic Faculty ___**2**__Clinical Faculty
___**3**__Clinical Staff ___**4**___Other (Please specify)
_____

Ugmob 10. Was joint mobilization covered during your entry-level undergraduate athletic training education program?
__**1**___Yes __**2**___No

If you answered "No" to question 10, skip to question 15

Ugmobthy 11. Was joint mobilization theory covered as part of a required course during your entry-level undergraduate athletic training education program?
___**1**___Yes ___**2**___No

If you answered "No" to question 11, skip to question 13

Ugthyhrs 12. Approximately how much time was spent learning the theories associated with joint mobilization in the required course(s)?
__**1**____1 hour ___**2**___2 hours ___**3**___3 hours ___**4**___More than 3 hours __**5**____Unknown

Ugskill 13. Were joint mobilization skills/techniques covered as part of a required course during your entry-level undergraduate athletic training education program?
___**1**___Yes ___**2**___No

If you answered "No" to question 13, skip to question 15

Ugskillh 14. Approximately how much time was spent learning joint mobilization skills/techniques in the required course(s)?
___**1**___1 hour ___**2**___2 hours ___**3**___3 hours ___**4**___More than 3 hours ___**5**___Unknown

Ugencor 15. Were you encouraged to practice your joint mobilization skills during your clinical experiences/clinical rotations?
____**1**__Yes __**2**___No

Compleyg 16. Have you used joint mobilization techniques since you completed your entry-level undergraduate education as an athletic trainer?
___**1**___Yes ____**2**__No

Ynotuse If NO, why not? Check all those that apply below.
___**1**___Not confident enough in your own skill level
___**2**___Afraid of causing permanent injury
___**3**___To time consuming
___**4**___Do not believe it is an effective treatment
____**5**__Prefer other manual therapies
____**6**__Lack of knowledge in area (never had instruction)
___**7**___Lack of knowledge in area (insufficient instruction)
___**8**___Lack of skill in area (never had instruction of skill)
____**9**__Lack of skill in area (insufficient instruction of skill)
___**10**___Lack of sufficient time to do techniques effectively
___**11**___Do not perceive the need for it in my patient population
___**12**___Other (Please specify)
_____

Grmob 17. Was joint mobilization covered during your graduate level education?
__**1**___Yes ___**2**___No ___**3**___Did not attend graduate school

If you answered "No" or did not attend graduate school to question 17, skip to question 23

18. In what discipline did you receive your masters degree? _____

Grtheory 19. Was joint mobilization theory covered as part of a required course during your graduate education program?
___**1**___Yes ____**2**__No

If you answered "No" to question 19, skip to question 21

Grthehrs 20. Approximately how much time was spent learning the theories associated with joint mobilization in the required course(s)?
____**1**__1 hour ___**2**___2 hours ___**3**___3 hours ___**4**___More than 3 hours ___**5**___Unknown

Grskill 21. Were joint mobilization skills/techniques covered as part of a required course during your graduate education program?
___**1**___Yes ___**2**___No

If you answered "No" to question 21, skip to question 23

Grskillh 22. Approximately how much time was spent learning joint mobilization skills/techniques in the required course(s)?
__**1**____1 hour ___**2**___2 hours ___**3**___3 hours ___**4**___More than 3 hours ___**5**___Unknown

Gaassist 23. If you had a graduate assistantship while in graduate school how often did you use joint mobilization on your patients?
___**1**___Did not have a graduate assistantship ___**2**___Never ___**3**___Limited ___**4**___Moderately __**5**___Often ___**6**___Very often

Ceumob 24. Have you taken a continuing education course post BOC certification that included joint mobilization?
___**1**___Yes ___**2**___No

If you answered "No" to question 24, skip to question 27

Ceuhours 25. Approximately how many continuing education contact hours (CEUs) have you had in courses that included joint mobilization? _____

Cecourse 26. What did the formal (CEU) course(s) include? (Select only one)
___**1**___Extremities __**2**____Spine __**3**___Both

Jttech 27. What techniques of joint mobilization do you most often use? (Check all that apply) ____**1**__Cyriax – passive mobilization ___**2**___Kaltenborn – sustained mobilization ____**3**__Maitland – oscillating mobilization ___**4**___Paris – based on chiropractic care ___**5**___Mennel – small accessory mobilization ___**6**___Unknown

Usejtmob 28. On which anatomical areas have you used joint mobilization? (Check all that apply)
_____Digits _____Hand _____Wrist _____Forearm
_____Elbow _____Shoulder _____Hip _____ Knee
_____Ankle _____Foot _____Cervical Spine _____ Thoracic Spine _____ Lumbar Spine **(Coding depends on how many areas were checked)**

Conjtmob 29. On which anatomical structures do you feel most confident when using joint mobilization? (Check all that apply)
_____Digits _____Hand _____Wrist _____Forearm
_____Elbow _____Shoulder _____Hip _____ Knee
_____Ankle _____Foot _____Cervical Spine _____ Thoracic Spine _____ Lumbar Spine **(Coding depends on how many areas were checked)**

Dousejtm 30. On what anatomical structures do you use joint mobilization most?
_____Digits _____Hand _____Wrist _____Forearm
_____Elbow _____Shoulder _____Hip _____ Knee
_____Ankle _____Foot _____Cervical Spine _____ Thoracic Spine _____ Lumbar Spine **(Coding depends on how many areas were checked)**

jmobreha 31. Do you think joint mobilization is a helpful rehabilitation tool?
____**1**__Yes ___**2**___No

Helpful 32. To what end do you perceive joint mobilization to be most helpful?
___**1**___Increase range of motion ___**2**___Decrease pain
___**3**___Increase function __**4**____All of the above

Assjtmob 33. Do you feel comfortable in assessing/determining when it is appropriate to use joint mobilization?
___**1**___Yes ___**2**___No

Ynotceu 34. If you have not taken a formal CEU course on joint mobilization, what is(are) your reason(s) (check all that apply)
___**1**___Timing or scheduling conflict
___**2**___Costs too much
___**3**___Do not perceive a need for it in my patient population
____**4**__Not interested in it

___**5**___Believe that I am adequately prepared/trained in joint mobilization from athletic training education
___**6**___Other (Specify)_____
___

APPENDIX C8

Institutional Review Board

California University of Pennsylvania

ORIGINAL

Proposal Number
08-023
Date Received
11/21/08

exempt

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 : The Relationship Between the Amount of Educational Training and Utilization of Joint Mobilization Implemented by the Certified Athletic Trainer

Researcher/Project Director: Natalie L. Myers

Phone # 757-870-2564 ***E-mail Address*** mye8558@cup.edu

Faculty Sponsor (if required) Dr. Linda Meyer

Department Health Sciences and Sports Studies

Project Dates August 2008 ***to*** April 2009

Sponsoring Agent (if applicable) _____

Project to be Conducted at California University of Pennsylvania

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

Keep a copy of this form for your records.

Required IRB Training

The training requirement can be satisfied by completing the online training session at http://cme.nci.nih.gov/ *. A copy of your certification of training must be attached to this IRB Protocol. If you have completed the training at an earlier date and have already provided documentation to the California University of Pennsylvania Grants Office, please provide the following:*

Previous Project Title _____

Date of Previous IRB Protocol _____

Draft, April 7, 2005

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(ses)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 primary purpose of this thesis study is to develop a predictive model of joint mobilization utilization. This model will predict the usage of joint mobilization based on the educational training of certified athletic trainers. If an effective model can be predicted it will affect undergraduate, graduate, and continuing education, which will enhance future athletic training curriculums.

A descriptive research design will be used in conjunction with a survey to conduct this study. To establish reliability the researcher will conduct a pilot study that will be distributed to a total of 30 certified athletic trainers at California University of Pennsylvania and Elon University in North Carolina. This is not a true experimental design as no variables are being manipulated. The survey was designed by the researcher, and will be distributed to certified athletic trainers within District 3. The subject will be asked simple demographic questions followed by questions directly related to educational training during undergraduate, graduate, and continuing education courses on joint mobilization. The survey will end with questions related to the use of joint mobilization. The National Athletic Trainers' Association will distribute the researcher's survey to 1,000 certified athletic trainers within district 3. The e-mail will include a cover letter and link that will take the participant directly to the survey. The survey will be set up on survey monkey. The cover letter will introduce the researcher, explain the study, and discuss the significance behind the study. Informed consent by the certified athletic trainers will be implied through their anonymous return of the survey, and this will be stated in the cover letter. Survey monkey will send back the completed surveys to my e-mail address coded for identification by numbers so confidentiality is maintained.

A step-wise regression analysis will be used to develop a predictive model of joint mobilization utilization. After the data is gathered the researcher will analyze it using SPSS version 16.0. A list of tables and figures will also be provided for visual observations.

The following is the hypothesis that will be examined by this study:
1) Certified athletic trainers with more knowledge and understanding on joint mobilization are more inclined to use this manual therapy technique in their clinical setting.

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.*

   There are no risks involved to subjects participating in a survey. All subject's answers will be kept confidential. No research is going to be carried out before the research gains approval from the IRB.

   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.*

   The selection of subjects will include 1,000 certified athletic trainers in district 3. The National Athletic Trainers' Associations will randomly select the participants.

   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.*

   The cover letter that will be attached to the survey will state that subjects have the right to choose not to participate in the study. Therefore, informed consent is implied upon completing and returning the survey to the researcher.

   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.*

   The information of the participants will be kept confidential as neither their e-mail address or name will be attached to their answers. The only people that will have access to the data will be the researcher and the researcher's advisor.

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

☒ *Adult volunteers*	☐ *Mentally Disabled People*
☐ *CAL University Students*	☐ *Economically Disadvantaged People*
☐ *Other Students*	☐ *Educationally Disadvantaged People*
☐ *Prisoners*	☐ *Fetuses or fetal material*
☐ *Pregnant Women*	☐ *Children Under 18*

☐ *Physically Handicapped People* ☐ *Neonates*

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.

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

Project Director's Certification
Program Involving HUMAN SUBJECTS

The proposed investigation involves the use of human subjects and I am submitting the complete application form and project description to the Institutional Review Board for Research Involving Human Subjects.

I understand that Institutional Review Board (IRB) approval is required before beginning any research and/or data collection involving human subjects. If the Board grants approval of this application, I agree to:

1. Abide by any conditions or changes in the project required by the Board.
2. Report to the Board any change in the research plan that affects the method of using human subjects before such change is instituted.
3. Report to the Board any problems that arise in connection with the use of human subjects.
4. Seek advice of the Board whenever I believe such advice is necessary or would be helpful.
5. Secure the informed, written consent of all human subjects participating in the project.
6. Cooperate with the Board in its effort to provide a continuing review after investigations have been initiated.

I have reviewed the Federal and State regulations concerning the use of human subjects in research and training programs and the guidelines. I agree to abide by the regulations and guidelines aforementioned and will adhere to policies and procedures described in my application. I understand that changes to the research must be approved by the IRB before they are implemented.

Professional Research

Project Director's Signature

Department Chairperson's Signature

Student or Class Research

Student Researcher's Signature

Supervising Faculty Member's Signature if required

Department Chairperson's Signature

ACTION OF REVIEW BOARD (IRB use only)

The Institutional Review Board for Research Involving Human Subjects has reviewed this application to ascertain whether or not the proposed project:

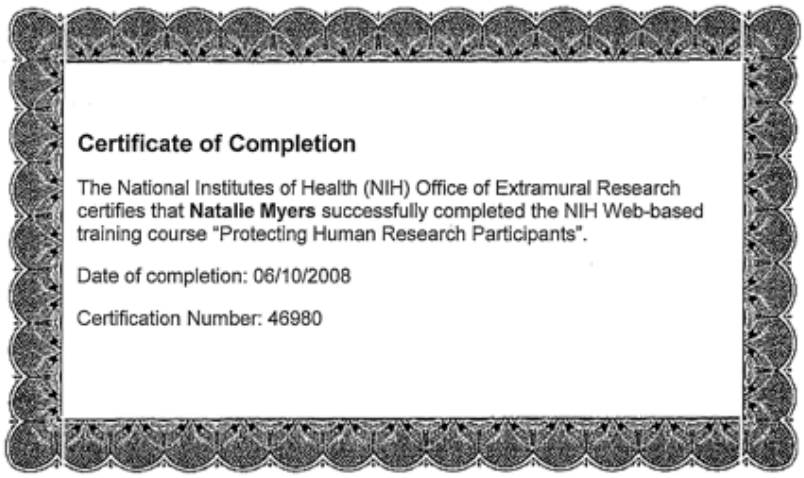
1. provides adequate safeguards of the rights and welfare of human subjects involved in the investigations;
2. uses appropriate methods to obtain informed, written consent;
3. indicates that the potential benefits of the investigation substantially outweigh the risk involved.
4. provides adequate debriefing of human participants.
5. provides adequate follow-up services to participants who may have incurred physical, mental, or emotional harm.

☒ Approved ☐ Disapproved

Chairperson, Institutional Review Board

12-17-08
Date

Draft, April 7, 2005



Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Natalie Myers** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 06/10/2008

Certification Number: 46980

APPENDIX C9

Subject Cover Letter

February 17, 2009

Dear Fellow Certified Athletic Trainer:

My name is Natalie Myers and I am currently a graduate student at California University of Pennsylvania pursing a master's degree in Athletic Training. Part of the graduate study curriculum is to fulfill the thesis requirement through conducting research. I am conducting survey research to determine if educational training predicts joint mobilization usage. Educational training is defined as undergraduate education, graduate education, and continuing education hours and/or courses. If an effective model can be predicted it will affect undergraduate, graduate, and continuing education. Therefore, future curriculums can spend more time incorporating the theories, skills, and techniques of joint mobilization into their programs.

One thousand randomly selected certified athletic trainers from district 3 are being asked to submit this survey; however, you do have the right to choose not to participate. The California University of Pennsylvania Institutional Review Board has approved the Educational Predictor on Joint Mobilization Usage Survey. The survey has also been found to be valid and reliable. Please click the following link to access the survey http://www.surveymonkey.com/s.aspx?sm=cARgeiJPYgogYM7BD9_2baQA_3d_3d.

All surveys are kept confidential, and informed consent will be assumed upon return of the survey. 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, please feel free to contact me at nmyers02@gmail.com.

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

Sincerely,

Natalie Myers, ATC
California University of Pennsylvania
250 University Ave
California, PA 15419

nmyers02@gmail.com

Participants for this survey were selected at random from the NATA membership database according to the selection criteria provided by the student doing the survey. This student survey is not approved or endorsed by NATA. It is being sent to you because of NATA's commitment to athletic training education and research.

APPENDIX C10

Follow-up Subject Cover Letter

March 1, 2009

Dear Fellow Certified Athletic Trainer:

This is a follow up e-mail regarding your participation in my Educational Predictor on Joint Mobilization Survey. Thank you to those who have already completed my survey. Your participation will make for an overall better study.

If you have not yet completed the survey your involvement would be greatly appreciated. Please click the following link to access the survey http://www.surveymonkey.com/s.aspx?sm=cARgeiJPYgogYM7BD9_2baQA_3d_3d. The California University of Pennsylvania Institutional Review Board has approved the Education Predictor on Joint Mobilization Survey. The survey has also been found to be valid and reliable. All surveys will be kept confidential, and informed consent will be assumed upon return of the survey. I ask that you please take this survey at your earliest convenience returning it no later than Monday March 9th, 2009. The survey will take approximately 15 minutes to complete. If you have any questions, please feel free to contact me at nmyers02@gmail.com.

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

Sincerely,

Natalie Myers, ATC
California University of Pennsylvania
250 University Ave
California, PA 15419
nmyers02@gmail.com

Participants for this survey were selected at random from the NATA membership database according to the selection criteria provided by the student doing the survey. This student survey is not approved or endorsed by NATA. It is being sent to you because of NATA's commitment to athletic training education and research.

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ABSTRACT

Title: THE RELATIONSHIP BETWEEN THE AMOUNT OF EDUCATIONAL TRAINING AND UTILIZATION OF JOINT MOBILIZATION IMPLEMENTED BY THE CERTIFIED ATHLETIC TRAINER

Researcher: Natalie L. Myers

Advisor: Dr. Linda Meyer

Date: May 2009

Research Type: Master's Thesis

Content: Joint mobilization has been shown to be an effective rehabilitation tool. However, most studies are directly related to physical therapy patients in comparison to athletes. Therefore, the researcher wanted to examine via survey if educational training is directly related to how much athletic trainers use this manual therapy.

Objective: The purpose of this study is to develop a predictive model of joint mobilization utilization. This model will predict the level of usage of joint mobilization based on the educational training of certified athletic trainers.

Design: Descriptive research study.

Setting: The National Athletic Trainers' Association (NATA) disrupted via e-mail The Educational Predictor on Joint Mobilization Usage Survey (EPJMUS).

Participants: Two hundred and thirty four certified athletic trainers from District 3 completed the EPJMUS.

Interventions: A pilot study was completed in order to determine validity and reliability of the instrument. The EPJMUS was found to be valid and reliable after performing a

	Cronbach's Alpha. The researcher then greeted 1,000 randomly selected athletic trainers chosen by the NATA with a cover letter and link to the survey.
Main Outcome Measures:	The EPJMUS was divided into four main sections. The independent variable included educational training, while the dependent variable included joint mobilization utilization. Items 10-16 incorporated undergraduate educational training, items 17-23 incorporated graduate educational training, items 24-26 incorporate post Board of Certification continuing education, and items 28-30 included question related to the use of joint mobilization. The survey questions were coded via the researcher, and a stepwise regression analysis was run to determine which independent variables would best predict the use of joint mobilization.
Results:	The primary findings of this study incorporated a predictive model that revealed how many continuing education hours the participants had, and how often subjects used joint mobilization in their graduate assistantship position had the most affect when predicting joint mobilization utilization. The independent variables had a significance level of less than or equal to .000.
Conclusion:	This study revealed that graduate assistantships and continuing education had the greatest affect on joint mobilization utilization. Therefore, undergraduate curriculums need to spend more time educating athletic training students on joint mobilization, and then emphasizing techniques learned in the classroom in the clinical setting.