Volume 7
October 1992 – October 1994
A Subject and Author Index
of Dissertations and Theses
Including Abstracts.

Health
Physical Education
and Recreation

Exercise and Sport Sciences

Microform Publications
Bulletin

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This publication is Bulletin Volume 7. It compiles previous supplements nos 1 through 4 and includes the collection that would have made up supplement no. 5. The bulletin represents microfiche published between October 1992 and October 1994. In the future, the biannual supplements, which used to give a listing of published fiche by subject area only, will be replaced by biannual bulletins. The bulletins will include a thesis and dissertation titles and abstracts section and a keyword section. In 1995, the Bulletin vol. 8, no 1 will appear in April, Bulletin vol. 8, no 2 in October. There will be two issues (nos 1 and 2) per annual bulletin.

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PART I: TITLES AND ABSTRACTS

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PHYSICAL EDUCATION

ADMINISTRATION

Adams, Kline R. AN EVALUATION OF THE THREE-POINT SHOT AND SELECTED VARIABLES ON THE POINT DIFFERENTIAL IN BASKETBALL, 1991. M.S., Brigham Young University (Boyd O. Jarman). (89pp 1 f $4.00) PE 3450

This study examined the relationship of the three-point shot and other selected variables to the point differential of the Orem, Utah, Mountain View High School (MVHS) boys basketball team for the 1989-90 and 1990-91 seasons. The researcher viewed a total of 40 videos and recorded statistics on three-point shots, two-point shots, free-throws, rebounds, and turnovers. A correlation was computed for the three-point shot on the point differential. Results indicated that the three-point percentage had a significant relationship to the point-differential for the 1989-90 season (r=0.611) and the 1990-91 season (r=0.480). A stepwise regression was then computed for all of the variables. Results indicated that for the 1989-90 season three-point shot percentage, turnovers for and against MVHS, and rebounds for MVHS had a significant relationship to the point differential, accounting for 80.44% of the variance. For the 1990-91 season the major factor which had a significant relationship to the point differential was the number of two-point shots made, accounting for 67.59% of the variance. For both seasons combined, the number of two-point shots made, rebounds against MVHS, and turnovers for MVHS had a significant relationship to the point differential, accounting for 82.3% of the variance.

Applegate, Michael T. THE ECONOMIC IMPACT OF DEAN E. SMITH ACTIVITIES CENTER EVENTS ON CHAPEL HILL, NORTH CAROLINA, 1993. M.A., University of North Carolina at Chapel Hill (Frederick O. Mueller). (109pp 2 f $8.00) PE 3405

This study examined the economic impact of two special events held at the Smith Center on The University of North Carolina and the city of Chapel Hill. A 11 item questionnaire was distributed at the UNC-CH vs. NC State basketball game held on Saturday, February 6, 1993 at 2 pm and the George Strait concert held on Friday, March 5, 1993 at 8 pm. The nine spending categories surveyed included: Restaurants, Night Clubs, Retail Stores, Lodging, Auto Expenses, Commercial Transportation, Parking, Tickets, and Smith Center Expenses. The basketball game generated $493,590 within the local economy and the concert generated $359,818 within the city of Chapel Hill. The two categories which contributed the most toward the total impact for each event were Tickets and Restaurants. For the basketball game $144,041 was spent on tickets and $72,380 was spent in Chapel Hill restaurants. On the night of the concert $104,385 was spent on tickets and $51,657 was spent in restaurants. The results of this study indicate that spectators at events held in the Dean E. Smith Activities Center contribute a substantial amount of revenue to the local economy.

Cheatham, Tina R. THE ATHLETIC ORGANIZATIONAL STRUCTURE AND ADMINISTRATIVE VIEWS OF UNIVERSITY AND ATHLETIC GOVERNING PERSONNEL IN THE SOUTHWEST CONFERENCE, 1992. Ph.D., Texas Woman's University (Bettye Myers). (214pp 3 f $12.00) PE 3410

Administrative views defining the organizational structure and future of women in athletics were described by Southwest Conference university and athletic administrative personnel. A semi-structured interview technique was used for this modified ethnographic study. The descriptive data collected from the subjects were recorded, transcribed, and categorized according to themes of commonality. Representative views of all administrative positions were found to be in positive agreement on organizational structure, regardless of university affiliation; however, the senior woman administrators and the university presidents initiated similar progressive ideals as opposed to the more conservative views of the athletic directors on particular athletic issues. The results of this qualitative study provided essential descriptive data as viewed by university and athletic administrators within the realm of athletic administration.


This study was conducted to gain insight into sport sponsorship in Canada from the perspective of both sponsors and sport groups. The study groups included Canadian companies with a history of sport sponsorship involvement (n=75), and a combined sample of sport governing bodies representing national and provincial levels of sport (n=72). Exchange theory was used as a theoretical guide to examine relationships between these two groups. Analyses were conducted with respect to: the importance of different sponsorship criteria used by sponsors; the level of agreement between sport
groups’ perceptions of sponsors’ criteria, and the actual importance ratings indicated by the sponsors; the reasons cited by sponsors and sport governing bodies for discontinuing sponsorships; relationships between perceived dependency and the likelihood of initiating and terminating sport sponsorships; the evaluative criteria utilized by sponsors and sport governing bodies to determine the success of sport sponsorship; sport sponsorship’s “fit” within the overall marketing strategy of companies; and the perceptions of sponsors and sport groups toward one another. Findings indicated that sponsors considered sport sponsorship to be a strategic activity used to achieve commercial objectives. Important criteria indicated by corporate sponsors included “exclusivity”, “awareness”, and “image”. “Sales” and “dealer/ trade feedback” also were cited as important measures of a successful sponsorship. Sport groups exhibited an overall understanding of sponsorship criteria that were considered important to sponsors. However, sport governing bodies overvalued the importance placed by sponsors on a number of criteria. Companies were more likely to discontinue sponsorship than sport governing bodies, and attributed discontinuance to poor return on investment, unmet objectives, and changes in the corporate strategy. Sport governing bodies and sport groups both agreed that sport groups were more likely to initiate sponsorship relationships, and less likely to terminate them.


Division I athletic administrators (N=166) were randomly selected and assigned to 2 groups, Administrators and Mentors. These groups were asked to submit their perceptions of the seven competency dimensions—Planner, Fiscal Officer, Evaluator, Educator, Resource Developer, Leader and Communicator—for administration or mentoring. The survey instrument used was the Administrative Competencies in Physical Education and Athletics Survey from Endersbe’s 1987 study. The overall return rate was 55%. The statistical treatments used on the data were the t test for two independent samples and the Wilcoxon T test. The t test for two independent samples was used to determine if the perceptions of the Administrators group differed from those of the Mentors group at the .05 level. For all seven dimensions the results of the t test were p<.05. The Wilcoxon T test, at the .05 level, was used to determine if the groups rated the 7 dimensions on the survey the way they ranked them. The results showed that there were differences between the ratings and rankings of some of the dimensions but they were non-significant statistically.

Gage, Sandra L. MARKETING STRUCTURES, ACTIVITIES AND OUTCOMES AMONGST SELECTED NATIONAL SPORT ORGANIZATIONS, 1992. M.A., University of Western Ontario (Karen Danylchuk). (194pp 2 f $8.00) PE 3420

The purpose of this study was to explore the marketing function within selected National Sport Organizations. The study involved an examination of the marketing features (structures, activities, and outcomes) across four levels of marketing involvement (goods, events/entertainment, pursuit of excellence, and mass participation). Secondary purposes of the study were to determine (a) whether structural characteristics of the marketing functions affected the activities used to market products, and (b) how the outcomes of these marketing activities were evaluated. Case studies were conducted on Alpine Canada Alpin and Basketball Canada, following the completion of a pilot study on Tennis Canada. The embedded multiple case approach accounted for marketing’s tendency to permeate other functions in the organization and allowed for a comparison of marketing functions between Alpine Canada Alpin and Basketball Canada. Results of the pilot study were also included for discussion purposes. The studies consisted of archival and document reviews, combined with interviews of administrative and marketing personnel to describe the current marketing functions of the organizations. The organizational analyses revealed that each organization marketed itself to varying degrees across the four levels of involvement, dependent on (a) product revenue potential, (b) structural characteristics, (c) organizational product ownership, and (d) nature of sport and its presentation. Activities used to market these products were implemented according to (a) organizational product emphasis, (b) structural characteristics, (c) nature of product presentation, and (d) target market. Methods used to measure activity outcomes and their effect on associated product areas were found to be prepositional in nature because they were not formally employed. Available budget information did correspond to structural characteristics of the marketing function and activities implemented within these frameworks. An effective and sequential relationship between structures, activities, and outcomes was found for each of the marketing functions within the three organizations studied. The implications of these results and recommendations for future research indicate the need for quantitative evaluations in the field. Practical suggestions for sport administrators were presented to assist sport organizations to effectively and efficiently market their products by addressing structures, activities and outcomes.


The purpose of this study was to identify the perceptions of Pennsylvania public high school principals and athletic directors on the future effects that the repealed Pennsylvania Interscholastic Athletic Association (PIAA) Constitutional Bylaw Article 11, Section 2 will have on selected aspects of administering their Pennsylvania high school, interscholastic, varsity athletic programs. The bylaw originally stated that no team representing a Pennsylvania high school, interscholastic, varsity athletic program was allowed to compete during the “day of rest” that occurs on Sundays; however, there must be one “day of rest” within each seven-day week from Sunday through Saturday for every athlete. The perceptions of the principals and athletic directors are based on the future effects of the bylaw during the first three years following the date of the repeal. The data for analysis in this study was obtained from responses to a survey completed by randomly selected public school principals and athletic directors representing 25% of the PIAA member schools in each of the 12 PIAA geographical districts. The questionnaire was divided into four categories for statistical analysis: (a) demographics, (b) athletic budget, (c) athlete and community participation, and (d) scheduling of community activities and athletic contests and practices. All
items on the questionnaire were analyzed through the use of a
descriptive statistical analysis. The results were presented as
frequencies, percentages, means, medians, modes, and standard
deviations. In addition, the following statistical analysis proce-
dures were completed: (a) chi-square, (b) correlation analysis, and
(c) analysis of variance (ANOVA). The results of chi-square and
ANOVA statistical analyses indicated significant differences
between the demographic variables of (a) school setting, (b) high
school enrollment, (c) PIAA district, and (d) number of sports,
when compared to items within the sport administration variables
of (a) athletic budget, (b) athlete and community participation, and
(c) scheduling of community activities and athletic contests and
practices. Based on these findings, recommendations were made
for future studies.

Hick, Barbara A. FRESHMAN ELIGIBILITY IN INTERCOLLE-
GIATE ATHLETICS., 1992. M.Ed., Temple University (Bonnie L.
Parkhouse). (55pp 1 f $4.00) PE 3353

The purpose of this study was to compare the opinions of selected
Division I university presidents, athletic directors, head athletic
coaches, and athletic academic advisors as to whether or not
freshman student-athletes should be allowed to compete their first
year. A questionnaire was sent to 160 subjects, all members of
either The Big East Conference or the Pacific Ten Conference.
There was an 81% return ratio. The data showed that 67% of the
subjects were against the concept of declaring all freshmen
student-athletes ineligible their first year. A higher percentage of
athletic directors favored freshman ineligibility than athletic
coaches. Forty-seven percent of the coaches who direct revenue
producing (football and men’s basketball) athletic programs were
in favor of freshman ineligibility compared to only 17% of the
coaches who direct non-revenue (all other athletic) programs. It
was concluded that the majority of subjects do not think that
freshman ineligibility will occur within the next five years. This
study should be replicated in five to ten years using a different
sample from Division I institutions, including freshmen student
athletes.

Irwin, Richard L. DEVELOPMENT OF A COLLEGIATE LICENS-
ING ADMINISTRATIVE PARADIGM, 1990. Ed.D., University of
Northern Colorado (D. Allen Phillips). (202pp 3 f $12.00) PE 3322

The purpose of this study was to develop an optimal collegiate
trademark licensing paradigm through critical analysis of existing
profiles in collegiate and non-collegiate sport-related licensing
programs. A survey instrument was designed to evaluate the
licensing program’s organization structural dimensions of
standardization and specialization. The survey instrument was
distributed to licensing program representatives at 220 colleges
and six non-collegiate sport-related enterprises. Significant
differences were found to exist between the independently and
non-independently administered collegiate licensing programs on
several factors relative to the organization structural dimensions of
standardization and specialization. In addition, a significant
difference was found in these two groups between the percentage
of royalty revenues allocated for annual program operating
expenses. Significant differences were also found to exist between
the collegiate and non-collegiate sport-related licensing programs
on a number of organizational structure issues under investiga-
tion. A significant difference was found to exist on the organiza-
tion structural dimension of specialization mean scores between
the collegiate and non-collegiate sport-related licensing programs.
A cluster analysis revealed that the collegiate and non-collegiate
sport-related licensing programs fell into two distinct clusters
based on responses to the organization structural dimensions
under investigation, indicating variation in the methods of
operation relative to these factors. It was concluded that the
reported differences were influenced by the adopted university
licensing program management philosophy, interest in addressing
elements inherently critical to licensing program administration,
and the licensing program’s internal human resource develop-
ment.

Johnson, Jay R. A SURVEY OF DIVISION II ATHLETIC AND
PHYSICAL EDUCATION FISCAL TRENDS FOR THE NEXT
TWENTY YEARS, 1992. Ed.D., West Virginia University (Carl P.
Bhaneman). (138pp 2 f $8.00) PE 3358

The purpose of the study was to determine what major financial
problems may occur within Division II athletic and physical
education programs during the next twenty years. Financial
problems and fiscal solutions were forecast by administrative
experts. A Modified Delphi Technique was utilized in the study to
obtain a consensus opinion from experts through a series of
questionnaires with controlled feedback. The experts surveyed
included athletic directors, physical education chairs, and
presidents at the Division II level who have at least five years of
experience. The first questionnaire was mailed to forty randomly
selected experts. The first round of experts that responded and
met the minimum five years experience criteria numbered twenty
six. The response rate for the second and third questionnaire was
forty percent of the first questionnaire or sixteen respondents.
Geographical representation remained similar throughout the
study. The experts were asked to project future financial problems
and possible fiscal solutions. Each respondent rated the forecasts
according to rank, impact, and desirability which was later
assessed using the mean rank method. The experts ranked seven
financial problems which included administrative costs, competi-
tive salaries, equipment costs, new facility construction, old facility
renovation, repairs and maintenance, and travel expenses. The
impact and desirability of eight fiscal solutions were forecast for
each financial problem. The solutions included bond issues,
government allocations, tuition, student assessment, alumni gifts,
foundations, endowments, annual gifts, and corporate sponsor-
ships. The greatest financial problem for athletics and physical
education will be new facility construction. Three fiscal solutions
(annual gifts, government allocations, and bond issues) were
forecast in the high impact range regarding athletic financial
problems and three (bond issues, government allocations, and
tuition) fiscal solutions were forecast in the high impact range
regarding physical education. Seven fiscal solutions (annual gifts,
annual gifts, bond issues, corporate sponsorships, endowments,
foundations, and government allocations) were forecast as highly
desirable regarding athletic financial problems and five fiscal
solutions (alumni gifts, bond issue, foundations, government
allocations, and tuition) were forecast as highly desirable
regarding physical education.

Kautz, Robert E. COMPARING TORT LIABILITY KNOWLEDGE
OF FUTURE TEACHER COACHES AND CURRENT PRACTIC-
ING TEACHER COACHES, 1993. M.S., Washington State
University (Samuel Houston Adams). (115pp 2 f $8.00) PE 3428
This study compared tort liability knowledge between teacher coaches who have attended a sport law class or tort liability seminar/workshop and teacher coaches who have not attended a sport law class or tort liability seminar/workshop. One-hundred eighty subjects consisting of Washington State University teacher education students and Boise, Idaho public school teacher coaches participated in the study. Data was collected by the administration of a 38 question tort liability survey (Frank 1982). The data indicated a significant difference in tort liability knowledge between teacher coaches who have attended a sport law class or tort liability seminar/workshop and teacher coaches who have not attended a sport law class or tort liability seminar/workshop.


This study is a history of the decisions of the appellate courts of the state of Washington (court of appeals, Supreme Court) as they relate to physical education, sports, and facilities in public schools. Its purpose was to organize an historical account, present what appear to be the precedent setting cases, interpret the influence of statutory laws, and discuss the implications for the future. In the collection of data, primary sources were used to obtain the relevant case studies used to compile this history. Primary sources include the following law digests; the Washington Reporter, Washington Reporter 2nd ed., Pacific Reporter, Washington Appeals, and Westlaw. Significant decisions may be summarized as follows:

(a) School districts may be held liable for their negligent acts or omissions; (b) school districts owe a duty of care to make sure that pupils are supervised; (c) improper or lack of supervision can be the approximate cause of an injury for which the district can be held liable; (d) school districts are responsible for making sure their facilities are safe for the students who use them as well as invitees of the district; (e) school districts may issue separate teaching and coaching contracts; (f) teaching contracts are covered under the continuing contract law but coaching contracts are not; and (g) suits against school districts should not be dismissed if reasonable minds can differ on who is at fault but should be left to the decision of a jury. Statutory laws RCW 28.58.030 and RCW 4.96.020 have had the most significant impact on court decisions throughout the years as the courts have vacillated on their implications. Implications for the future suggest continual challenges in the area of school tort liability and supervision, unless the senate legislature passes new more protective immunity legislation for school districts.

Meyer, Jane C. PERCEPTIONS OF AGENCIES THAT MARKET COLLEGIATE EMBLEMATIC MERCHANDISE TOWARD SELECTED FACTORS RELATED TO ROYALTY INCOME, 1992. Ph.D., University of Iowa (Gary F. Hansen). (327pp 4 f $16.00) PE 3363

The primary purposes of this study were to compare the perceptions of 1) collegiate trademark licensing directors with marketing directors of manufacturers which produce emblematic merchandise; 2) directors of independent with directors of agent administered licensing programs; and 3) directors of licensing programs that generate under $50,000 annual royalty income with directors of programs that generate over $500,000 annual royalty income; towards selected factors believed to influence increases in royalty income. The secondary purpose was to determine the relative importance of various factors influencing increases in royalty income as perceived by collegiate trademark licensing directors and manufacturers of collegiate emblematic merchandise. The Perceptions of Agencies That Market Collegiate Emblematic Merchandise TowardSelected Factors Relating to Royalty Income Questionnaire was constructed for the purpose of collecting perceptions. The questionnaire contained six parts: Parts I through IV collected perceptions from respondents toward selected factors believed to be related to increases in royalty income. Respondents indicated, on a five-point scale, their level of agreement/disagreement with each of the 59 items in Parts I through IV. Part V collected institutional data from licensing directors, and Part VI collected manufacturers’ data from marketing directors. Of the 246 questionnaires distributed in September, 1991, 124 (63.3 percent) licensing directors and 26 (52.0 percent) marketing directors of manufacturers returned properly completed questionnaires. The .05 level of significance was used for determining statistical significance. T-tests of independent samples were used to test the hypotheses investigated. Major findings were: 1. Among comparisons made between the three groups of respondents, only 25 of the 213 comparisons were statistically significant. 2. Respondents agreed that numerous factors are related to increases in royalty income. The three major factors were: academics and athletics successes of institutions, television exposure, and logo use and flexibility of logo use. These findings were consistent with current literature. 3. Respondents disagreed with only 13 of the 59 statements (22.0 percent) in the questionnaire. 4. Administrative structure of licensing programs was not perceived as a major factor influencing increases in royalty revenue.


The purpose of this study was to investigate the use of electronic technology in the sports information departments at the 14 universities in the Pennsylvania State System of Higher Education. The subjects involved in this study were the sports information directors at the 14 state universities. The subjects were sent questionnaires and 13 responded with a completed questionnaire. The responses to the questionnaire were analyzed to determine mean-rank scores and percentages concerning the importance of the use of computers, desk-top publishing, facsimile machines, and networking systems. Significant findings from this study included that the facsimile machine is the most valuable piece of electronic technology followed by the computer, and that desk-top publishing is increasing in importance while, because of the varied responses concerning the future of networking systems, this technological advance will need to be studied again in the future before making a final judgment on its importance.


The purpose of this study was to identify and examine the opinions of the Association of Representatives of Professional Athletes (ARFA) members toward recommendations for determin-
ing the qualifications of those persons assuming the role and responsibilities of a contract advisor for professional athletes. Specifically, this study attempted to identify and examine the recommended qualifications needed to be a competent contract advisor. The qualification centered around a contract advisor's educational background and professional preparation. A questionnaire was developed and sent to 100 ARPA members. Sixty-nine questionnaires were returned. The conclusion of the study indicated that the ARPA members were on average 42 years of age, male, and white. The ARPA members had an average annual income in the $80,000 to $90,000 range. Seventy-two percent of the ARPA members recommended a baccalaureate degree as the optimal level of education needed to be a competent contract advisor. The ARPA members rated a major or minor in sport administration/management as essential to be a competent contract advisor. The ARPA members rated an internship in a sports management firm as essential to be a competent contract advisor. Having players' association certification, attending seminars concerning contract negotiations for professional athletes, and conducting research concerning contract negotiations were also rated as essential to be a competent contract advisor. The ARPA members were of the opinion that contract advisors should be subject to a standard competency examination. The ARPA members also felt that contract advisors should be made to join one regulatory contract advisors' association. The ARPA members favored federal regulation of contract advisors over state regulation.


The purpose of this study was to identify the degree to which each of the regions of the National Federation of State High School Associations (NFSHSA) conforms to the events endorsed by the National Federation of State High School Associations for outdoor state-wide championships in track and field. The statewide chairpersons for all 50 states and the District of Columbia were surveyed. The Kruskal-Wallis one-way ANOVA was used to test the null hypotheses that there were no differences in the deviations from, additions to, omissions in, or variations of the events endorsed by the NFSHSA based on region. Paired t-tests were used to test the null hypotheses that there were no differences in the events based on gender. As a result of the findings in this study, the following conclusions were drawn: 1. There were no differences in the deviations from the events endorsed by the NFSHSA for track and field based on region for girls. 5. There were no differences in the deviations from the events endorsed by the NFSHSA for track and field based on region for boys. 6. There were no differences in the deviations from the events endorsed by the NFSHSA for track and field based on gender. 7. There were no differences in the omissions in the events endorsed by the NFSHSA for track and field based on gender. 8. There were no differences in the variations of the events endorsed by the NFSHSA for track and field based on gender.


The manner in which athletic events are covered by the media, specifically the print media, is important. Unfortunately, the coverage and attention given to women’s sports by the media have been disparaged and minimized. Since women’s sports are severely underreported, the issue as to why the media fail to give equitable representation to women’s sports and men’s sports stories warrants attention. Little research has been conducted on the structure and function of a university’s sports information office. The purpose of this study was to determine not only the amount and type of media coverage of NCAA Division I men’s and women’s sports in campus newspapers but to determine if the coverage was a function of the structure of the university’s sports information office. To examine the relationship between structure of sports information offices and actual media coverage of women’s varsity sports by university campus newspapers, the population selected consisted of 348 sports information directors from the 298 NCAA Division I schools. Data were collected by the use of questionnaires and campus newspapers. The dependent variables in the study were number of photographs, number of articles, and total column inches. The independent variables in the study were structure, funding, press releases, gender ratio, campus newspaper usage, and personnel. Treatment of data included both descriptive and inferential statistics. The key independent variable in this study was structure of the sports information offices. Most institutions (88%) have a sports information director who works in a single athletic administrative structure that is responsible for the collective coverage of men’s and women’s varsity sports. The amount and type of varsity sport coverage for women printed in campus newspapers constituted only one-third (35%) of all varsity sport coverage. Structure did not have a real impact on the amount of actual media coverage. Rather, the study revealed that the most influential factors that determined actual media coverage of women’s varsity sports were the number of press releases that emanated from the sports information office and the regularity of usage of this information by the campus newspapers.

MEASUREMENT AND EVALUATION

Chow, Bik Chu. COMPARISONS OF DOMAIN SCORE AND RELIABILITY ESTIMATES USING TRIALS-TO-CRITERION, SEQUENTIAL PROBABILITY RATIO, AND PRE-SET TRIAL LENGTH TESTS, 1991. Ph.D., University of Georgia (Ted A. Baumgartner). (127pp 2 f $8.00) PE 3313
The purpose of the study was to develop and test a method to analyze and evaluate team performance in volleyball in terms of individual skill performance as well as sequential skill performances. Seventy-two sample games from the F.I.V.B Cup international men's volleyball competition were video taped, computer recorded, and statistically analyzed. Games were grouped into two categories according to the team standing and game status: Top 4–Bottom 4 teams and Winning-Losing games. MANOVAs and discriminant function analysis were used to investigate the playing characteristics of individual skill performance and to select the best predictor(s) of team success among the skill components. Log-linear procedures were used to examine the dependencies (first- and second-order transition patterns) among the sequential playing actions. Results showed that: 1) the effect of decreasing task difficulty on reliability estimates using the TTC, SPR, and pre-set trial length tests was found to be different. In general, the TTC was found to be a better test than the SPR as a domain score estimator. However, the SPR was found to be the best test in reliability estimation among the three tests. When an easier test was defined by using another set of trial criteria, higher reliability estimates for the three tests were found. INDEX WORDS: Domain Score, Reliability, Mastery Classification, Trials-to-criterion Test, Sequential Probability Ratio Test, Pre-set Trial Length Test

Eom, Han J. COMPUTER-AIDED RECORDING AND MATHEMATICAL ANALYSIS OF TEAM PERFORMANCE IN VOLLEYBALL, 1989. M.P.E., University of British Columbia (Robert Schutz). (133pp 2 f $8.00) PE 3383

The purpose of the study was to develop and test a method to analyze and evaluate team performance in volleyball in terms of individual skill performance as well as sequential skill performances. Seventy-two sample games from the F.I.V.B Cup international men's volleyball competition were video taped, computer recorded, and statistically analyzed. Games were grouped into two categories according to the team standing and game status: Top 4–Bottom 4 teams and Winning-Losing games. MANOVAs and discriminant function analysis were used to investigate the playing characteristics of individual skill performance and to select the best predictor(s) of team success among the skill components. Log-linear procedures were used to examine the dependencies (first- and second-order transition patterns) among the sequential playing actions. Results showed that: 1) the significant differences between the groups were due to better performances on those skills which took place in the Counterattack Process (i.e., Block, Dig, Set, and Spike), demonstrated by the Top 4 teams and in Winning games. Among these the Block and Spike were the most (relatively) important skills determining team success; 2) Success in spiking performance was more dependent upon the given outcomes of the set (1st-order) than those of the reception (2nd-order); and 3) the patterns of 1st- and 2nd-order transitions were stable and consistent regardless of the Team, Game and Process Status. Both the methodology and subsequent results provide a viable aid for effective coaching in volleyball. In addition, this tool may also be applicable to other sporting contexts.


Prediction of track and field performances has been an interesting topic for researchers. The majority of previous researchers have focused on prediction of the world records or the best performances by using time series analysis and regression analysis from world records or best performances themselves. The researcher in this study, however, examined some of the ignored factors which affect athletic performances and set up some new predictive models for the world men's high jump and long jump events. The relationship between the characteristics of the top average performance and the rate of increase in the next year was obtained to determine the importance of such factors in producing the best performance of the next year. Performance groups were cataloged into top one, top 10, top 20, and top 50. Certain predictive models were established to predict the best performance in the next year by the best performance and the standard deviation of the top average performance in the current year. Predicting by the top 10 and top 20 groups had a better predictive result than predicting by the other groups in the high jump event. However, prediction of the long jump performance had more predictive errors because of the irregular trend. The conduct of this study enabled the researcher to develop the more reasonable and more realistic predictive models in which a lower or a higher score than the previous year's can be predicted if most of the top performances are deviated from, or close to the mean score.

Jones, Carol E. THE RELATIONSHIP OF A BASKETBALL EFFICIENCY RATING SYSTEM TO GAME OUTCOME, 1993. M.S.Ed, State University of New York College at Brockport (Daniel E. Smith). (75pp 1 f $4.00) PE 3474

The problem was to determine whether Smith's (1983) basketball efficiency rating system was a valid method of evaluating individual player's performance and predicting game outcome. Subjects were the 1990-91 Syracuse University men's collegiate basketball team and their opponents, 1991-92 University of Rochester men's collegiate basketball team and their opponents and four seasons (1988-1992) of the State University of New York, College at Brockport men's and women's collegiate basketball teams. Data, collected from the sports information directors, included each team's basketball box score statistics for the season. Efficiency ratings were calculated and three correlations were analyzed using the Pearson Product Moment Correlation Coefficient to determine the relationship between the variables: points scored and efficiency ratings, minutes played and efficiency ratings, and team point differences and average team efficiency rating differences. The Critical Values of Correlation Coefficient Table revealed a significant relationship between the three correlations. Therefore, end of game efficiency rating comparisons are a good indication of game outcome and Smith's (1983) efficiency rating system appears to be a valid, reliable and objective evaluation tool.
The purposes of this study were to describe the differences in golf ability of college males and to predict golf ability based on performance on a battery of golf skill tests. Subjects in the study were 60 college males who were placed in an advanced, intermediate, or novice ability group based on their average golf score. The golf skill test battery consisted of a drive, middle-distance, pitch, chip, and putt test. Descriptive discriminant analysis was used to identify group differences. Three analyses were performed and the results were similar for each analysis. The most important variable for separating the groups was the drive followed by the pitch and putt. The combination of the drive, pitch, and putt separated the groups as well as the original five variable combination. The underlying structure separating the groups consisted of the drive, pitch, and putt and was labeled an overall golf factor. Predictive discriminant analysis was used to classify the subjects into the group that they most closely resemble. For the advanced group, the classification rate was 85%. The most important test for classifying subjects into the advanced group was the drive test. The drive and putt tests classified the subjects into the advanced group with the same accuracy as all five variables. For the intermediate group, the classification rate was 50%. The most important test for classifying subjects into the intermediate group was the pitch test. The drive and pitch tests classified intermediate subjects with the same accuracy as all five tests. The classification rate for the novice group was 90%. For the novice group, the chip, pitch, and middle tests were similar in importance. Four two-test combinations classified novice subjects with 100% accuracy. The major conclusions of the study were: (1) the differences in golf ability are well explained by the drive, pitch, and putt tests; and (2) for classification, the best tests were dependent on the group of interest. INDEX WORDS: Descriptive Discriminant Analysis, Predictive Discriminant Analysis, Golf Skill Tests

Choi, Euichang. BEYOND POSITIVIST SPORT PEDAGOGY: DEVELOPING A MULTIDIMENSIONAL, MULTIPARADIGMATIC PERSPECTIVE, 1992. Ph.D., University of Georgia (Wilma M. Harrington). (177pp 2 f $8.00) PE 3457

The primary purpose of this study was to develop a multidimensional, multiparadigmatic view of sport pedagogy as a field of study. This purpose was pursued by reconceptualizing the nature of the subject matter and modes of inquiry in sport pedagogy. Curriculum as the subject matter was understood as a socially-constructed, family resemblance concept that involved multiple dimensions. Five curriculum dimensions were identified: the textual, the perceptual, the operational, the hidden, and the null. Multiple modes of inquiry were legitimized for sport pedagogy based on Jurgen Habermas' theory of knowledge-constitutive human interests. The empirical-analytic, the interpretive, and the critical research paradigms were identified as viable. The basic assumption underlying the alternative view was that multiple paradigms should be employed for sport pedagogues to appreciate the multiplicity of the subject matter. A review of conceptual and empirical studies by using the Paradigm-Dimension Conceptual Framework showed that the alternative view does far greater justice to the ways in which systematic inquiry is actually conducted in sport pedagogy. Index Words: Sport Pedagogy, Research Paradigm, Curriculum Dimension, Conceptual Framework, Positivism.
Connor, Fiona J. TEACHING LANGUAGE CONCEPTS AND LABELS TO PRESCHOOL CHILDREN IN SPECIAL EDUCATION AND HEAD START CLASSES THROUGH PHYSICAL EDUCATION LESSONS, 1993. Ph.D., Michigan State University (Gail M. Dummer). (194pp 2 f $8.00) PE 3459

This study attempted to improve language concept comprehension, language label knowledge, and overall gross motor skill performance in preschool children. Two treatments were implemented—a language-enriched physical education (PE) intervention (experimental) and a PE intervention (control). Seventy two children, aged three to six years from preschool special education classes (PPI), Head Start (HS), and typical preschool programs (PS), were assigned to five groups: PPI experimental (n=14), HS experimental (n=18), HS control (n=17), and PS experimental (n=11). Each intervention took place in three, 30-minute lessons per week, for eight weeks. All children were pretested and posttested on language concept/label knowledge using the Bracken Basic Concept Scale, and on motor performance using the Peabody Developmental Motor Scale. A 2 (treatments) X 2 (programs) X 2 (times of testing) repeated measures ANCOVA with treatment nested within program, was applied to the group mean raw scores for each dependent measure, with follow-up using Tukey HSD. The PS group was omitted from analysis due to lack of a control group. Children in all groups improved their school readiness concept/label and direction/position concept knowledge. HS children outperformed PPI on both language measures. However, HS did seem delayed in school readiness concept/label knowledge compared to PS. Motor skill improvement occurred in balance, nonlocomotor, locomotor, and receipt/propulsion skills, with children in PPI, HS, and PS showing similar gains to those indicated in previous studies involving typical preschoolers. However, in this study all subjects had low motor performance scores compared to the expected standard scores for their age, with the PPI group scores ranking significantly lower than HS and PS scores, respectively. The experimental and control groups improved equally on the motor skill measures. Therefore, PE could be included as another environment in which to emphasize cognitive development across the curriculum. Furthermore, the generally poor motor performance scores suggested a need for preschool motor skill instruction.

Dulaney, Nicole M. THE EFFECTS OF A FLEXIBILITY TRAINING PROGRAM ON FLEXIBILITY TEST SCORES IN ELEMENTARY SCHOOL CHILDREN, 1991. M.S., Arizona State University (Charles B. Corbin). (75pp 1 f $4.00) PE 3316

A study was conducted to determine if a flexibility training program would improve performance on two flexibility tests for first, third, and fifth grade males and females (N=229). The children were tested on the sit and reach test and the V-sit test three times during a six week treatment period and once after a six week latency period. The children, per grade level, were randomly assigned to three groups; a control group and two treatment groups (stretching exercises twice a week or five times a week). A 3x3x4 ANOVA with repeated measures revealed that males and females, regardless of what grade or group, significantly (p<.05) improved on the sit and reach test over the six week treatment period; however, their scores decreased on the V-sit test. After the six week latency period sit and reach test scores for males and females decreased and V-sit test scores continued to worsen. The results suggest that the physical education program during the treatment period contributed to the improvement in sit and reach test performance but impaired V-sit test performance.

England, Kathleen M. ANALYSIS OF THE INSTRUCTIONAL ECOLOGY IN TUTORIAL TENNIS SETTINGS, 1993. Ph.D., Ohio State University (Deborah Tannenhill). (327pp 4 f $16.00) PE 3413

The purpose of this study was to examine the instructional ecology of tutorial tennis settings and determine implications for group instruction. Description of the instructional task system and patterns that emerged from learner practice tasks were examined as well as the degree of learner involvement in response to stated tasks. Information gained from the instructional ecology of tutorial tennis settings were used to develop a model for group instruction. Case study research design guided this investigation, providing an in-depth understanding of tutorial instruction. Five tennis teaching professionals from local tennis clubs served as subjects for this study. Systematic observation strategies with extensive field notes were used to describe and systematically analyze the nature of the instructional ecology in tutorial tennis settings. Direct response data such as interviews, and a background questionnaire were used to gather additional information from tutorial settings. Data was analyzed for each of the five case studies individually which separately focused on: 1) components of the observation instrument; 2) interview information; 3) questionnaire data; 4) document sources; 5) implications for group instruction based on strengths drawn from tutorial instruction. Hence, a separate analysis was performed on each of the five case studies. Findings included: all five teachers were business-like, using a direct instruction approach. Although these teachers were serious about teaching tennis skills, they were warm and friendly which was reflected in a positive and motivating learning climate. These tutors used behavior chaining which linked prompts to tasks before and after most learner responses to refine tasks. In addition, learners were engaged in high quality activity the majority of time while highly successful and congruent to stated tasks. These teachers displayed high levels of tennis content knowledge, averaging 15 years of tennis teaching experience. Through effective sequencing of task progressions, combined with frequent feedback, these teachers transformed content knowledge into pedagogical content knowledge. These tutorial teachers displayed effective teaching behaviors that group instructors in physical education could benefit.

Eom, Han J. THE INTERACTIVE EFFECTS OF DATA CATEGORIZATION AND NONCIRCULARITY ON THE SAMPLING DISTRIBUTION OF GENERALIZABILITY COEFFICIENTS IN ANALYSIS OF VARIANCE MODELS: AN EMPIRICAL INVESTIGATION, 1993. Ph.D., University of British Columbia (Robert W. Schutz). (210pp 3 f $12.00) PE 3461

The present study employed Monte Carlo procedures to investigate the effects of data categorization and noncircularity on generalizability (G) coefficients for the one facet and two-facet fully-crossed balanced designs as well as on the Type I error rates for F tests in repeated measures ANOVA designs. Computer programs were developed to conduct a series of simulations under various sampling conditions. Five independent parameters were considered in the simulations: (a) three levels of repeated measures (3, 5, 7); (b) three G coefficients (.60, .75, .90); (c) three epsilon values (.50, .70, 1.0); (d) three sample sizes (15, 30, 45); and
Fischer, Joseph C. THE CONSTRUCT VALIDITY OF A SCALE TO MEASURE TEACHER ENTHUSIASM IN SECONDARY PHYSICAL EDUCATION, 1992. D.P.E., Springfield College (Gretchen A. Brockmeyer). (235pp 3 f $12.00) PE 3418

The purpose of this study was to identify a content of behaviors that represent teacher enthusiasm in secondary physical education. The subjects were a randomly selected sample of NASPE members from the Eastern District of AAHPERD, involved in the secondary level of education. Out of a sample of 1,000 teachers, 680 participated in the study. The measuring instrument was the Teacher Enthusiasm Rating Instrument which was a Likert-style rating scale that had a domain of content of both low- and high-inference descriptors of teacher enthusiasm. The domain of content was derived from a search of the literature, a pilot study, and input from a panel of 18 experts named because of expertise in physical education teacher education. A hypothesized model of teacher enthusiasm was developed which included four low-inference factors which were titled: (a) ‘expressive/animation’, (b) ‘interaction’, (c) ‘instruction’, and (d) ‘humor’, and one high-inference factor titled ‘subjective, internally originated and genuine traits of teaching’. Factor analysis was used to confirm the hypothesized model using the principal components and unweighted least squares extraction techniques, and the extracted factors were subjected to both orthogonal and oblique rotation techniques. The low- and high-inference analyses both produced a more complex representation of teacher enthusiasm than the hypothesized model. The low-inference analysis consistently produced factors named: (a) ‘humor’, (b) ‘direct teaching’, (c) ‘expressive’, (d) ‘responsive teaching’, (e) ‘animation’, (f) ‘interpersonal interaction’, and (g) ‘reciprocal interaction’. In addition, other low-inference factors were named ‘exhort interest’ and ‘demonstrate’. The high-inference analysis consistently produced factors named: (a) ‘practical teaching’, (b) ‘general affect’, (c) ‘internal enthusiasm’, and (d) ‘affective teaching’. The complexity of the construct of teacher enthusiasm was revealed through this study, however very consistent and similar results were produced across all analyses, which was an important aspect of the findings.

Hanson, Margaret A.B. DEVELOPING THE MOTOR CREATIVITY OF ELEMENTARY SCHOOL PHYSICAL EDUCATION STUDENTS, 1993. Ed.D., University of Georgia (Ann E. Jewett). (210pp 3 f $12.00) PE 3466

The purpose of this study was to determine the effectiveness of instruction focused on the creative movement processes in developing the motor creativity of fourth grade physical education students. The creative movement processes of varying, improvising, and composing from the process dimension of the Purpose Process Curriculum Framework (Jewett & Mullan, 1977; Jewett & Bain, 1987) were utilized to plan instruction for developing motor creativity. A model was developed for planning instruction for the creative movement processes approach, including three steps: stating objectives, planning modifications of activity’s content, and planning feedback. The performances of students who had experienced this approach were compared to those of students who had experienced the traditional approach of skills acquisition and refinement. Subjects for this study were 58 fourth-grade students who were evenly distributed in two homerooms. Each homeroom experienced learning strategies specific to their group’s instructional focus (creative or traditional). As they participated in their regularly scheduled physical education classes for 16 weeks, they received lessons in ball handling, rope jumping, dancing, and rhythms. Data were collected using measures of general creativity, motor creativity, and motor skills ability. Journal observations recorded by the researcher following each lesson provided additional information. Significant differences between groups were found. The creative instruction group improved significantly in general creativity, while the traditional instruction group remained relatively the same. The creative instruction group scored significantly higher than the traditional instruction group in terms of motor creativity and motor skills ability. General creativity, motor creativity, and motor skills ability were unrelated following traditional instruction; yet, general creativity and motor creativity were moderately related following instruction in the creative movement processes. An analysis of the journal observations revealed three categories of student behaviors: affective, social, and skill-learning behaviors. More positive behaviors were recorded for the creative instruction group in each of the three categories. The major conclusions of the study were that instruction focused on the creative movement processes improves general creativity, results in superior performances in motor creativity and motor skills ability, and promotes positive affective, social, and skill-learning student behaviors. INDEX WORDS: Composing, Creative Movement Processes, Educational Creativity, Improvising, Motor Creativity, Motor Skills Ability, Physical Education Curriculum, Purpose Process Curriculum Framework, Varying
Harrelson, Gary L. PREDICTORS OF SUCCESS ON THE NATIONAL ATHLETIC TRAINERS ASSOCIATION CERTIFICATION EXAMINATION, 1992. Ph.D., University of Southern Mississippi (Bill Larson). (87pp 1 f $4.00) PE 3351

The purpose of this study was to investigate athletic training students’ success on the National Athletic Trainers Association (NATA) Certification Examination and the degree to which this success was related to selected variables. Fifty-two subjects were selected who were enrolled in the University of Southern Mississippi’s athletic training curriculum since 1978 and have taken the NATA’s Certification Examination. The relationship between the independent variables of overall GPA, athletic training GPA, academic minor, academic minor GPA, ACT composite score, gender, fraternity or sorority affiliation, teaching or non teaching, and the number of semesters enrolled at the University of Southern Mississippi and the criterion variables of number of attempts before successful completion of the entire NATA Certification Examination and its three subcomponents were analyzed within the framework of Multiple Linear Regression. The statistical techniques of multiple correlation and semi-partial were used. Data analysis shows that none of the independent variables in this investigation can be used to independently predict success on the NATA Certification Examination and its three subcomponents. However, there does appear to be a strong interrelationship between several of the independent variables.

Hastie, Peter A. TASK ACCOUNTABILITY IN SCHOOL PHYSICAL EDUCATION AND SPORTS SETTINGS, 1990. Ph.D., University of Queensland (John Saunders). (382pp 4 f $16.00) PE 3352

The concept of accountability provided the focus for this examination of how academic work is accomplished in secondary school physical education and sports settings. The physical education study of Tousignant (1982) served as the model for an initial study which investigated accountability in a coaching setting. It was concluded that similar task systems operate in both teaching and coaching, although two extra types of tasks were identified in coaching. The functional behaviors of teachers and coaches were then examined in two further studies to differentiate between those who were more and less effective in promoting involvement in classes or training sessions. The results of both studies identified active instruction as a key strategy for teachers and coaches in facilitating involvement in physical education classes and sports training sessions. Where teachers and coaches were constantly giving information about the task, and feedback to students while they were working, greater levels of academic learning time - physical education (ALT-PE) were recorded than when the instructors were passively observing their students. In a further observational study, monitoring was also identified as a key strategy in teaching physical education. Students were more likely to be appropriately involved in the set tasks when the teacher was watching the students in close proximity, rather than when the students could not be seen by the teacher. Questionnaire data were collected from secondary school physical education students and sports players (N= 1028) as the basis for an analysis of students'/players' perceptions of their teachers'/coaches' use of accountability strategies. A model was proposed to determine the interrelationships between the variables associated with accountability. This model was tested through Linear Structural Relations (LISREL) and confirmed that in physical education classes, the accountability factors of monitoring directly affected involvement, while active instruction affected involvement indirectly throughout the students’ valuing of the teacher. In sports settings, monitoring did not show significant regression effects, while active instruction showed a strong relationship. Throughout the series of studies in this thesis, accountability was confirmed as an important variable in the teaching and coaching process. It was possible to differentiate effective teachers and coaches through their use of accountability strategies, and it was verified that students perceived these strategies as affecting their level of involvement in classes or training sessions. It might be possible for researchers and practitioners involved in teacher education to undertake interventionist programmes, aimed at increasing the adoption of accountability strategies. Other research possibilities may include the investigation of the operation of accountability in other movement settings, such as in primary schools, or other levels of sports coaching, such as in professional teams or novice teams. Finally, the interrelationships identified between physical education teaching and sports coaching in this series of studies offer support for the value of an upgraded study of coaching pedagogy, drawing upon the theoretical frameworks available to researchers in the teaching of physical education.


The purposes of this study were: (a) to identify the utilization of athletic trainers by composition of schools in the Washington Metropolitan Area (WMA); and (b) to identify the desired professional preparation and potential job market for high school athletic trainers in the WMA, according to high school athletic directors in the WMA. The study further surveyed the high school athletic directors in the metropolitan region on their knowledge of and support for the credentialing process of the National Athletic Trainers’ Association (NATA). The major findings of the study were as follows: 1. The primary educational preferences of high school athletic directors for employment as an athletic trainer were: (a) a bachelor’s degree, and (b) NATA certification. 2. Athletic directors had knowledge of the athletic trainer credentialing examination and educational preparation endorsed by NATA. 3. Athletic directors supported the idea of state credentialing of athletic trainers. The conclusions of the study were as follows: 1. High schools which had a larger number of students enrolled were not more likely to employ an athletic trainer than high schools with a smaller number of students. 2. High schools which had a larger number of faculty were more likely to employ an athletic trainer than high schools with a smaller number of faculty. 3. High schools which had a larger number of male sports teams were more likely to employ an athletic trainer than high schools with a smaller number of male sports teams. 4. High schools with a larger number of female sports teams were more likely to employ an athletic trainer than high schools with smaller numbers of female sports teams. 5. High schools with a larger number of male participants were more likely to employ an athletic trainer than high schools with a smaller number of participants. 6. High schools with a larger number of female participants were more likely to employ an athletic trainer than high schools with a smaller number of female participants.

The problem was to investigate the relationship of timing, targeting, and responding (withitness) to student reaction during a desist (action to stop a misbehavior). Other relationships investigated were withitness to monitoring and teacher experience, class size, and type of activity to withitness. The subjects were thirty-one middle school Physical Education teachers in Albuquerque, New Mexico. The 1982 Revision Coding system was used to record ALT-FE while class was in session. The withitness score was measured by watching the videotape and evaluating each desist for appropriate timing, targeting, and responding. The monitoring score was also drawn from the videotape and was a combination of the sector change rate per minute and the percentage of time facing the majority of the class. The data was analyzed through the use of ANOVA’s and a multiple regression. The study revealed that student response (how a student responds to a desist) was significantly related to timing, targeting, and responding (withitness). The only other significant relationship was between the type of activity and withitness which indicated teachers scored significantly higher withitness scores in team sport activities.


Subjects for this study were student teachers, cooperating teachers, and college supervisors from the Springfield College physical education professional preparation program. The research was designed to: (a) determine the relationship of the perceptions of student teachers, cooperating teachers, and college supervisors of the importance of the student teaching objectives and to (b) compare the differences among the perceptions of the degree of achievement of these objectives by the student teachers. The researcher also compared the degree to which the student teachers achieved the five objectives that they ranked the highest. The instrument used included 15 student teaching objectives. In section 1 of the instrument, completed at the beginning of the semester, the subjects were required to rank the objectives as to importance. The Kendall Coefficient of Concordance (W) was utilized to analyze the data. The Kendall tau Correlation Coefficient was used to determine the association between every two sets of rankings of the 15 objectives. In section 2 of the instrument, completed at the end of the experience, the subjects were required to rate the degree of achievement of the objectives by the student teachers. The Kruskall Wallis H test was used to compare the differences in rankings of the ratings of each objective, among the triad groups. An overall agreement (p<.05) was found among the three sets of rankings of the importance of the objectives by the triad groups. A significant (p<.05) difference was found in the mean rank of the achievement ratings of 9 out of the 15 objectives. Furthermore, it was found that the student teachers did not perceive that they completely achieved the objectives that they ranked as highly important.


The purpose of this study was to identify factors that affected African-Americans in their decisions to enroll and their ability to persist in doctoral study in physical education and related disciplines. A written survey was administered to 106 African Americans who earned doctoral degrees between 1971 and 1990. A sample of six individuals was selected and subsequently interviewed. Quantitative and qualitative survey data were integrated, when appropriate, and a respondent profile was constructed. Case study reports were written for each of the six interviewees and a cross-case analysis was conducted. Factors affecting enrollment and persistence were both institutional (geographic location, financial aid, campus environment) and non-institutional (professional aspirations, personal qualities, support from family and others). Financial aid and campus environment were important persistence factors due to the respondents’ low income prior to doctoral study ($20,000 or less), and because their choice of doctoral institutions was limited to PWIs. Most respondents attributed their persistence to personal determination and perseverance. Those who experienced a poor campus environment relied primarily upon their personal qualities and support from family and others.

Leis, Hans H. **THE EFFECTS OF TWO INSTRUCTIONAL CONDITIONS ON SPORT SKILL SPECIFIC ANALYTIC PROFICIENCY OF PHYSICAL EDUCATION MAJORS**, 1993. Ph.D., University of Southern Mississippi (Sandra K. Gangstead). (94pp 1 f $4.00) PE 3391

The purpose of this study was to determine the effects of specific skill instruction and skill analysis instruction on the ability of preservice physical education majors to analyze a tennis serve and to determine the extent to which majors might be able to transfer learned observational strategies to the process of observing and analyzing novel movement patterns. Subjects were used as intact groups from a university sport developmental class and a sport instructional techniques class for physical education majors. One group received traditional skill instruction as an instructional condition and the other group received skill analysis training as an instructional condition. Skill analytical proficiency was assessed prior to and after treatment. Novel skill analytical proficiency was also assessed at post-treatment. Using a pre-test, post-test quasi-experimental design, a t-test applied to analytical proficiency scores found a significant difference between groups. The skill analysis group performed better than the skill instruction group. A t-test applied to novel skill analytical proficiency scores found no significant difference between groups. The data indicate that skill analysis training may enhance sport skill analytical proficiency, but this ability seems to be sport specific and not a generic ability.

The study deals with mathematical models as they apply to predict sports performances with track and field events. The purposes of this study were the following: 1) identify the best applied mathematical model based on their assumptions, strengths and weaknesses, and the outcome predictions among the models using a comprehensive updated data set; 2) use a comprehensive updated data set and the chosen best fitting model to predict future performances for males and females in selected track and field events, and determine whether women will outperform men and if so, when; 3) develop a new random sampling model to predict the world record and ultimate performances based on the assumption (testable) that the performance has already reached asymptotic level and the best performance population will be stable in the next 50 or more years. BMDP-IR and BMDP-3R software were used to fit the linear and nonlinear models and produce statistics to assist in identifying the best fitting model. An FORTRAN 77 Monte Carlo simulation program was written to do the simulation utilizing values derived from extreme value theory for the men’s 1500m event. The world prediction results obtained from the random sampling model were then compared with Glick’s theoretical expected number of world records in a given period. The results showed that: 1) the best performance per year data is the most appropriate data in track and field for model development, and the exponential model relating running time and historical year with the best performance data is the most valid deterministic model for prediction of world records and the ultimate performance; 2) the differences between women’s and men’s performances in track and field will keep diminishing, however, women are not predicted to catch up to the men in the chosen events in this study; 3) a greater performance improvement is expected in the near future for those events in which the performances still exhibit a linear trend (e.g.,10000m, and High jump); 4) under the assumption that the average ultimate performance has been reached in the men’s 1500m event, the random sampling model is an effective method to predict the new world records for this event; 5) according to the random sampling model the waiting time between world records becomes progressively longer with every newly established world record. A world record beyond the limit of 205 seconds for the men’s 1500m event could take up to one hundred years or more.

Lizandra, Mireia SPORT MANAGEMENT CURRICULA: IDENTIFICATION OF MINIMUM CORE CONTENT AREAS AND COURSES TO BE INCLUDED IN EACH CONTENT AREA FOR UNDER-GRADUATE AND GRADUATE (MASTER’S) SPORT MANAGEMENT PROGRAMS, 1993. Ed.D., Temple University (Bonnie L. Parkhouse). (264pp 3 f $12.00) PE 3477

The purpose of this study was to examine the core content areas for undergraduate and graduate (master’s) sport management programs identified by the National Association for Sport and Physical Education (NASPE)/North American Society for Sport Management (NASM) Joint Task Force on Sport Management Curriculum and Accreditation. More specifically, the focus of this study was designed to: 1. Determine if the core content areas identified in the document, Standards for Voluntary Accreditation of Sport Management Programs, for both undergraduate and graduate (master’s) sport management programs were deemed essential for career preparation in sport management as perceived by academicians and practitioners in the field of sport management. 2. Identify the minimum courses to be included in each core content area for both undergraduate and graduate (master’s) sport management programs, based on those courses recommended by NASPE/NASSM, as perceived by academicians and practitioners. 3. Determine if there is a difference in core content area(s) and course(s) in the undergraduate and graduate (master’s) sport management programs for each of the segments of the sport industry analyzed in this study. A questionnaire was developed by the investigator and mailed to 155 academicians and 406 practitioners in the field of sport management. The results of this study confirmed that academicians and practitioners agreed with the content areas identified in the document, Standards for Voluntary Accreditation of Sport Management Programs, for both undergraduate and graduate (master’s) sport management programs as deemed essential for career preparation in sport management. However, differences were found between academicians and practitioners in the identification of the minimum courses to be included in each core content area for both undergraduate and graduate (master’s) sport management programs. The four subgroups of practitioners considered the content area(s) identified in the document, Standards for Voluntary Accreditation of Sport Management Programs, for both undergraduate and graduate (master’s) sport management programs as deemed essential for career preparation in sport management. However, differences were found with regard to the importance of each area and the courses to be included in each content area. This fact supports the need for specialized-tracks within sport management programs for different sport management careers. The minimum courses to be included in each core content area for both undergraduate and graduate (master’s) sport management programs.

Mathias, Kirk E. A COMPARISON OF THE EFFECTIVENESS OF INTERACTIVE VIDEO IN TEACHING THE ABILITY TO ANALYZE TWO MOTOR SKILLS IN SWIMMING, 1990. Ed.D., University of Northern Colorado (Jeff Steffen). (116pp 2 f $8.00) PE 3328

The primary purposes of the study were to develop an interactive videodisc application and conduct an initial comparison of interactive video instruction and traditional methods of teaching students to analyze two motor skills in swimming. The secondary purposes were to compare whether interactive video has an effect on teaching students to analyze intermediate versus complex skills in swimming and to examine the students’ perception of the interactive videodisc application. The sample consisted of seventeen subjects from the Water Safety Instruction class at the University of Northern Colorado. Subjects were divided into a control group (N=11) receiving normal instruction along the guidelines of the American Red Cross and a treatment group (N=6) receiving instruction through an interactive videodisc medium. Subjects were taught to analyze the freestyle and the butterfly swimming strokes. A pre- post-test design was implemented to measure differences in ability of the subjects in analyzing the two strokes. The subjects all improved in their ability to analyze strokes. The treatment did not lead to a significant difference in cognitive or psychomotor analysis scores. Subjects who received the interactive videodisc instruction believed that it was an effective medium of teaching and that they would use it again if they received the opportunity. These results seem to indicate that interactive videodisc instruction is at least as effective as traditional instruction in teaching teachers to analyze two swimming strokes. Refinement of current interactive videodisc instructional strategies could lead to different results.
This study compared the effects of 6-week physical education programs, concepts-based versus traditional, on knowledge, motivation and parent perception of student behavior. Subjects were 45 male and 42 female high school students aged 15-19 in four intact classes. Classes were randomly assigned to two groups with two classes per group. A crossover design was used where both groups received both programs in opposite sequence. Students completed pre, mid, and posttest evaluations using two instruments: a knowledge test and the Intrinsic Motivation Inventory (IMI) (McAuley, 1989). Parents completed an awareness survey at the midpoint of the experiment. The statistical analysis was a repeating measure MANOVA for student instruments and an item ANOVA on the parent survey. The significance level was p<.05. No significant differences existed between programs for the IMI or parent survey. The concepts-based program produced a knowledge increase of 28% (p<.01). No increase resulted from the traditional program.

The purpose of this study was three fold: (1) Norms were established for 17 skill and fitness related tests for third, fourth, and fifth grade boys and girls; (2) the scoring abilities were compared on the same tests of four types of evaluators that included a physical education specialist, a regular classroom teacher, the student subjects, and student peers; (3) the fitness scores and skill abilities of the above mentioned children were compared for those taught by P.E. specialists to those taught by their classroom teachers. Results showed that the P.E. specialist evaluated significantly different than the classroom teacher on four fitness tests and different than the subjects and their peers on eight fitness tests. The classroom teacher scored differently than the subjects and peers on two fitness tests. There were no differences among evaluators on any of the nine skill tests. There was no difference between specialist taught schools and those taught by classroom teachers on any of the skills tests, but on the eight fitness tests the students from the nonspecialist schools performed better on five of eight fitness tests.

The purpose of this study was to develop a descriptive account of the work of teaching physical education as viewed by veteran physical educators. A qualitative multicase study was conducted with eight veteran physical educators in Georgia and South Carolina. Four educators who taught at the elementary level (kindergarten through 5th grade), and two each from the middle (6th grade through 8th grade) and secondary levels (9th grade through 12th grade) participated in the study. Two of the four elementary teachers taught at one school and the others taught at two schools. A criterion-based sampling procedure was used to select the participants. The following criteria were utilized: (1) a full-time physical education teaching assignment; (2) ten or more years of teaching experience; and (3) equal representation of both genders. Data were collected over a two month period through personal interviews with each teacher. Two teachers provided documents about their teaching. Data were then analyzed using the constant comparison method. Four major categories emerged from the data revealing how veteran physical educators viewed their work. The first category, occupational tasks, described the technical work of teaching. The subcategories, planning, coping, evaluation, and duties provided accounts of the work done in this area. The second category, image, addressed how the teachers felt others viewed them as physical educators and how they viewed themselves. The third category, isolation, referred to the teachers' feelings of either professional or physical isolation within the schools. The fourth category, professional interactions related the teachers' feelings about their contact with parents, administrators, other teachers, and students. The conclusions of this study were as follows: (1) veteran physical educators describe their work in terms of occupational tasks, image, isolation, and professional interactions; (2) teachers' work encompasses planning, coping, evaluations, and duties; (3) occupational tasks, image, isolation, and professional interactions were described by all teachers; and, (4) no one category was unique to any one educational level.

INDEX WORDS: Teaching as Work, Teaching Physical Education, Veteran Teachers, Teachers' Perceptions
to determine differences in male and female responses from the four groups. The ratings for each concept were analyzed with a 2 x 4 ANOVA. Males had a significantly (p<.05) higher mean score in comparison to the females on the ‘likeability’ dimensions for Concept 1 (Health-Parts), Concept 2 (Skill-Elements), and Concept 6 (Self-Testing). Females scored significantly (p<.05) higher in both the ‘utility’ and ‘likeability’ dimensions of Concept 8 (Attitude Toward Fitness). Physical education teaching faculty had a significantly (p<.05) higher mean score than the students in both the ‘utility’ and ‘likeability’ dimensions for Concept 1 (Health Parts), Concept 2 (Skill Elements), Concept 3 (Change Fitness), and Concept 8 (Attitude Toward Fitness). They were also higher on the ‘utility’ dimension for Concept 5 (Measuring Fitness) and Concept 7 (Developing a Plan). The mean for all of the adults was significantly (p<.05) higher than the student mean for the ‘utility’ dimension for Concept 1 (Health Parts), Concept 2 (Skill Elements), Concept 6 (Self Testing), and Concept 8 (Attitude Toward Fitness). The adults scored significantly higher on both the ‘utility’ and ‘likeability’ dimensions for Concept 3 (Change Fitness). No significant (p>0.05) interactions were found for the interaction of sex and group for any of the ‘utility’ or ‘likeability’ scores for any of the eight fitness concepts.

Roberts, Ellen L. TEACHERS’ BELIEFS ABOUT PURPOSES AS REFLECTED IN TEACHING PRACTICES: A STUDY IN ELEMENTARY SCHOOL PHYSICAL EDUCATION, 1990. Ed.D., University of North Carolina at Greensboro (Kate R. Barrett). (328pp 4 f $16.00) PE 3337

The focus of this study was to discover how beliefs about the purposes of elementary school physical education were reflected in teaching practices. Specifically, the study sought to determine what teachers believed to be the primary purposes of their teaching and further to determine the ways and extent to which those purposes were reflected in the teachers’ selection of content and interactive teaching behaviors. The theoretical base for the study is the body of research on teacher thinking, especially the relationship between thoughts and actions as conceptualized in the model by Clark and Peterson (1986). The interpretive research paradigm was selected as the framework for the methodology. Participants were five experienced elementary school physical education specialists. All were observed teaching, had selected lessons audiotaped, and participated in both informal and semi-structured interviews. The teachers’ beliefs about the purposes of elementary school physical education reflected some common thinking yet remained highly individualized. Teachers named from two to four primary purposes but had difficulty in identifying both the purposes of their teaching and the means by which they sought to achieve those purposes. The five teachers identified 15 purposes for their teaching. They were consistent in practicing 7 of these, inconsistent in practicing 5, and 3 were placed into a questionable category. No teacher was able to carry out practices that were consistent with all of her purposes. Differences between more consistent and less consistent teachers were identified, with the more consistent teachers characterized by their ability (a) to identify a greater number of means and more relevant means for achieving their purposes, (b) to be more verbal both during the interviewing process and during instruction, (c) to display greater interest in continued study, and (d) to use less formal class structures.

Parr, Emily, Elizabeth Bressan. AN INTERPRETIVE INQUIRY OF THE FACTORS THAT IMPACT PRESERVICE TEACHER REFLECTIONS AND DEVELOPMENT DURING A FIELD-BASED ELEMENTARY PHYSICAL EDUCATION METHODS COURSE, 1992. Ed.D., University of North Carolina at Greensboro (Kate R. Barrett). (229pp 3 f $12.00) PE 3367

The purpose of this study was to analyze and describe the reflections and development of seven preservice teachers during a field-based elementary physical education methods course. The research was guided by a focus on what the preservice teachers learned, how that learning changed over time, and how reflection impacted the preservice teachers’ development during the methods course. The theoretical context which informed this study included adult cognitive development, teacher concerns, differences between experts and novices, teacher perspectives, and teacher reflection. Learning was viewed through the lens of cognitive psychology. Data sources included nonparticipant observations of methods course meetings and field experiences, documents, interviews, and audiotaped weekly reflection sessions. Data analysis involved a constant comparison method. As a result of data analysis, the preservice teachers were divided into two groups. The first group began the semester with an orientation towards teaching as control and shifted to a greater focus on teaching for learning by the end of the semester. The second group began the semester focused on teaching for learning and continued to grow within that orientation during the semester. The two groups of preservice teachers were compared and contrasted in light of four areas of preservice teacher development which emerged during the study: a) inclusion of the self in knowing, b) development of classroom management knowledge, c) development of an image of the subject matter, and d) development within the components of pedagogical content knowledge. The first group exhibited characteristics similar to but less developed than the second group by the end of the study. Finally, the potential impact of reflection on preservice teacher development and implications of the study for teacher education were explored.

Snell, Christopher R. THE ROLE OF PHYSICAL EXPERIENCE IN EDUCATION, 1993. Ph.D., University of Oregon (Marjorie H. Woollacott, Elizabeth Bressan). (156pp 2 f $8.00) PE 3397

In physical education, and other similar productive cross-disciplines, the professional preparation curriculum is becoming increasingly fragmented, abstract, and theoretical. The move to a subdisciplinary educational approach is often at the expense of learning experiences which involve physical interaction with the environment, or learning by doing. A contributory factor in this trend may be the narrow definitions of scholarship and professional activity that currently prevail at many universities. In line with the view that professional competence is best developed through a practice-oriented curriculum, the purpose of this study is to examine the role of physical experience in education. A qualitative case analysis approach was adopted to provide a contextual account of the relationship between physical experience and the advancement of knowledge, the integration of knowledge, the application of knowledge, and the process of teaching to promote knowledge. The professional lives of three expert educators from the fields of music, engineering, and physical education were the primary units of analysis, or settings studied. Information was gathered through interviews, field observations, and review of written materials. Findings are presented in the form of analytic narrative vignettes, direct quotes, and an
interpretive commentary. Patterns among the data indicate that physical experience can be a valuable learning medium for students and is a legitimate representation of scholarship for teaching. Varieties of physical experience, including simulation, experimentation, the clinical practicum, and work experience, can teach physical skills and problem-solving, provide career insights, and help bridge the gap between theory and practice. Professional involvement based on physical experience can also contribute to the advancement, integration, and application of knowledge through outreach, community involvement, continuing education, applied research, and consulting. The potential of physical experience as a primary knowledge source, as opposed to a forum for testing theory, is discussed along with implications for professional education, undergraduate education in physical education, and scholarship in physical education.

Suphawibul, Mayuree. COMPETENCIES FOR ADAPTED PHYSICAL EDUCATORS IN THAILAND, 1992. Ph.D., Oregon State University (John M. Dunn). (183pp 2 f $8.00) PE 3340

The purpose of this study was to identify competencies which are perceived as important by Thai adapted physical educators, to determine the differences that exist in the way physical education professors and adapted physical educators judge the level of each competency, and to recommend a set of competencies for adapted physical educators in Thailand. The questionnaire, Competencies for an Adapted Physical Educator in Thailand containing 59 competencies based on 6 point Likert type scales, was used in this study. The fifty-nine competencies were translated from the Competencies for an Adapted Physical Education Specialist, modified by Dempsey (1986) from the 1981 AAHPERD Guidelines for Adapted Physical Education. The meaning equivalence of the competencies was validated by using the Delphi method along with the back translation technique. The computed reliability coefficients of the questionnaire, using the Hoyt-Stunkard’s technique was .9577. The study’s population consisted of 31 college and university professors who have taught adapted physical education courses to college/university students and 40 adapted physical educators who have conducted physical activities for people with disabilities in schools and institutions for the disabled in Thailand. Data collection was completed in an eight-week period. Means, standard deviations, a t-test and the Bonferroni Method of Multiple Comparisons were used to treat these data. The results showed that 1) the competencies were perceived as extremely important by professors and adapted physical educators in Thailand, 2) the perceptions of professors and physical educators on the competency statements individually and overall were similar since the null hypotheses were not rejected, and 3) the relationship of both groups on the importance of each competency and competency category was high with a Spearman rank correlation of .7842, and .8587 respectively. Based upon the findings of this study, it was recommended that this set of competencies should be used as guidelines for the preparation of adapted physical educators in Thailand.

Tingsabhat, Juta. A CRITERION-REFERENCED TEST FOR BEGINNING TENNIS PLAYERS, 1993. P.E.D., Indiana University (Dale A. Ulrich). (136pp 2 f $8.00) PE 3499

The problem of the study was to construct and evaluate a criterion referenced test (CRT) for measuring the basic mechanics of good form in beginning tennis skills. Based on a review of the tennis literature and the Delphi Technique, a CRT was constructed. Content validity, concurrent validity, and instructional sensitivity were evaluated. Reliability of the domain score estimate, the mastery classification decisions, and interrater reliability were also established with data collected on 92 undergraduate students (male=57, female=35, 18-20 years) who had enrolled in beginning tennis courses at Indiana University during the Spring and Summer of 1992. Analysis of the data revealed the CRT has acceptable content validity based on an agreement index of .75 or higher which was obtained from 25 content experts. Concurrent validity was obtained when a Spearman Rank-order correlation coefficient of .63 was obtained. A significant difference (p<.01) between means of the instructed and un instructed scores suggests that the CRT is sensitive to student progress. The SEM associated with the domain score estimate was 1.08. The reliability of mastery classification decisions and interrater reliability were both high, with a Kappa of .66 and 1 being obtained. Within the limitations of the study it can be concluded that the CRT is a reliable and valid instrument.


The purposes of this study were (a) to identify what the minimum qualifications should be for a tennis teaching professionals to be hired at tennis facilities managed by club administrators, and (b) to determine if differences in perceptions exist between the tennis teaching professionals and club administrators at those facilities as to what the minimum qualifications should be for tennis teaching professionals to be hired. The following research questions were answered in this study: 1. Tennis teaching professionals and club administrators place a higher standard on the minimum qualifications for head tennis teaching professionals to be hired at managed tennis facilities than they place on the minimum qualifications for assistant tennis teaching professionals to be hired at managed tennis facilities. The higher standards applied to all seven indices included on the study: Academic background, certification status, skill and playing level, teaching experience, non-teaching tennis related activities, personality, and administrative skills. 2. Differences in the perceptions of what the minimum qualifications should be for head and assistant tennis teaching professionals:

Exist between tennis teaching professionals and club administrators; exist between certified tennis teaching professionals and non-certified teaching professionals; do not exist between administrators of indoor tennis clubs, outdoor tennis clubs, indoor / outdoor tennis clubs, and country clubs; do not exist between teaching professionals with an academic background in athletic areas and teaching professionals with an academic background in non-athletic areas; exist between tennis teaching professionals age 35 years or younger and tennis teaching professionals older than age 35 years; do not exist between female tennis teaching professionals and male tennis teaching professionals; and exist between club administrators with teaching experience and club administrators with no teaching experience. 3. The perceptions of tennis teaching professionals and club administrators as a total group vary by: The number of years experience in the tennis industry; geographical area; and urban, suburban, and rural setting.
Wei, Bing. A COMPARISON OF PERCEPTIONS OF THE IMPORTANCE BETWEEN PHYSICAL EDUCATION GRADUATE TEACHING ASSISTANTS AND GRADUATE PROGRAM COORDINATORS ON SELECTION OF GRADUATE TEACHING ASSISTANTS AND THEIR TEACHING PERFORMANCE CRITERIA, 1992. Ph.D., University of Southern Mississippi (Walter E. Cooper). (128pp 2 f $8.00) PE 3402

The purpose of this study was to examine the difference between coordinators and graduate teaching assistants in their perceptions of the importance of selected criteria for the selection placement of GTA’s and the supervision-evaluation of their teaching performance. Thirty-two coordinators and two hundred and six GTA’s from twenty-seven states and forty universities nationwide were surveyed for this study. Data was collected during the months of April and May of 1992. The questionnaire was developed by the writer based upon the input from university physical education graduate program materials, interviews with the authorities, writer’s personal observations and the experience as a graduate teaching assistant for the past five years. All hypotheses were tested for statistical significance by using multivariate analysis of variance with a $p<.05$ rejection level. Results indicated that there were significant differences detected between the coordinator group and the group of graduate teaching assistants on all the hypotheses. A significant difference was found to exist between the two groups in the selection criteria ($F=3.76$, $df=13/211$, $p=.001$); in the placement criteria ($F=5.52$, $df=5/229$, $p=.001$); in the selected supervisory approaches ($F=11.36$, $df=6/228$, $p=.001$); and in the evaluation criteria ($F=8.31$, $df=8/228$, $p=.001$). No significant difference was found between the two groups on the appropriate- ness of departments concerning the use of the above major categories. This study should be beneficial to traditionally labeled physical education department administrators in selecting and placing graduate teaching assistants as well as supervising and evaluating their teaching performance.

Woerfel, Laurie A. THE EFFECTS OF GENDER ON ALT-PE MOTOR IN JUNIOR HIGH PHYSICAL EDUCATION, 1991. M.A., California State University, Long Beach (David J. Wurzer). (157pp 2 f $8.00) PE 3403

The purpose of this study was to determine what effect the gender of teachers and students have on the levels of Academic Learning Time-Physical Education (Motor) in junior high physical education. Six physical education teachers (three male and three female) were each videotaped teaching three classes: one all-male class, one all-female class, and one coeducational class. A total of 18 classes were videotaped teaching a 20-minute Experimental Teaching Unit. A computerized version of the Academic Learning Time Physical Education-Teacher Behavior observation coding instrument was used to measure teacher and student behavior. Findings showed no significant difference in the mean percentage of Academic Learning Time-Physical Education (Motor) for classes taught by men and women teachers nor for each of the three gender group classes. Gender did not seem to have and effect on the levels of Academic Learning Time-Physical Education (Motor) in this study.


The purpose of this study was to define certain basic cultural aspects of American and Korean movement, so that the differences and similarities could be identified and used to help Brigham Young University folk dancers perform Korean dance most accurately. The methodology implemented was derived mostly from Alan Lomax’s Choreometric Coding Sheet. Korean and American dancers’ movements were both analyzed and compared via video tape. The data results supported the original premise that different cultures have specific indigenous movement styles that emerge as unique when compared with other cultures. The coding sheet greatly enhanced the ability to objectively differentiate between cultural dance styles. Folk dancers could implement such a coding method to perform Korean dance movement in a manner more like a native performer.


Objectives were to identify the dancers and principal works, relationship of these works to other theatrical offerings, and the influence the Civil War and Reconstruction Era had on theatrical productions in New Orleans. Theatres studied were the Academy of Music, St. Charles Theatre, Varieties Theatre, and French Opera House. Methodology included surveying the development of theatrical dance prior to the Civil War and systematically reviewing New Orleans newspapers, playbills, and examples of critical scholarship. Throughout the process of analysis, verification, and criticism, changes in theatrical dance which occurred during the decade were determined. Prior to war, dance was most commonly performed within other productions or as entr’acte/ divertissement entertainment; ballet, character, social, and minstrel dancing were the most popular forms. Theatricals dwindled with the onset of war and halted in April 1862 when New Orleans was seized by Union troops. Beginning with the 1862-63 season, theatres reopened and audiences enjoyed minstrel shows, pantomimes, extravaganzas, burlesques, spectacles, and variety shows. By end of the war, theatre flourished, and audiences demanded variety. New forms of spectacles, pantomimes, and burlesque comedies swept the country. Dancing, particularly ballet, was pivotal in their success. Despite the austere political climate, New Orleans’s productions rivaled those in New York and audiences saw all the star attractions of the era such as Marie Zoe, Lotta Crabtree, G. L. Fox Pantomime Troupe, Lydia Thompson Burlesque Troupe, Martini and Marzetti Pantomime and Ballet Troupe, Buckley Minstrels, and Giuseppina Morlacchi Ballet Troupe.

The purposes of this study were to extract from contemporary literature those curricular offerings and implementation strategies which comprise dance wellness (DW) and which have been recommended by experts for study by college/university dance students; determine the degree to which college/university DW curricula reflect recommendations by experts; identify inconsistencies that are revealed between recommendations by experts and actual DW curricula in college/university dance departments/programs; and assess college/university dance department/program administrators’ perceptions of DW. The literature indicated that education in DW is perceived to be critical for dancers, dance teachers, and choreographers. The researcher identified 10 curricular components and four implementation strategies that were recommended by experts as integral to DW programs. Using survey methodology, data were requested from dance administrators representing 124 different college/university dance major departments/programs in the United States. Of the 88 (70.97%) respondents, 70 (56.45% of the original sample) provided usable surveys. Consisting of 129 questions, a DW Curricular Questionnaire (DWCQ) was used to collect data regarding school profiles, DW curricula, DW supplementary programs, and perceptions of DW. The content validity of the DWCQ was verified by a panel of experts. Both the test-retest reliability (overall Spearman’s rho of .81) and internal consistency (alpha coefficients from .71 to .81) of the DWCQ were high. DW programs were offered in 57.14% of the dance departments/programs. Collectively, 66.43% of the components of dance wellness were offered in the average dance program. “High” levels of supplementary DW programs were available in 45% of the departments/programs. The primary barriers to the inclusion of DW in college/university dance programs included limited finances, time in curricula, and faculty expertise. DW ranked fifth in importance compared to nine other dance curricular areas. Education in the area of DW was perceived to be “important” to “very important” for dancers, dance teachers, and choreographers. It was believed that the responsibility for DW education lies within dance departments, not non-dance departments. The present study identified inconsistencies between DW literature, dance administrators’ perceptions, and actual DW curricula. Recommendations to resolve these inconsistencies were advanced.

Clark, Dawn. AN INTERPRETIVE INQUIRY OF THE PROFESSIONAL LIFE HISTORIES OF SELECTED WOMEN DANCE/PHYSICAL EDUCATORS, 1992. Ed.D., University of North Carolina at Greensboro (Sarah M. Robinson). (270pp 3 f $12.00) PE 3348

This inquiry focused on a group of women dance/physical educators for whom movement is the epistemological vehicle for a way of knowing. The participants had professional experience within both disciplines of dance and physical education, yet in their quest to seek a professional identity, they often transcended the disciplinary boundaries. Choreology (Preston-Dunlop, 1987), which studies the intrinsic structure of the dance medium, was used as a metaphor for the inquiry. The five strands of the dance medium which comprise Choreology are the movement, the movers, the decor, the sound and the space. In this inquiry, the decor for example, served as a metaphor for understanding historical and social context as the scenic contribution or “backdrop” for the women’s emergent issues. The method for interpreting the participant’s life histories was the dialectical-hermeneutic (Guba & Lincoln, 1989). This provided the means to understand their multiple realities within a constructivist paradigm. From an interpretation of their life histories, a dialectic emerged between educator/performer and process/product orientations to the disciplines of dance and physical education. The paradoxical elements inherent in each perspective were examined. Key issues of hegemony, reification, and commodification emerged from the interviews. The lens of “politics” was utilized to examine and interpret these and other issues. A strong thread of “participatory consciousness” (Heshusius, 1992) emerged as guided their epistemology. The study examined the issues raised by women educators who are constructing professional identities within often rigid disciplinary structures. Their previously unheard voices may be shared by others involved with issues such as curriculum, teacher preparation, arts education and women’s studies.


The purpose of this study was to present an overview of the professional career of Bill Evans, from the date of his affiliation with Utah Repertory Dance to the present. Having acquired various primary sources, including video tapes, newspaper articles and personal interviews, the writer was able to present a detailed description of the artistic contributions of dancer-choreographer, Bill Evans.


The purpose of this dissertation was to research the folk dances of Puerto Rico and present a written and illustrated documentation. This study includes the related history, an instructional manual with illustrated documentation, and an annotated bibliography of selected folk dances in accordance with the blending of Spanish, African and Indian influence. The folk dances that were selected for the study represented (1) the traditional dances of society, (2) the garabato or mountain dances, and (3) the dances that have evolved as a combination of racial and cultural elements called bomba dances. Drawings of each basic step, costumes and musical instruments were made by the author for the illustrated presentation of this study.

Giddins, Kevin J. INFLUENCING A BROADER UNDERSTANDING OF JAZZ DANCE, 1992. M.A., Brigham Young University (Catherine H. Black). (65pp 1 f $4.00) PE 3421

Jazz dance is often misunderstood and viewed only as a hard, sexy, “Flash Dance.” Lack of knowledge in the history of jazz dance in some cases perpetuates one-sided views. To counter this one-sided attitude toward jazz dance, a live performance of jazz dance was presented in order to broaden understanding to include jazz dance within the definition of fine art. Much of the movement expressed in the performance was found through improvisation. Art objects reflecting jazz were displayed in a museum setting prior to the formal performance. Information on jazz was expressed during the performance through narration. The
presentation was designed to stimulate the subconscious and conscious mind through reinforced images. Following the production, surveys were administered to evaluate the influence of the experience. The written thesis and video are available for review at the Brigham Young University Dance Department.

Hill, Claudia B. TECHNIQUE OF AMERICAN SOCIAL DANCE SYLLABUS, 1992. M.A., Brigham Young University (Phyllis C. Jacobson). (194pp 2 f $8.00) PE 3469

The purpose of this thesis was to write a standardized technique syllabus for a bronze level American Social Dance class for the intent of aiding instructors in lesson plan preparation and developing student technique, and also to aid students with retention of the technique. The syllabus was used for one semester in Brigham Young University’s bronze level American Social Dance classes, after which formative evaluations were instigated for the purpose of strengthening the content of the syllabus. The revised syllabus has been implemented by Brigham Young University for use in its bronze level American Social Dance course.

Hong-Joe, Christina M. DISCIPLINE-BASED DANCE EDUCATION: A TRANSLATION AND INTERPRETATION OF DISCIPLINE-BASED ART EDUCATION FOR THE DISCIPLINE OF DANCE, 1991. M.A., Texas Woman’s University (Penelope Hanstein). (78pp 1 f $4.00) PE 3422

A Discipline-Based Dance Education (DBDE) model curriculum framework for K-12 education is presented based on a translation and interpretation of the conceptual core of the Discipline-Based Art Education (DBAE) approach. The study encompasses an investigation and presentation of a process and inquiry oriented discipline-based approach to dance education, whereby the modes of inquiry and content concepts for the student as performer, choreographer, historian, critic, and aesthetician within the dance discipline are clearly identified and delineated. The interrelationship of these roles is explored in relation to DBDE with associated metaphorical analogies and charts which focus on the imperative of keeping the art of dance-making at the center of the study of dance as a discipline. A DBDE curriculum framework is evolved together with suggestions for the implementation of the learning and inquiry processes within the discipline. Conclusions are drawn as to the viability of DBDE as a curricular approach for K-12 education and the consequent issues, implications, and provisions necessary for the future development of a discipline-based approach for dance education in schools.


The purpose of this study was to identify and analyze concepts of artistic creative process from selected literature in psychology and creativity and to draw pedagogical implications to the teaching of process oriented, person-centered choreography. It begins by introducing a teaching sequence for student/choreographers making solo, self-performed artworks. Six areas of creative process activity (the generation, interpretation, exploration, selection, evaluation, and forming of movement and ideas) and two preconditions of creativity (motivation and attitude) were investigated. Information was compiled under the six-area matrix, covering three psychological dimensions including primary (self-referent and perceptual), secondary (object-referent and conceptual), and tertiary (symbolic and inter-relational) modes of procedure. This model conceptually bases such artistic phenomena as intuition, imagination, and symbolic capacity in the elaboration of intrinsic personal forces in materials and ideas. Directions and methods of implementation are summarized in five pedagogical principles which provide a basis for the foundation of process-oriented, person centered teaching of choreography. Given that creativity is best achieved when the artist is intrinsically-motivated, feels free to express himself or herself, centrally integrates the creative dialogue, and is in an optimal position to make decisions about the development of the work, the teacher of choreography is primarily advised to operate with an empathic, experience near mode of teaching, create an environment of constructive honesty, freedom of expression, and a sense of peer support, and to encourage and facilitate the student’s perception of their own creative flow. The research process ended with the application of a revised version of the original methodology which bridged the conceptual material back to the practice of guiding choreography. The value of a model that includes primary, secondary, and tertiary dimensions of activities, and dialogical collaborations within and throughout the creative process was confirmed.


The possibility that Laban Movement Analysis, and specifically one of its components, Effort Analysis, can be an important adjunct to current systems for distinguishing between and among dance culture regions was explored. Systems which have been used to categorize dance and to distinguish between dance culture regions were examined, with an emphasis on research in which Laban Movement Analysis has been utilized. The present study was limited to Bulgaria. Films and videos of Bulgarian dances were reviewed and two dances from each of four geographically diverse regions were selected for analysis. Selections were made to be as representative as possible. A computer program was developed to analyze and record the occurrence of up to eight separate effort elements on a time-line and then produce a bar graph indicating the presence or absence and relative proportion of the effort elements. Two observers, one a Certified Movement Analyst, then used the computer program to analyze the segments of dance which had been selected for study. The movement profile graphs provided both a clear visual record of the movement preferences shown in each dance and region and a means for comparing regional movement preferences. The graphs also provided a clear way to discuss the movement qualities of the dances themselves. Statistical analyses yielded additional information about the dance observations. The correlation between the two observers was very high (r=0.9682). It appeared that the differences between performances of the dances resulted more from regionality than from differences between the dances themselves. The F values (2.032 and 1.656) showed the differences to be significant at the 5% level of confidence for one observer and at the 10% level for the other. It is probable that greater significance for both observers would have occurred had either a
stratified sampling technique not been used to select dissimilar dances or had a larger sample of dances from each region been analyzed. It was concluded that this methodology utilizing Laban Movement Analysis and movement profile graphs provides a valuable adjunct to current systems for distinguishing between and among dance culture regions, augmenting and expanding rather than replacing current systems.


Sixty-six female junior high school students (age 12 to 16) from junior high schools in Hong Kong volunteered to be the subjects. Students in the dance group received ballet training in private dance schools for 3 or more years. Students in the non-dance group had no previous dance training. Pictures of the subjects in a standing position were taken from the lateral and posterior view. Standing postures of the subjects assumed in the pictures were rated by the researcher according to the Posture Rating Chart found in the New York State Physical Fitness Test. Rating scores of subjects in the dance and non-dance group were compared by the Mann-Whitney U statistical analysis. Students in the dance group had significantly ($p<.05$) better standing alignment than students in the non-dance group in the following areas: total overall posture, total anteroposterior posture (lateral view), and posture of the neck, chest, shoulders, upper back, abdomen, and lower back segments (all from lateral view). For the total lateral posture (posterior view), posture of the trunk segment (lateral view), and posture of the head, shoulders, spine, and hips segments (all from posterior view), no significant ($p>.05$) rank differences were found between the dance and non-dance group.


The purpose of this project was to define the elements of modern dance and present in concert the choreography of four nonlinear solos and also an ensemble combination of these solos, to demonstrate how dance elements can be crafted and combined to create a modern dance. A panel of experts evaluated the concert. Two evaluations, written by members of the lay audience, were also included in this thesis. A videotape recording of the concert presentation of this choreographic project is on file with the Brigham Young University Department of Dance as a complementary portion of this study.


Aesthetic standards, standards of appropriateness, quality or competency, in old time square dancing and footwork dancing (flatfootsing, clogging, buckdancing) correspond among African-American and European-American dancers in Southwest Virginia. Comparison of the dancing in one African-American and one European-American community in each of two subregions in Southwest Virginia, the Coalfields and the Blue Ridge, leads to identification of distinctive subregional styles which cut across ethnic groups. When aesthetic standards are examined in the ways in which they adhere to either African or Northern European aesthetic canons, the choices are found to form a pattern. Coalfields dancers of both ethnicities predominantly choose African canons, and some African and Northern European canons which reinforce each other. Blue Ridge dancers choose a mixture of Northern European and African canons. Where the styles of the two ethnic groups diverge from each other in each subregion to produce local community variations, African-Americans choose predominantly African aesthetics and European-Americans choose predominantly Northern European aesthetics. The canons which apply across all four communities are either African or the result of the confluence of both, suggesting that the dance forms formerly believed purely Anglo-Saxon in origin in fact incorporate substantial African influence. This pattern of choice making has been influenced by social, political and economic factors, including: the strength of the Abolition movement, the impact of the presence or absence of the coal industry, and the country of origin of the African-Americans in each subregion. The continuity, discontinuity or re-emergence of old time dancing within each community is influenced by aesthetic and historical factors within and surrounding the dancing.

Wimber, Carmel D. TEXT AND POSTMODERNISM IN MODERN DANCE, 1993. M.A., University of Oregon (Jenifer Craig). (127pp 2 f $8.00) PE 3503

Trends in the textual presentation of western performance dance are considered significant to an understanding of postmodernism in dance. Three instances of text which take dance as a subject are analyzed: dance theory, dance criticism and printed dance programs. These texts on dance serve to reinforce the belief that movement should speak for itself, and not through text, in late twentieth century modern dance. This formulation of the relationship between dance and text is new and indicates a changing emphasis in modern dance, a change which is expected to be consistent with changing postmodern values. Postmodern cultural developments and postmodern critical theory suggest an increasing interest in the body, an interest which makes dance newly relevant in the postmodern period. Inherited ideals of modern dance are found to be in conflict with this interest, however, and the possibilities for the emergence of dance in the future are evaluated in light of this conflict.
This study investigated the effects of glasnost and perestroika on Soviet sports utilizing information from magazines, journals, newspaper articles, and books. Interviews were conducted with Soviet sport experts, a U.S. track coach, and experts on politics and history. Before Gorbachev, Soviet sports were a propaganda instrument for the Communist Party. The government believed dominating international sports could bring prestige to the USSR. Thus, elite sports were stressed so strongly that mass sports were ignored until 1985. Before 1985 the Soviets did not allow commercialism or professionalism. The government tightly controlled the press, allowing only good news about Soviet sport to be disseminated throughout the USSR. In investigating the effects of glasnost and perestroika on Soviet sport, a hypothesis was developed that Soviet sport had become more Westernized. This hypothesis proved true. Formerly the government-controlled domain of the elite, Soviet sport became mass oriented and thoroughly scrutinized by a free media. With profit-making clubs, professional athletes, and games such as baseball, Soviet sport became increasingly Westernized. The Communist Party no longer even interested in controlling Soviet sports. Due to Gorbachev’s reforms Soviet sport lost many of its unique characteristics during the last years of the USSR.


This study attempted to discover and describe the cultural knowledge and understandings that Margaret (Bell) Gibson derived from her performance as a highly successful athlete in Canadian women’s sport during the 1920s–1930s. A case study approach was used that employed qualitative research strategies. This approach was considered appropriate as prominent issues in women’s lives are subtle and context-bound. A series of five informal interviews were conducted with Bell, using an ethnographic approach developed by Spradley (1979). Each interview was recorded and transcribed into text. The text was then validated by Bell, prior to analysis by the researcher. An inductive-reflexive analysis of the text was employed, as much of the information emerged as Bell recalled her experiences in sport. This involved the use of an evolving methodology, which identified classifications of knowledge and structures of thought as they were revealed. Bell’s narrative was contextually-grounded in a review of Canadian history from 1920 to 1938, as this seemed to connect Bell’s experience as a sportswoman to the broader socio-historical milieu. Findings were substantiated through a process of triangulated inquiry wherein verification was sought from newspaper clippings, official records, and historical documents. The analysis of Bell’s narrative revealed a complex system of knowledge based on categories of information related to the structure of sport, social network, jumping, cultural activities, concepts of space and timing, and role definition. Documentation of the major sporting events Bell experienced, as an athlete, was also recorded. Implications for future research were discussed.

Lee, Jong-Young. SPORT NATIONALISM IN THE MODERN OLYMPIC GAMES, 1990. Ed.D., University of Northern Colorado (Rulon S. Francis). (252pp 3 f $12.00) PE 3326
The general purpose of this study was to analyze sport nationalism in the modern Olympic Games. Much of the research concerning sport nationalism in the Olympics has focused on describing its development and evolution. Sport nationalism might be defined as a political philosophy in which the good of the nation is supreme. Sport nationalism has been evident throughout the history of the modern Olympic Games. Pierre de Coubertin, a French nationalist, attempted to use Olympic sport to strengthen the morale of his nation. Early Olympiads were marred due to the ill-feelings between the Americans and the British. The Berlin Games of 1936 were used by Hitler and the German Government to demonstrate the power of Germany. In conjunction with the processes of decolonization and of increasing nationalism on the world scene, the issue of sport nationalism in the Olympics was imbued with elements of the East-West conflict. The entry of the Soviet Union and its bloc nations in the Olympics hallmarked a new state in the Olympic history. The sport nationalism exhibited by the new emerging nations and black African nations presented a real threat to the modern Olympic system. The original emphasis of the Olympic Games was on the athlete, not the nations. But excessive sport nationalism ignored the importance of the athlete. This was illustrated most poignantly during the Olympic boycotts of 1976, 1980, and 1984. The boycott in the recent Seoul Olympics was limited to a handful of nations. In summary, the present Olympic system with nation-states only enhanced sport nationalism in the Olympics. Under the framework of nationalism, the modern Olympic Games have been held for almost 100 years. Though it is difficult to investigate tangible results from the sport nationalism in the recent Seoul Olympics, it is clear that a new dimension of sport nationalism in the Olympics has formed in a new detente era of international politics.


Various parts of the question concerning how random and deterministic attributes intertwine during the course of athletic contests have been explored by researchers. This study attempted to extend the research data base and formulate the initial postulates for a model to describe the random/deterministic interaction. The 1988-89 National Hockey League season was the primary focus of attention. Supplemental examination was made of the 1937-38 and 1946-47 NHL, the last 50% of the 1988-89 National Basketball Association season and the 1987-88 Football Association English First Division seasons. The data overwhelmingly supported earlier studies which argued that major outcomes (wins/losses, goals, shots) followed a random sequence. The axiomatic model developed argued that the random pattern of outcomes is quite pervasive (wins/losses, shots and goals for, against or combined are distributed randomly whether home, away or total games are examined). The pattern of outcomes (win/losses, goals, shots) is relatively independent of the size of the unit of measurement: random patterns held whether one period, two period, three period games or four-game sets are examined. Conditional probability tests showed game-to-game outcomes were independent (a win was no more likely to be followed by a win than by a loss). The pattern of outcomes (goals) is dependent on how the data is examined. If all 21 team’s goals are plotted time-wise, goals are distributed uniformly minute by minute (except for the last minute of play). If goals or shots per game (or period) are tallied for home, away or both teams, the resultant frequency distribution will approximate the negative binomial distribution. However, if the time-spaces between goals are tallied, a geometric distribution will emerge. Deterministic effects were demonstrated when artificial season outcomes based on first, second or third period only seasons were found to correlate favorably with real season outcomes (wins, losses, points, goals for, goals against). Finally, comparison of hockey, basketball and soccer outcomes suggested that upset rates may vary from one sport to another.

Tigges, Gabriela B. THE HISTORY OF CAPOEIRA IN BRAZIL, 1990. Ed.D., Brigham Young University (Ruel Barker). (159pp 2 f $8.00) PE 3498

The purpose of this study was to write the history of Capoeira in Brazil that included its possible origins, its repression and persecution, and its significance in the culture of Brazil. The dissertation describes the two distinct styles of Capoeira, Capoeira Angola and Capoeira Regional, discusses the Masters (Pastinha and Bimba, respectively) who promoted each of the two styles, and outlines the methods used by each. It explains how Capoeira originated with African slaves and how it was then incorporated into the culture in its various forms—as a form of (1) self defense, (2) dance, and (3) sport. The dissertation relied on information gathered from primary and secondary sources. It was reviewed, synthesized, and presented in an organized fashion to serve as a historical source manual on the subject of Capoeira.
Two women's fitness magazines (Women's Sports & Fitness and Shape) were compared for the years 1985 and 1990 to determine changes within each magazine in the 5-yr period and to compare differences between the magazines from the year 1985 to the year 1990. The Duquin (1977) scale was used to rate the activity level of people appearing in the photo-sport advertisements. The Mann-Whitney U statistic was used to analyze the results of the Duquin (1977) scale. The mean ranks on the Duquin (1977) scale were found to be higher, indicating more activity, in the 1990 issues of both magazines compared to the 1985 issues and higher in Women's Sports & Fitness magazine than Shape magazine in 1985 and in 1990. Chi Square was used to compare the sport and non-sport advertisements. Significant differences between sport and non-sport advertisements were found in the 5-yr period in Shape magazine. A content analysis of certain criteria was conducted to determine improvements in the portrayal of the sporting woman within each magazine in the 5-yr span and also differences between the magazine in the portrayal of the sporting woman. The researcher determined that there was an improvement in both magazines from 1985 to 1990 in the portrayal of the sporting woman. However, there was a difference between the magazines as women appearing in advertisements in Shape magazine are less often shown actively engaged, seen more frequently with sexual overtones, more often portrayed with isolated body parts and more likely to be depicted in swimsuits but not near water than women appearing in Women's Sports & Fitness.
Recently, investigations have demonstrated significant relationships between muscular power (the combination of or interaction between strength and speed) and athletic performance. Initiation of improvements in power output capacity will first involve identifying individual weaknesses in specific power parameters. This study was proposed to evaluate variations in power output between selected subjects. Characteristics of aerobic endurance and muscular strength were also examined for possible relationships to power parameters. Fifty-one male students aged 17-24 served as subjects in their investigation and were tested on three different occasions for predicted maximal oxygen uptake (predicted VO₂), isotonic strength, and short-term power output. Pearson correlation and analysis of variance (ANOVA) procedures were performed on subject data (N = 51) to examine power parameters. Peak power (PP) correlated with both average power (AP) and power decline (PD) while PD correlated positively with AP and negatively with time to peak power (TTPP) (p < 0.05). Operationally defined groups of high and low PD differed significantly with regard to TTPP means. Extension strength, predicted VO₂, and selected power variables were also evaluated by Pearson correlation procedures. AP and PP were both found to correlate significantly with slow extension strength (SEXT), fast extension strength (FEXT), and predicted VO₂. ANOVA procedures were then performed for SEXT, FEXT, and predicted VO₂ with regard to PP and AP levels. Findings suggested that subjects grouped high in PP and AP have similarly high extension strength capabilities. Based on the results of this investigation, it was concluded that there are differences in power parameters between selected subjects. Also, subjects grouped high in PP and AP were stronger and had greater PD.

Aurslanian, Dina B. ASYMMETRIC LIFTING USING A WEIGHT BELT, 1993. M.S., Ball State University (Rafael E. Bahamonde). (139pp 2 f $8.00) PE 3455

The purpose of this study was to use EMG data of the erector spinae muscles synchronized with three-dimensional video techniques to determine the body’s responses to asymmetric lifting under weight belt conditions. The subjects performed static isometric contractions and dynamic lifts from 0° and 45° from the midline of the body. Three weight belt conditions were used. EMG data revealed significant differences in EMG variables with belt conditions. Weight belt use decreased burst area, peak voltage, and maximum frequency. Kinematic data indicated a significant difference in the left knee and left and right elbow range of motion when the type of lift, symmetric or asymmetric, was considered. Lifting technique also produced a significant effect on the maximum and minimum velocity of the center of mass. The results of the study indicate that weight belt use is an effective means of reducing spinal compression and thus may be helpful in preventing low back injury.

Barr, John O. NEURAL VERSUS MUSCULAR RESPONSES TO ISOMETRIC STRENGTH TRAINING OF THE TRICEPS BRACHII, 1989. Ph.D., University of Iowa (David H. Nielsen). (230pp 3 f $12.00) PE 3345

This study investigated neuromuscular mechanisms underlying strength development over six weeks of isometric testing and training of the right triceps brachii. Eighteen right-hand dominant female subjects, 23.8 ± 3.6 years old, were randomly assigned to control (weekly testing), or training (weekly testing and daily training) groups. The training group daily performed ten ramp isometric contractions progressed to maximum voluntary contraction (MVC) over five seconds, held at MVC for an additional three seconds. An initial orientation/practice session proceeded two test-retest sessions on successive days. Weekly isometric tests (sessions 3-9) assessed: torque during maximum isometric contractions; triceps EMG/torque relationship break point position, maximum predicted EMG, lower and upper slopes of the bilinear triceps EMG/torque relationship; percent antagonist biceps activity; submaximal interpolated responses indicating muscle activation. Both groups showed significant improvements in triceps torque, 18% for the control and 29% for the training group. Strength increases were significantly greater for the training group in sessions 5 through 9. Neural coordination among triceps heads was not significantly altered. Both groups demonstrated significant break point shifts to the right with significant between group differences at session 6, indicating a difference in neural recruitment. Maximum predicted EMG was significantly greater for the training group in sessions 5 through 9, indicating improved neural activation. Nonsignificant changes in upper and lower slopes indicated that muscular factors did not play a significant role relative to changes in strength. There were no significant changes in antagonistic biceps muscle activity. Only measures of torque and EMG for the triceps lateral head had high reliability. The submaximal interpolated response was unreliable at the beginning of the experimental period. However, one criterion measure for this response significantly improved by the end of the experimental period. Average submaximal interpolated responses at 10 to 90% MVC indicated improved muscle activation when comparing sessions 1 and 10. This study supported neural factors as underlying acute strength changes associated with testing and training. Further research is warranted to better substantiate the reliability of criterion measures and to identify the nature of neural factors.

Bednarzcyk, Janet H. THE EFFECT OF MASS ON THE KINETICS OF STEADY STATE WHEELCHAIR PROPULSION IN ADULTS AND CHILDREN WITH SPINAL CORD INJURY, 1993. M.P.E., University of British Columbia (David Sanderson). (97pp 1 f $4.00) PE 3377

A recent trend in wheelchair design has been the reduction of the mass of wheelchairs. This design trend is especially important for the pediatric wheelchair user because pediatric chairs, though smaller in size, have as much mass as comparable adult chairs. There is little experimental evidence to support the clinical belief that low mass chairs are preferable and there is an absence of published data on wheelchair propulsion by pediatric subjects. The purpose of this study was to examine the effect of mass on the kinematics of steady state wheelchair propulsion. The experimental design involved both adults and children with spinal cord injury in order to test the hypothesis that mass would have an
effect on wheelchair propulsion. This experimental design permitted the comparison of the kinematic wheeling style of children and adults with spinal cord injury. METHODS: The mass of identical low-mass test chairs (9.3 kg, available in a variety of sizes to match the users) was manipulated by mass additions (5 and 10 kg). The two subject groups were adults (n=10) with spinal cord injury secondary to trauma and children (n=10) with uncomplicated spinal cord injury secondary to congenital defects (Spina Bifida). The two groups were neurologically matched by motor assessment according to the American Spinal Injury Association Scale. Steady state propulsion across a level runway at a velocity of about 2 m/sec was recorded by two gen-locked video cameras. Each subject performed five trials for each of the four test conditions: own chair, test chair, and test chair with 5, and 10 kg of added mass. The three dimensional coordinates of eight light reflective markers placed on the subjects’ right side were determined by direct linear transformation after digitization and filtering (6 Hz). From these data, the movement of body segments (trunk, upper, and lower arm) and angles between these segments (elbow, shoulder, trunk, and shoulder abduction) were determined. An electronic signal generated from a thumb switch was used to determine the timing of wheel contact (grab) and release from which the % propulsion of the wheeling cycle was determined. A single wheeling cycle was analyzed from the central portion of each trial and time normalized in % intervals with grab being defined as 0% of the cycle and the subsequent grab being defined as 100% of the cycle. Average within- and between-subject coefficients of variation (CVs) of the angular data were calculated in order to compare the variability of the angular data in the two groups. Statistical analysis were multiple univariate, repeated measures analysis of variance (ANOVA) and analysis of covariance (ANCOVA) with significance set at Greenhouse-Geisser adjusted p values <0.05. RESULTS: The average mass of the pediatric group was much smaller than the adult user’s mass (37.4 kg vs 68.5 kg). The mean age of the pediatric subjects was almost one third of the mean age of the adult subjects (11.3 years vs 33.5 years). The subjects were closely matched neurologically as evidenced by the mean ASIA scores in the two groups (pediatric=56.1 ± 3.48, adults=55.2 ± 4.73). The averaged group wheeling velocities were 2.26 ± 0.39 m/sec for the pediatric group and 2.38 ± 0.31 m/sec for the adult group wheeling in their own chairs. A 2-(groups)-by-4-(conditions) ANOVA of the actual wheeling velocities showed a significant groups effect and a nonsignificant interaction effect indicating that the pediatric group were wheeling their chairs at a significantly lower velocity than the adult group but that the two groups responded to the different test chair conditions in a similar fashion and that the velocities were similar under all four test conditions. The two groups spent comparable proportions of the wheeling cycle in propulsion (pediatric group=24.45 ± 7.29%, adult group=24.41 ± 7.61%) in the own chair condition. A 2-(groups)-by-4-(conditions) ANCOVA of the % propulsion data, with wheeling velocity as a covariant, showed that both the groups effect and the groups-by-condition interaction effect were not significantly different indicating that the portion of the wheeling cycle spent in propulsion did not differ in either group or in any of the wheeling conditions. The angular data showed that the pediatric group had more shoulder extension (maximum pediatric group 66.6°, and adult group 60.3°) and less elbow extension than the adult group (maximum pediatric group 138.0°, adult group 144.7°). A 2-(groups)-by-4-(conditions)-by-6-(portion of wheeling cycle, first 25%) ANCOVA of the angular data (with velocity as a covariant) showed significant differences for three (elbow, shoulder, and shoulder abduction) of the four angular parameters and nonsignificant groups-by-conditions effects indicating that both groups responded in a similar manner to the test chairs and to the mass addition conditions. DISCUSSION: These results, based on a test sample of chairs and subjects, indicate that mass additions did not affect the angular kinematics, % propulsion or wheeling velocities of two groups of subjects with spinal cord injury in steady state, short distance, level wheelchair propulsion. The pediatric group did show significant absolute angular differences from the adult group but the angular changes over time and across experimental conditions were the same in both groups. Explanations for these results include the possibility that mass is not important in short distance, level wheelchair propulsion or that kinematic measures alone were not sufficient to measure the effective force application which may have changed in response to the mass additions. Also it is possible that the reduced drag of the new test chairs used in this study confounded the mass effects. The implications of this work for clinical practice are that the conclusions from previous adult studies of the biomechanics of wheelchair propulsion appear to be able to be applied to the pediatric wheelchair user. There is a need for further studies on the special needs of the pediatric wheelchair user. Further studies employing kinetic as well as kinematic measurements over longer time periods would clarify the relative importance of mass and drag in wheelchair propulsion.

Bothner, Krisanne E. THE DEVELOPMENT OF A VIDEO-BASED MOTION ANALYSIS SYSTEM, 1992. M.S., Purdue University (Carole J. Widule). (88pp 1 f $8.00) PE 3346

Video image processing has become a convenient and powerful tool to represent movement. The capability to interface a computer with a video source to perform motion analysis makes this technology ideal for fields such as Biomechanics. A short turnaround time between filming and the accumulation of data makes video more efficient than cinematography, and the portability enables researchers to collect data in many different settings. Video analysis systems on the market today have two drawbacks however. First, the cost of fully developed systems may deter some users. Many individuals and institutions have access to necessary components for video analysis and the purchase of extra equipment is unrealistic. Second, the user has little or no input into the software development of these “black boxes,” making modification of input parameters, image manipulation processes, and output formats impossible. It would be useful to have documentation of the development of a video-based motion analysis system available for those interested in acquiring such capabilities. For the present study, a video-based motion analysis system has been developed with full documentation of each stage of the process: from hardware acquisition to algorithms implemented in the software. With this knowledge, the accessibility to this technology will be increased, which should enhance and augment future research in the field.


The skating characteristics of professional ice hockey forwards (n=12) were analyzed from videotapes of 24 games. The subjects were analyzed to determine the time allocation and frequency of 27 skating characteristics, and the total and average number and length of shifts (short amount of playing time). Players spent the
highest percentage of total time (with and without puck) in a two foot glide without puck (39%) followed by cruising without puck (16.2%). A small percentage of total time was spent with possession of the puck (4.5%). The average number of shifts per period was 5.2 and the average length of a shift was 61 seconds. A stepwise discriminant analysis revealed that playing time had the most discriminating power (p<.05) with high point scorers spending more time on the ice than low point scorers. When playing time was not considered in the analysis, the most important discriminating factors were two foot glide without the puck and backward to forward skating. The most common skating characteristics involved an alternating pattern of two foot glide and either cruising or medium intensity skating (without the puck).

Braginton, Michael J. A COMPARISON OF CONCENTRIC AND ECCENTRIC HAMSTRING TO QUADRICEP PEAK TORQUE RATIOS AT VARIOUS SPEEDS OF MUSCLE CONTRACTION AS DETERMINED BY THE KINETIC COMMUNICATOR, 1990. M.S., Brigham Young University (Earlene Durrant). (78pp 1 f $4.00) PE 3456

This study was a comparison of concentric and eccentric hamstring to quadricep peak torque ratios measured at velocities of 60°/sec, 180°/sec, and 300°/sec as determined by the Kinetic Communicator (KINCOM). Thirty-three intercollegiate volleyball and basketball players were tested on one occasion. All testing was performed by one evaluator. An analysis of variance was used to determine significant differences of hamstring to quadricep ratios between sport, sex, contractions, leg, and interactions between them. The analysis indicated that the concentric H/Q ratios at 180°/sec and 300°/sec (.64 and .67) were significantly (p<.05) greater than the eccentric H/Q ratios at 180°/sec and 300°/sec (.59 and .57) at p<.05 and p<.01, respectively. No significant differences were found at 60°/sec (.55 vs .57, concentric vs eccentric). No statistical differences in concentric or eccentric H/Q peak torque ratios were found between basketball and volleyball players or between men and women. Fatigue was not considered to affect the subjects using this testing protocol.

Burke, Jeannemarie. CHANGES IN SPINAL EXCITABILITY PRECEDING A VOLUNTARY MOVEMENT IN YOUNG AND OLD ADULTS, 1991. Ph.D., Indiana University (Gary Kamen). (336pp 6 f $24.00) PE 3311

Twenty old adults, mean age of 68.5 years, and 20 young adults, mean age of 23.1 years, were tested on four days during a one-week period. On each day the subject performed 84 right plantar flexions in a simple reaction time paradigm. Day one was a practice session. On days two, three and four, changes in spinal excitability preceding a voluntary movement were assessed by eliciting one of the following reflexes: unilateral right Achilles tendon reflex, unilateral right tibial H-reflex, or simultaneous bilateral tibial H-reflexes. Regardless of the reflex used to assess motor preparation, the duration of reflex facilitation was prolonged preceding a voluntary movement in the old adults. The percent of Achilles tendon reflex facilitation preceding a voluntary movement was greater in the young adults than in the old adults without a concomitant age-related change in percent of H-reflex facilitation. During the 500 ms interval prior to the presentation of the response stimulus, the amplitude of the H-reflex in the responding leg was depressed as compared to the amplitude of the H-reflex in the non-responding leg in the young adults only. The results supported changes in motor preparation with age.

Cody, Shannon M. THE EFFECTS OF THE STRENGTH SHOE ON VERTICAL JUMP PERFORMANCE IN MALE COLLEGIATE BASKETBALL PLAYERS, 1989. M.A., University of North Carolina at Chapel Hill (William E. Prentice, Jr.). (49pp 1 f $4.00) PE 3314

The purpose of this study was to determine if maximal vertical jump performance of male collegiate junior varsity basketball players attending the University of North Carolina at Chapel Hill was significantly changed through the use of an ergogenic training device, namely The Strength Shoe. The sample included ten male junior varsity basketball players and two male graduate students. Six subjects were randomly assigned to the experimental group and five to the control group. All participated in a four week training regimen with subjects in the experimental group having worn the Strength Shoes during the training sessions, while the controls’ wore their own basketball shoes. A vertical jump pre-test was administered prior to training and a posttest following the training to determine the effects of the Strength Shoe on maximal vertical jump performance. A 2 x 2 analysis of variance with repeated measures on the last factor indicated no statistically significant difference in maximal vertical jump performance between the subjects who trained in the Strength Shoe and those who trained in conventional high top basketball shoes.

Cossette, Nicole A. RELATIONSHIPS OF GROUND REACTION FORCES AND LOWER EXTREMITY GEOMETRY TO POST-SURGICAL CHRONIC KNEE PAIN, 1993. M.S., Purdue University (Carol J. Widule). (112pp 2 f $8.00) PE 3460

Subjects with chronic knee pain have been assessed in terms of gait characteristics while post-ACL reconstruction patients who experience knee joint pain have not been formally researched. This study investigated the potential relationship between angulation of bony structures of the foot, geometry of the lower extremity, forces about heelstrike, and post-surgical patients who experience ambiguous knee joint pain. Twenty-three male and females volunteers participated in this study. All had undergone patellar tendon ACL reconstructions 38.9 ± 11.7 months prior to participation. Subjects achieved full knee extension 4.96 ± 3.46 weeks and began full weightbearing 4.10 ± 3.01 weeks post-surgery. Respondents reported being “released to full activity” at an average of 6.59 ± 2.68 months following reconstruction. Mean pain reports were 1.29 ± 1.21 (on a scale of 0.00 to 7.00) immediately following typical exercise and 0.63 ± 0.96 twenty-four hours post-exercise. These results correspond to varying intensity of “dull, vague pain.” Pain locations were randomly distributed about the knee joint and supporting musculature. Due to a lack of normality of the subject population, a nonparametric correlation coefficient was utilized. Differences were calculated from each independent variable and squared to diminish error caused by negative values.

Acute pain post-exercise was strongly correlated with rearfoot angulation in full weightbearing (r=0.483, p-value=0.0196) and with the time of toe-off during gait (r=0.498, p-value=0.0155). Prolonged pain exhibited a significant interaction with only one variable, rearfoot angulation in full weightbearing (r=0.486, p-value=0.0186). Though the major hypothesis of this study was that geometric and force measurement differences between legs
correlated with chronic pain, the rearfoot angulation measurement was the only independent variable in which no mean difference between legs was noted. Further study is needed to determine the implications of this finding. The etiology of chronic pain post surgery appears to be strongly associated with positions of the feet during weightbearing. Additional attention should be given to the advantages of orthodic therapy to alleviate extreme variations from clinical norms and the use of weightbearing rehabilitation exercises post-surgery, especially post-ACL reconstruction.

Djevalikian, Raffi. THE RELATIONSHIP BETWEEN ASYMMETRICAL LEG POWER AND CHANGE OF RUNNING DIRECTION, 1992. M.A., University of North Carolina at Chapel Hill (Frank Pleasants). (100pp 2 f $8.00) PE 3382

This study’s purposes were to 1) assess the relationship between mechanical leg power and change of running direction, and 2) to assess the relationship between asymmetrical leg power and change of direction either to the right or left. Thirty female soccer players from the University of North Carolina at Chapel Hill were tested for mechanical leg power using the Continuous Jump test (CJ) and the Vertical Jump test (VJ) performed two-legged (2LCJ and 2LVJ) and one-legged with the right (RLVJ) and left (LLVJ). Change of direction was measured by the Boomerang Run (BR) performed to the right (RBR), left (LBR), and averaged (MBR). Regression equations were performed between the 2LCJ and the MBR (r=-.153, p=.4186) and between the 2LVJ and the MBR (r=.422 p=.020). In order to determine if leg power asymmetry is related to change of direction speed either to the right or left, a 2-factor repeated measure Anova was performed using results from the 1LCJ test among those who performed the RBR with a dominant left leg and those who performed the LBR with a dominant right leg (p=.313, F=1.056). The same analysis was performed using results from the 1LVJ test (p=.411, F=.698). Results suggest that there is a significant relationship between change of direction and Leg Power as measured by the 2LVJ (05 alpha level), but no significant relationship between leg power asymmetry and RBR or LBR.

Falvo, Lisa A. MECHANICAL AND PHYSIOLOGICAL DIFFERENCES BETWEEN RUNNING AND WALKING AT VARIOUS VELOCITIES, 1992. M.S., Springfield College (H. Joseph Scheuchenzuber). (90pp 1 f $4.00) PE 3349

Ss for this study were 12 college age males. Each subject walked and ran on a motorized treadmill at 3.7, 4.5, and 5.3 mph. The order of testing was randomized and subjects were placed in one of four groups. Expiratory gases were collected using a Tisot spirometer with an open circuitry method. Gases were analyzed as expired by a GAF/BAR Mark II Graphics Calculator. FORTRAN programs were written to calculate potential and kinetic energies of segments. A 2 x 3 ANOVA with repeated measures design was used to determine if significant difference in metabolic costs for the subjects walking and running at three speeds existed. A 2 x 3 ANOVA with repeated measures was also used to determine the significance of mechanical work differences of the two conditions at three speeds. There was no significant (p>.05) difference in the mean absolute mechanical energy values among the three speeds. Post Hoc Neuman Keuls test was used and it was determined that there was a significant (p<.05) difference between the values for the slow and medium velocities, and between the slow and fast velocities, but not between the medium and fast velocities. There was a significant (p<.05) difference in the metabolic cost values among the conditions of walking and running. There was a significant (p<.05) difference in metabolic cost among the three predetermined speeds. There was a significant (p<.05) interaction between speed and condition.


The relationships between the onset time of rapid arm lowering (RAL) and the time of occurrence (TF1) and the magnitude (F1) of the peak VGRF of landing for 48 college age female and male Ss during drop landings onto a force platform with both feet after hanging from a horizontal bar and dropping from a height of 60 cm were examined. The drop height was measured from the surface of the force platform to the right lateral malleolus of the hanging Ss. The onset time of RAL movement (T1) was defined as the time, relative to impact, when the angular velocity at the shoulder was greater than 200 degree/s. Landings on a AMTI BioMechanics Platform were videotaped and analyzed utilizing the Peak 2D Motion Measurement System. T1 was initially calculated as the mean of the right and left shoulder scores. T1, TF1, and F1 were then calculated as the means of five trials. Separate zero-order correlation coefficients were calculated and statistically tested for whether they were significantly different from zero utilizing the Fisher z transformation method. The intercorrelation coefficients between T1 and TF1, r=.2738, and between T1 and F1, r=.2064, were not significantly (p>.05) different from zero. The intercorrelation coefficient between TF1 and F1, r=.4500, was significantly (p<.01) different than zero. The relationship between RAL movement and the force of landing remained unclear. The slope of the landing force curve (the ratio of F1 to TF1) was thought to be useful in assessing landing softness and the effectiveness of eccentric muscle control during landing.


The intra-rater, inter-rater, and internal consistency reliabilities of measuring lumbar range of motion with the Dynavector™ LVD were assessed by repeatedly examining six male subjects (mean age=20.8 yrs, SD=2.1 yrs) with five different raters. The following component movements and movement combinations were measured, flexion, extension, left and right lateral bending, left and right axial rotation, total sagittal movement, total frontal movement, total transverse movement, and total planar movement. Intra-class reliability coefficients for each of the above movements and movement combinations were calculated from three way analysis of variance with repeated measures. Additionally, average coefficients of variation and 95% confidence intervals were calculated for each component movement. The results indicated good to high intra-rater, inter-rater, and internal
The purpose of this study was to determine the difference in VO2equated for weight, 1993. M.S., Springfield College (H. Widule). (87pp 1 f $4.00) PE 3463

The purpose of this study was to quantify the load on the forward leg during a fencing lunge. The information about the forces was used to identify possible causes of injury. Data from film and a force platform were combined to find the ground reaction forces, moments, and muscle forces in the leg. Using this information, the joint forces at the ankle, knee, and hip were found. Large joint forces were found at all joints immediately upon impact. There was a great deal of variation among subjects in the joint forces immediately after impact. Following impact, the joint forces were greatly reduced for the duration of the lunge, with much less variation among the subjects. The large magnitude of the forces place the fencers at risk for injury. In particular, there is a risk of injuries to the posterior cruciate ligament of the knee and to the bones of the leg.

Fink, Phillip. FORCES IN THE FORWARD LEG DURING A FENCING LUNGE, 1993. M.S., Purdue University (Carole J. Widule). (87pp 1 f $4.00) PE 3463

The purpose of this study was to compare dominant shoulder external rotator strength was tested concentrically and eccentrically at 120 deg/sec. Peak torque and maximum repetition work values were recorded. Concentric values were used to convert each subject’s eccentric peak torque and maximum repetition work values into eccentric percentages (Ecc% = Ecc/Con x 100). The eccentric results (p<.05) indicated that the pitchers produced significantly greater eccentric peak torque (133.22 ± 14.00) and maximum repetition (154.77 ± 11.96) work percentages than the position players (117.88 ± 16.81) (132 ± 14.17). The greater eccentric force percentages produced by the pitchers may be the result of the adaptive specificity, over time, of the external rotator muscles.

Heagy, Brian S. KINEMATIC ANALYSIS OF MALE OLYMPIC CROSS-COUNTRY SKIERS USING THE OPEN FIELD SKATING TECHNIQUE, 1993. M.S., Oregon State University (Gerald A. Smith). (123pp 2 f $8.00) PE 3467

The kinematic characteristics of 17 elite male cross-country skiers competing in the 50 km race of the 1992 Winter Olympic Games were determined. Each skier used the open field skating technique, one of four skating techniques used in free technique cross-country ski races. Skiers were filmed by the use of three video cameras, placed at a filming site on a flat portion of the racing course. Digitized data from the video were used to determine selected kinematic parameters which included: cycle velocity; cycle length; cycle rate; center of mass (CM) velocity vector angle; CM lateral displacement; CM lateral velocity; CM horizontal velocity; ski angles; ski edging angles; several types of pole angles; and hip, knee, and trunk angles. Temporal characteristics including strong side and weak side ski and pole phase times were also calculated. Cycle velocity and cycle length were found to be significantly related as were cycle velocity and the maximum strong side knee angle (r>.48, p<.05). Cycle velocity and the CM vector angle were found to have only a moderate non-significant relationship as did cycle velocity and the strong and weak side ski angles. For those skiers using the open field skating technique, CM lateral motion (as measured by the CM velocity vector angle and the ski angles) did not seem to be a distinguishing factor between faster and slower skiers, as hypothesized. However, cycle length and the maximum strong side knee angle did seem to distinguish faster from slower skiers. Skiers who covered more distance throughout a cycle tended to have faster cycle velocities. Contributing to this increased distance could have been the thrust of the strong side ski. Skiers with the most strong side knee extension tended to ski the fastest. Thus, it seems that greater leg extension results in greater propulsive forces and greater velocity.


Specific to throwing a football, limited data are available to compare similarities or differences among the various types of possible passes or between the other overarm throwing/striking skills. The present study reported the kinematic variables associated with throwing a football, and attempted to gain insight into the relationship between lateral stride foot placement and accuracy. Four division I-A quarterbacks were used in the study. The kinematic variables calculated were similar to those in recently articles with the exception of hip and shoulder angular velocity. Hip and shoulder movement may be subject to individual differences within the overarm throwing pattern. No correlation was found between lateral stride foot placement and accuracy,
although a recommendation to increase this distance (approximately eight inches in this study) was made to allow the net force to be translated forward in a more linear fashion and to allow for more complete hip rotation.


The purpose of this study was to assess the reliability of the Biodex isokinetic dynamometer in the measurement of peak torque during concentric loading of the back flexors and extensors. The back muscles of 30 asymptomatic male Temple University volunteers, who had no previous experience with the Biodex back apparatus, were tested in a 100 degree arc using the concentric mode of the Biodex B-2000 isokinetic dynamometer. Following a warm-up of four sub-maximal and one maximal repetition, the subjects performed a five repetition test bout at 90 degrees per second. The three testing sessions, conducted on different days, consisted of a practice, test, and retest session. The subjects were retested following a rest period of at least 7 days and not more than 10 days. The reliability between test and retest was evaluated by performing a Repeated Measures Analysis of Variance with Reliability from the SPSS manual (Hull & Nie, 1981). Correlation coefficients for trunk flexion and extension were r=0.74 and r=0.87, respectively. Cronbach’s alpha levels for trunk flexion and extension were .843 and .931, respectively.


The purpose of this study was to determine the effects of hip position and angular velocity on quadriceps and hamstring peak torque and on the hamstrings/quadriceps (H/Q) ratio during maximal isokinetic eccentric force. The dominant knee of 7 males (mean age=23.7 ± 2.6 yrs) and 7 females (mean age=23.3 ± 1.6 yrs) was tested using a KIN/COM dynamometer. Both the quadriceps and hamstrings were tested with the subject seated (110 degrees hip flexion) and supine (10 degrees hip flexion) at angular velocities of 60 and 180°/sec. The order of muscle group, hip position, and angular velocity was randomized. Testing sessions for the two muscle groups were separated by seven days. The highest eccentric peak torque of five maximal repetitions for each test trial was used for data analysis. A 2 x 2 x 2 factorial analysis of variance (ANOVA) was used with two levels each of muscle group, hip position, and angular velocity or the dependent variable of peak eccentric torque. A 2 x 2 factorial ANOVA examined two levels each of angular velocity and hip position with the H/Q ratio as the dependent variable. There were significant main effects for all factors with no significant interactions. 1. The quadriceps produce significantly greater eccentric peak torque than the hamstrings. 2. The quadriceps and hamstrings produce significantly greater eccentric peak torque in the seated position than in the supine position. 3. The quadriceps and hamstrings produce significantly greater peak torque at 180°/sec than at 60°/sec. 4. H/Q ratios are greater in the seated position than in the supine position. 5. H/Q ratios greater at 180°/sec than at 60°/sec.
The purpose of this study was to investigate the mechanical aspect of balance behavior during nonlocomotor assessment. Secondary purposes were (a) to determine kinematic and temporal similarity and dissimilarity among three balance tasks, (b) to determine the predictive relationship of seven independent variables to the dependent variable time-on-balance, and (c) to determine the viability of a five level balance skill continuum paradigm. One temporal and seven kinematic variables were observed through the video analysis of 72 children between 108 and 143 months of age screened for average or above average orthoptic and refractive vision while performing three static balance tasks. The tasks were (a) single leg stand (SOL), (b) tandem stand on rail (TND), and (c) tip-toe single balance stand (TTB). Subjects were filmed in the critical plane of movement, that exhibiting the greatest movement, using a Panasonic video camera at 30 fps and a shutter speed of 1/1000 s. Variables observed were (a) time-on-balance, (b) direction of loss of balance, (c) average position of the line of gravity relative to the base of support, (d) vertical displacement of the center of gravity, (e) trunk range of motion, (f) standard deviation of the line of gravity, (g) extreme recoverable line of gravity, and (h) extreme recoverable angle of stability. Film data were reduced using VuTech Freez Frame to capture video images and the TWU Film Analysis System developed by Noble, Zollman, and Yu (1988). Contributing to this lower than expected safety potential of child restraint systems is the lack of biofidelity in the anthropometric test devices (ATD) used by the government and the automotive industry to assess the effectiveness of child occupant protection systems. The development of ATDs that mimic human responses and can be properly instrumented to assess actual injury potential is essential. Since it is not possible to correlate human child injury potential with the biomechanical devices used for high level impact testing using experimental methods, the acquisition of child injury data from the real world is critical to ATD development. The aim of this clinical case series was the creation of a child injury data base for use in biomechanics research. The focus of the study was the association of injuries observed in young children who had been involved in automobile accidents while restrained by forward facing child restraint systems with (1) the particular vehicle crash characteristics and (2) the child restraint system used. The study resulted in the creation of a data base containing 198 children who sustained a total of 345 injuries. Seventy-three percent of the involved child restraint systems were identified by design type. The data analysis includes descriptive data concerning the injured body regions, and types and severities of injuries delineated by accident characteristics (i.e. impact direction, seating position, etc.). Comparison of abdominal injury and child restraint system design (harness or shield type) showed that abdominal injury was associated to a greater degree with shield type restraints compared to harness type restraints (X²=7.97, p<.01). The majority of injuries observed in all types of crashes were injuries to the head and face. The findings tentatively suggest that, in spite of the research, development and testing that has been performed during the past twelve years and the government regulated limitations on head excursions, forces and accelerations, there remains a critical need for better directed research into child injury causation and mitigation in the field of impact biomechanics.


The purpose of this study was to investigate the mechanical aspect of balance behavior during nonlocomotor assessment. Secondary purposes were (a) to determine kinematic and temporal similarity and dissimilarity among three balance tasks, (b) to determine the predictive relationship of seven independent variables to the dependent variable time-on-balance, and (c) to determine the viability of a five level balance skill continuum paradigm. One temporal and seven kinematic variables were observed through the video analysis of 72 children between 108 and 143 months of age screened for average or above average orthoptic and refractive vision while performing three static balance tasks. The tasks were (a) single leg stand (SOL), (b) tandem stand on rail (TND), and (c) tip-toe single balance stand (TTB). Subjects were filmed in the critical plane of movement, that exhibiting the greatest movement, using a Panasonic video camera at 30 fps and a shutter speed of 1/1000 s. Variables observed were (a) time-on-balance, (b) direction of loss of balance, (c) average position of the line of gravity relative to the base of support, (d) vertical displacement of the center of gravity, (e) trunk range of motion, (f) standard deviation of the line of gravity, (g) extreme recoverable line of gravity, and (h) extreme recoverable angle of stability. Film data were reduced using VuTech Freez Frame to capture video images and the TWU Film Analysis System developed by Noble, Zollman, and Yu (1988) modified by Zimmermann (1990). Descriptive statistics were computed and compared for each variable across tasks. Differences among tasks were examined using MANOVA with repeated measures. Mechanical task specificity, particular to time-on-balance, direction of loss of balance, standard deviation of the line of gravity, and the extreme recoverable line of gravity were reported. Correlational analysis and factor analysis illustrated that, although generally low, for each task, significant relationships among variables existed. Using a stepwise multiple regression the effectiveness of the experimental variables to predict time-on-balance was shown. The SOL and TTB tasks were most similar and the TND most different. A continuum of performance from most to least difficult was suggested across tasks. The TTB and SOL using time and direction of loss discriminated best for weak balancers. The TND discriminated best for the good balancers. The logic of the five level paradigm was supported, however the variables and tasks selected in this study were not sufficient to identify the middle levels of the paradigm. It was concluded balance tasks for nonlocomotor assessment are mechanically task specific and a continuum of balance ability was suggested. Although balance ability could be predicted using time-on-balance it can more adequately be determined using a combination of time-on-balance, direction of loss of balance, and the mechanical variables related to the line of gravity.

The purpose of this study was to investigate the mechanical aspect of balance behavior during nonlocomotor assessment. The determination of the mechanical aspect of the paradigm was supported, however the variables and tasks selected in this study were not sufficient to identify the middle levels of the paradigm. It was concluded balance tasks for nonlocomotor assessment are mechanically task specific and a continuum of balance ability was suggested. Although balance ability could be predicted using time-on-balance it can more adequately be determined using a combination of time-on-balance, direction of loss of balance, and the mechanical variables related to the line of gravity.

INTRODUCTION: Over the last twenty years, researchers studying the biomechanics of swimming have developed a theory of hand propulsion which emphasizes the role played by lift forces in generating hand propulsion. Hay, Liu and Andrews have suggested that the path followed by the hand of a swimmer might be attributed to motion of the arm relative to the trunk, to rolling of the trunk around the longitudinal axis, or to a combination of these two; and have conducted a computer simulation study to explore these possibilities. There appears, however, to have been no attempt to quantify the influence of body roll on the handpath...
in actual freestyle swimming. The purpose of this study was to determine the influence of body roll and motion of the arm relative to the trunk on the path followed by the hand during the pull phase in freestyle swimming. PROCEDURES: Ten, male swimmers from a university swimming team were used as subjects. Each subject swam three 20 m-long trials at workout pace. Two periscope video systems were used to record each subject’s performance in side view and front view. A buzzer was sounded for the swimmer’s back to permit body roll angle versus time histories to be obtained. The two video tapes were analyzed using a Peak 2D Motion Measurement System. The body roll angle versus time histories were found directly and the actual handpath was found by projection angle reconstruction. A 3D mathematical model was developed to determine the handpath that would have been recorded by each subject if there had been no mediolateral motion of his hand relative to his body. A geometrical analysis was conducted to determine the average influence of body roll on the actual handpath during the pull phase. RESULTS AND DISCUSSION: The results of this study indicated that the mediolateral motions evident in the actual handpaths were due approximately equally to body roll and upper limb relative motion. From the swimming technical point of view, we should give more attention to body roll than before. The subjects accelerated the fingertip medially during the first 30% of the pull phase, and laterally between 60% and 80% of the pull phase. The mean value of the maximum body roll angle for the ten subjects was 61°. The greatest angular speed of body roll was recorded during the beginning and the end of the pull phase, and the least near the middle of the pull phase.

Manchester, Diane L. EFFECTS OF AGE, VELOCITY, AND ADDED MASS ON POSTURAL ADJUSTMENTS ASSOCIATED WITH A RAPID ARM-RAISING MOVEMENT, 1990. Ph.D., University of Oregon (Marjorie H. Woollacott). (213pp 3 f $12.00) PE 3362

Effects of age, velocity, and added mass on postural adjustments associated with a rapid arm-raising movement were studied. Sixteen older adults (mean age=70.6) and sixteen young adults (mean age=26.9) performed horizontal arm flexion at the shoulder during stance. All subjects performed the movement at individual maximum velocity (MAX condition), at 75 percent of maximum velocity (M75), and at 50 percent of maximum velocity (M50), as well as with added mass (WTD condition). Timing lights monitored movement times, while an accelerometer on subjects’ wrists monitored movement onsets. EMG responses were recorded for the contralateral erector spinae, ipsilateral and contralateral hamstrings, and contralateral quadriceps (postural muscles), as well as anterior deltoid (voluntary muscle). Simple reaction time to a visual stimulus was measured. In older subjects, the erector spinae were activated after the anterior deltoid, significantly later than young subjects (p<.05), particularly at low velocities. With the ipsilateral hamstrings, a larger proportion of older subjects than young subjects showed delayed onsets. Thus, the postural voluntary latency was shortened. In the contralateral hamstrings, the latency was longer in the low velocity conditions for both age groups. In the contralateral quadriceps, onsets were later for older subjects, particularly in the lowest velocity conditions. Quadriceps activation was infrequent at low velocities for young subjects, while older subjects activated these muscles more frequently. No significant age or velocity effects were observed for the anterior deltoid. Added mass resulted in shorter latencies and more consistent quadriceps activation. Conclusions were that (a) postural versus voluntary muscle responses were affected differentially by age, velocity, and mass; (b) postural set and aging deficits affected timing variability; (c) older adults used alternative response strategies because of physical decrements or caution; and (d) anticipatory versus consecutive postural adjustments were affected differentially by decreasing velocity. A central representation of movement dynamics may coordinate postural and voluntary components. To the extent this representation is affected by aging, older adults may have difficulty anticipating consequences of an equilibrium disturbance and programming preparatory postural adjustments.

Martin, Melanie M. STRENGTH GAINS THROUGH AQUATIC EXERCISE, 1992. M.S., Springfield College (Charles J. Redmond). (122pp 2 f $8.00) PE 3434

Ss for this study were 30 female college students randomly assigned to two independent groups. Dominant, non-injured upper extremities were evaluated. The A group participated in aquatic exercise three times per week for 6 weeks. The C group did not participate in the program. The mean concentric torque values of the shoulder external rotators for the A and C groups at velocities of 60 and 180 deg/s were recorded for 3 test administrations, 3 weeks apart. A 2 x 2 x 3 repeated measures ANOVA was used to analyze the differences in concentric torque production of the shoulder external rotators. The mean concentric torque values were significantly (p<.005) greater for the A group compared to the C group. The mean concentric torque values were significantly (p<.000) greater at 60 deg/s compared to 180 deg/s. The mean concentric torque value for the third test administration was significantly (p<.05) greater than the value for the second test administration; which, in turn, was significantly (p<.05) greater than the first test administration. The mean concentric torque value for the A group was significantly (p<.05) greater than the value for the C group at velocities of 60 and 180 deg/s for the second and third test administrations. College women, who complete a 6-week aquatic training program, are able to improve the concentric torque production of the shoulder external rotators over the 6-week program in comparison to a control group.

McBride, Margaret E. EVIDENCE OF BIOMECHANICAL FUNCTIONAL SYMMETRY IN THE PRESENSE OF LOWER EXTREMITY STRUCTURAL ASYMMETRY DURING RUNNING, 1989. M.P.E., University of British Columbia (David Sanderson). (100pp 2 f $8.00) PE 3394

The biomechanical analysis of human gait is typically characterized by the generation of large volumes of collected data. In an attempt to simplify the analysis of results, researchers have made the pragmatic decision to record force and cinematographical data from only one side of the body and assume symmetry between the left and right sides. This study was devised to address two topics related to the issue of assumed biomechanical symmetry in the study of human gait mechanics. The initial objective was to determine if the assumption of symmetry in kinematic and kinetic variables remained valid in a group of runners diagnosed with a leg length differential. It was postulated that lower extremity structural asymmetry in the form of leg length inequality would be manifested as functional asymmetry in biomechanical parameters. The second objective of this study was to determine if runners with a leg length inequality were characterized by...
common systematic patterns of asymmetry in kinematic and kinetic variables. If universal compensation strategies were identified, they may eventually be linked to etiological factors involved in the development of overuse injuries in runners with a difference in leg length. A group of ten asymptomatic male runners served as subjects in this study. Subjects were assigned to one of two experimental conditions based upon bilateral anthropometric determination of leg length. Leg length assessment was comprised of bilateral measurements of the distance from the anterior superior iliac spine to the lateral and medial malleoli as well as the distance from the greater trochanter to the floor. The five runners in the structurally symmetrical group were characterized by a leg length differential of less than 3 mm while the five runners in the structurally asymmetrical group demonstrated a leg length inequality of greater than 10 mm. Subjects were required to run barefoot at 4.88 m/s over a flush mounted Kistler force platform imbedded in a straight 20 meter runway. After sufficient practice, six trials were collected from both the left and right legs. The three components of the ground reaction force were collected while a Locam 16 mm camera recorded each trial in the sagittal plane at 150 frames per second. Filtered kinematic and ground reaction force data were used as input into a mathematical model designed to estimate the joint forces and muscle moments occurring at each lower extremity joint during the stance phase of running. Bilateral comparisons were made on the range of motion at the hip, knee and ankle joints, mean vertical force peaks and net anterior posterior impulses. Analysis of the internal kinetic variables included the mean vertical joint reaction force and the mean muscle moment of force for each joint averaged to every 20% of the total stance duration. Results for each runner were assessed for functional equality using a symmetry index. For each variable analyzed, this calculation provided the mean absolute difference between the left and right legs for members of the structurally symmetrical group and between the long and short legs for the structurally asymmetrical runners. Comparison of group results revealed functional equality in the majority of biomechanical measures analyzed. Analysis of individual results revealed that regardless of structural status, some runners demonstrated functional equality while others were characterized by functional asymmetry. The second portion of the study attempted to determine if runners with a leg length inequality were characterized by universal patterns of asymmetry in kinematic and kinetic variables which could eventually be linked to the etiology of overuse injuries. As the structurally asymmetrical group demonstrated functional equality in the majority of variables measured, it was not possible to detect common patterns of compensation utilized by all runners with a leg length differential. Based upon these results, the following conclusions were made: 1. Regardless of structural status, functional symmetry remained a valid assumption in the majority of biomechanical variables measured in this study. 2. Structural asymmetry in the form of a leg length differential is not necessarily manifested as asymmetry in the biomechanical measures analyzed in this study. 3. No universal compensation strategy was utilized by all subjects presenting with a leg length differential. 4. Pooling data concealed bilateral asymmetries which existed in individual profiles.


Body mechanic checklist scores, thigh, trunk, and center of gravity displacement during a one person pivot transfer, and boosting up in bed where evaluated to determine the effectiveness of job specific training on the work performance of female student nurses from a local college. Thirty female subjects participated in the study and were divided into a control group, an experimental group that received basic body mechanic training, and an experimental group that received job specific training. Results of the body mechanic checklist analysis indicated that the job specific training group demonstrated a statistically significant improvement in their body mechanic techniques compared to the other two groups. Results of the kinematic analysis found no significant differences in thigh and trunk displacement during the one person pivot transfer between the three groups. Results of the thigh, trunk, and horizontal center of gravity displacement during boosting a patient up in bed indicated that the job specific training group improved their body mechanic techniques compared to the other two groups.


The purposes of this investigation were (1) to define the looseness of the hip in a clinically relevant way, (2) to develop an algorithm that calculates the looseness of the hip over the range of hip configurations encountered during normal activities of daily living, and (3) to identify the intertrochanteric osteotomy in a given case of osteoarthrosis that minimizes the looseness of the hip. Three potentially useful looseness indices were defined—the characteristic point locus, the joint space, and the contact region. Logistic regression was used to analyze selected data for 38 subjects who received valgus osteotomies. The final logistic regression equation for each of three definitions of osteotomy outcome (success/failure) was used to predict the probability of success associated with a specific osteotomy. The osteotomy with the largest probability of success identified the predicted optimal osteotomy for each outcome. For each final logistic regression equation, the degree of fit was low (R=0.270; R=0.303; R=0.354), while the number of correctly predicted outcomes was moderate (78.9%; 68.4%; 78.9%). The joint space looseness index appeared to be the most useful of the three looseness indices because it (1) exhibited a dominant, unimodal variation with osteotomy angle which would facilitate the prediction of an optimal osteotomy, and (2) remained as the only independent variable (albeit in different forms) in two of the three final logistic regression equations. Considerable agreement (71.1 percent) was found between the clinical indication of a valgus operation, and the prediction of a valgus optimal osteotomy for the logistic regression equation associated with Outcome 1: Pain. This result is of importance because relief from the pain created by the changes in the joint from osteoarthrosis is the primary concern of the patient considering surgical treatment. Thus, the logistic regression equation for Outcome 1 may potentially be useful to the surgeon in generating supplemental information which could be used to verify a clinical indication or to select an optimal osteotomy.

The purpose of this study was to compare the effect the AirStirrup Ankle Training Brace and an unbraced control condition had on ankle complex inversion, in pre- and post exercise trials. Plantar flexion and inversion stress was applied to the ankle complex by a platform that released the ankle into 35 degrees of inversion, with a starting position of 20 degrees of plantar flexion. The exercise included 20 minutes of continuous multidirectional aerobic stepping on an 8 inch platform. Thirteen subjects who denied history of ankle injury participated in the study. All subjects were screened for any biomechanical deformity prior to admission to the study. Prior to the actual research, the subjects participated in four practice sessions on the exercise apparatus called The Step. The practice sessions were designed to familiarize the subjects with the dimensions of The Step, the technique of stepping, and the choreographed routine. Test conditions were randomly ordered for each subject. The subjects participated in 20 minutes of aerobic stepping, and were tested in pre- and post-exercise trials on the aforementioned platform. The lowering of the platform was videotaped for data analysis. The videotape was then manually digitized and analyzed using the Peak 2D Motion Measurement System. Total ankle complex angular displacement data were analyzed using a two way analysis of variance with repeated measures. Results indicated a significant difference at the p<.05 level with respect to the braced and unbraced condition, regardless of the test. The AirStirrup Ankle Training Brace was found to significantly restrict ankle complex inversion angular displacement as compared to the control condition. Results of the statistical analysis revealed a nearly significant p<0.012 interaction between the pre- and post-tests and the braced and unbraced conditions.

Moody, Melissa. OPTIMAL DROP HEIGHT PREDICTION FROM LOWER BODY STRENGTH FOR PLYOMETRIC JUMP TRAINING, 1992. M.S., Texas Woman’s University (Jerry D. Wilkerson). (69pp 1 f $4.00) PE 3440

The investigator accumulated and assessed data to determine whether lower body strength was a predictor for the optimal drop height when performing a bounce drop jump. The subjects were 34 females between the ages of 15 to 18 years. Data were collected at Texas Woman’s University. Lower body strength was measured using the leg press on a universal gym. The subjects performed a one maximum repetition leg press. The subjects then performed drop jumps onto a Kistler Type 9261A forceplate. The forceplate was used to measure vertical jump height and determine the best drop jump. The subjects were filmed with a Locam high speed motion picture camera to determine whether the best jump was also a bounce drop jump. Regression analysis was used to calculate the relationship between lower body strength and drop height. The R value was -.19. Therefore, it was determined that lower body strength was not a predictor for the optimal drop height.

Moscov, June G. STATIC RANGE OF MOTION, LEG POWER, AND LEG STRENGTH AS PREDICTORS OF DYNAMIC RANGE OF MOTION IN FEMALE BALLET DANCERS, 1992. M.A., California State University, Long Beach (Michael G. Lacourse). (105pp 2 f $8.00) PE 3397

The purpose of this investigation was to determine the relationship between dynamic range of motion (DROM), static range of motion (SRM), leg strength, and leg power in beginning, intermediate, and advanced female ballet dancers during the performance of the grand jeté. Female ballet dancers (N=24) were measured for all variables during a single testing session. The total variability for DROM predicted by these variables was $R^2=.4731$, leaving 53% of the variability in DROM unaccounted for. Based on the present findings, leg strength was unrelated to DROM, while both leg power and SRM were only moderately related. The contribution of other factors to the remaining variability in DROM is addressed. It is recommended that further research be directed at understanding the neuromuscular mechanisms responsible for changes in DROM.

Muniz, Ana E. BIOMECHANICAL ANALYSIS OF FORCES AND TORQUES AT THE SUPPORT LOWER EXTREMITY DURING TWO RUNNING-IN-PLACE EXERCISES AT THREE PACES, 1990. Ph.D., University of Maryland (David L. Kelley). (377pp 4 f $16.00) PE 3331

The purpose of this study was to compare the stress forces (SFs) and torques at the support lower extremity (SLE) between two running-in-place (RP) exercises at three paces. Also, two biomechanical analysis procedures were validated for their accuracy in estimating the forces and torques at the SLE. These parameters were estimated by using a 7-link model of the human body with Newtonian equations and either motion analysis or simulation procedures. From the motion analysis procedures the vertical estimated force (EFFs) were excellent (Avg. r²=.98%, RRG=5%), while the anteroposterior EFFs were inadequate representations (Avg. r²=.67%, RRG=.26%) of the ground reaction forces (GRFs). The stress forces (SFs) and torques were estimated with greater accuracy for the joints located closer to the support foot and for those in which the vertical force dominated. The simulation procedures consisted of changing the period in the Fourier series of the moderate pace position data to correspond to the slow and fast paces, and by doing so determine their kinematic parameters. The results obtained from the simulated forces and torques were less accurate than those from the estimated forces and torques. The SFs and torques compared between the exercises were the maximum values during the support phase and the first .05 sec of landing. A 2x3 ANOVA with Repeated Factors was used to determine if differences existed. All GRFs, compressive forces, the landing proximal shear force at the shank, and the torque at the ankle were larger for RP thigh lift (RPTL) than for RP heel lift (RPHL) (p<.01). As the pace increased toward the fast tempo, all maximum shear forces decreased during both exercises (p<.05). Only during RPTL did the maximum proximal compressive force at the foot increase and the torque at the knee decrease as the pace increased toward the fast tempo (p<.05). The GRF and torque demands for this study ranged between walking and running. The suggestions by Yessis (1984) of “harmful stress” experienced on the SLE during RPHL and not during RPTL cannot be supported. During RP exercises, the load on the SLE is of low magnitude; thus, injuries to the SLE musculoskeletal system probably result from a combination of high repetition and load bearing on the ball of the foot.


In recent years spinal flexibility has been considered an important factor of overall health. Spinal range of motion parameters are often a part of standardized physical fitness assessments. While extensive work has been done on the flexibility of the spine in the
sagittal plane, limited attention has been devoted to, rotational and lateral movements of the back and neck. The variability of functional rotation and lateral flexion movements of the back and neck was examined in males and females through five age groups of the life-span. Fifty-five males and 55 females ranging in age from six to 80 years, participated in this study. Two spinal rotational movements and one lateral flexion movement were tested using a videotaping analysis. Data were analyzed using two way ANOVA followed by a Scheffe post hoc test. Non-significant differences in spinal flexibility were found between genders. Statistical differences were observed between the oldest and youngest groups. These two groups differed significantly from the three middle groups. On the basis of this study physical fitness programs and tests should include spinal rotation and lateral flexion movements for the program of evaluating flexibility. In addition, more emphasis should be placed on the cervical region when designing flexibility programs for the elderly.


This investigation was conducted to determine the relationship between leg length and the biomechanical analysis for the distance of walk back steps of the kicking motion in a soccerstyle placekick. In recent years, researchers (1990) began the search for the effective methods to improve the placekicking techniques. The subjects for this investigation were 94 placekickers at the high school, collegiate, or the professional trainee level. The placekickers were divided into four groups depending on leg length and were filmed during their approach and kick swing. The placekickers had three kicks and were tested on (a) initial angle, (b) initial velocity, and (c) maximum distance. The approach and the kick swing phase were drawn on a computer for graphics analysis and were compared by the K factor of the placekickers. The K factor was a decimal value formulated by the actual horizontal kick distance divided by the distance the ball would travel in a vacuum, \( r = V^2 \sin 2\theta / g \). The groups were divided by leg length, and ability level of participation. The mean of each leg length groups measurements on velocity, trajectory, and distance were calculated. Group One; the shortest leg length group had the lowest velocity (79.1 ft/sec), lowest trajectory (31.1˚), and the shortest distance (40.38 yds). Group Two, Four, and Three had measurements that increased in an order, with Group Three achieving the highest in all three categories respectively (85.61 ft/ sec; 32.69˚; 51.0 yds). T tests were conducted on (a) leg length, and (b) level of participation, with trajectory, velocity, and distance. An Anova statistical test also was run on the level of participation and leg length. Upon further investigation the shortest leg length groups of the College and Professional groups demonstrated the greatest efficiency. Within the limitations of this study, the recommended starting approach distances upon competition of the drive step ranged from 4ft to 5ft-3” from the football, but varied according to leg length.

Price, Kathleen M. A BIOMECHANICAL AND PHYSIOLOGICAL ANALYSIS OF EFFICIENCY DURING DIFFERENT RUNNING PACES, 1992. Ph.D., Texas Woman’s University (Jerry D. Wilkerson). (127pp 2 f $8.00) PE 3441

The purpose of this study was to investigate the differences between selected biomechanical and physiological parameters in treadmill running at an easy pace and at a race pace. A secondary purpose was to investigate the contribution of the biomechanical variables (stride frequency, stride length, time of stride, percent support) and physiological variables (heart rate, R value, VO2 percent of VO2max, blood lactate) to total efficiency. Nine male intercollegiate distance runners were filmed twice (5 min and 15 min) from a sagittal view with a 16 mm high speed camera at 100 fps during two running paces. One complete stride was digitized and the X/Y coordinates were used to determine the work per stride. Physiological data were also collected during the treadmill protocol and matched at the 5 min and 15 min intervals to determine total efficiency. One-way repeated measures ANOVA was utilized with two paces (easy or race) and two times (5 min or 15 min) to investigate the biomechanical, physiological, and efficiency variables. Maximum experiment wise error control for Type I errors was necessary because ten dependent variables were utilized and the correlation matrix indicated the data were nonorthogonal. The small sample size did not permit of MANOVA due to the limited degrees of freedom. The Bonferroni inequality test was used and produced a modified alpha level of .005. Although no significant interactions for time by pace were found for any of the dependent variables, a trend exists for several of the variables. Stride length and stride frequency increased with an increase in time and intensity. Percent of support and time of stride decreased with an increase in time and intensity of exercise. With and increase in time and pace, there was an increase in each physiological variable (heart rate, R value, VO2 percent of VO2max, blood lactate). Total efficiency decreased with an increase in pace.


The increased use of eccentric muscular exercise to augment performance and rehabilitation has generated questions regarding optimal and safe training loads. It has been suggested that lower extremity control of a load equal to 1 1/2 to 2 times body weight is prerequisite to successful eccentric “depth” jumping. The purpose of this study was to investigate the relationship between lower extremity loading as measured by the parallel back squat exercise and successful eccentric exercise. A second purpose was to determine the variable effect of depth jumps from differing heights on vertical jump performance. Seventy male and female intercollegiate athletes were tested for (a) maximal percent body weight controlled by the lower extremities via parallel squat exercise, (b) maximal vertical jump reach, and (c) maximal “depth” jumps from six heights ranging from 30-107 centimeters. The data revealed significant correlations between parallel squat performance and the ability to successfully control increasing “depth” jump heights, \( r=0.326; p<0.01 \) and jump reach performance \( r=0.283; p<0.05 \). No significant correlations were found between squat performance and “depth” jump performance from any of the individual heights. There was an inverse relationship found between “depth” jump performance and depth jump drop height. Average maximal vertical jump performance from ground level exceeded all but the lowest (30cm) depth jump height. The results suggest that parallel squat performance represents a small percentage (11%) of the
The purpose of this study was to investigate the influence of the Strength® Shoe and three plyometric drills on concentric and eccentric peak torque values of the triceps surae, 40-yard dash time, and vertical jump height. Subjects were 30 high school football players who were randomly divided into three groups of 10. All subjects participated in their regular football practice regimen. Two of the groups performed three additional plyometric drills. The first group, Exercising in the Strength® Shoe (EXSS), wore the Strength® Shoe for these drills. The second group, Exercising in Conventional Shoes (EXCS), wore their own conventional shoes. The third group, the Control Group (CG), also wore their own conventional shoes but did not participate in the additional plyometric drills. Concentric and eccentric peak torque, 40-yard dash, and vertical jump data were collected before and after a six week training period. Each subject was allowed only one attempt at the 40-yard dash and the vertical jump during the pretest and posttest data collection sessions. The Biodex B-2000 Isokinetic Dynamometer was used to collect left triceps surae peak torque data at 30 and 90 degrees per second through a 60 degree arc of motion. Peak torque data collection involved randomly ordering isokinetic mode and velocities. Four three-way analyses of variance (ANOVA) with repeated measures (p<0.05 level) were performed to examine the differences among test conditions. The results indicated a significant difference between velocities, concentrically, and between tests, eccentrically. Concentric means revealed greater peak torque generated at 30 degrees per second than at 90 degrees per second across the groups for both tests. Eccentric means increased in the EXSS group and CG, and greater (p<.01) than the averaged measured Q angle. Part three was an attempt to develop a prediction equation for the Q angle in normal subjects. Variable of sex, age, femoral rotation midpoint (FRM), transmalleolar axis (TMA), genu valgum, foot pronation, and Q angle were measured on 114 volunteer subjects. Sex was the most significant predictor of Q angle, followed by age, FRM and foot pronation. Part three was an attempt to reduce the standing Q angle and reported patellofemoral pain in patients with diagnosed patellofemoral pain. Nineteen patients referred to physical therapy for patellofemoral pain were chosen as subjects. A double blind ANOVA research design was used. Reducing foot pronation significantly reduced standing Q angle compared to controls (p=.041). Reducing foot pronation did not significantly reduce reported patellofemoral pain compared to controls (p=.221).

The purpose of this study was to establish norms and incidence for the degree of genu recurvatum, and to study the relationship between selective strength variables and the degree of genu recurvatum among college-age men and women. The genu recurvatum angles of 102 men and 99 women 18 to 30 years old were measured in standing and prone position with a goniometer. The mean genu recurvatum angle for college-age men was 3.86° ± 3.60°, and for women 5.32° ± 3.75°. To investigate the relationship of the strength variables to the degree of genu recurvatum, all subjects were further tested on the isokinetic dynamometer for muscle test analysis. The correlations of knee extensor and flexor muscles as well as of plantar flexor and dorsal flexor muscles with genu recurvatum angle, were significant (p<0.05), but the relationship was very weak and not relevant. The incidence of genu recurvatum was calculated and implications discussed.

Schultbies, Shane S. VALIDATION, PREDICTION AND REDUCTION OF THE QUADRICEPS ANGLE, 1991. Ph.D., Brigham Young University (Rulon S. Francis). (174pp 2 f $8.00) PE 3494

An investigation of the Q angle was conducted which consisted of three parts. Part one was a validation study. A model was devised by the author in which the quadriceps resultant was calculated in the frontal plane on four lower extremity cadaver specimens. This was then compared to the traditionally measured Q angle on the same specimens. The average quadriceps force resultant was 4.41° greater (p<.01) than the averaged measured Q angle. Part two was an attempt to develop a prediction equation for the Q angle in normal subjects. Variable of sex, age, femoral rotation midpoint (FRM), transmalleolar axis (TMA), genu valgum, foot pronation, and Q angle were measured on 114 volunteer subjects. Sex was the most significant predictor of Q angle, followed by age, FRM and foot pronation. Part three was an attempt to reduce the standing Q angle and reported patellofemoral pain in patients with diagnosed patellofemoral pain. Nineteen patients referred to physical therapy for patellofemoral pain were chosen as subjects. A double blind ANOVA research design was used. Reducing foot pronation significantly reduced standing Q angle compared to controls (p=.041). Reducing foot pronation did not significantly reduce reported patellofemoral pain compared to controls (p=.221).

The problem was to compare the effects of a traditional baseball weight training and a power weight training program on bat velocity. Subjects were 60 male and female college students ranging in age from 18 to 28 years old. Training program exercises were the leg press, leg curl, leg extension, bench press, lat pulldown, military press, bicep curl, and tricep extension, and performed on Universal weight extension, bench machines. Initial and final bat velocities were measured for all 60 subjects and subjects in the experimental groups were tested for a 1RM in the training program exercises. The traditional group (3x10) performed each eccentric contraction in four seconds. The power group executed each repetition in one second, and trained according to the principles of periodization. Both groups trained for seven weeks. Power trained males made greater significant improvements in bat velocity than any other group. Females made greater improvements in upper and lower body strength than males while traditional training and power training equally enhanced lower body strength across subjects.

Snowden, Steven R. THE EFFECT OF THE LEAD LEG PLANT ON FACTORS AFFECTING DISTANCE ON KICKOFFS IN FOOTBALL, 1991. Ph.D., Texas A&M University (Linus J. Dowell). (178pp 2 f $8.00) PE 3398

Purpose: The purpose of this study was to determine the effect of the lead leg plant on factors affecting distance in the kickoff in football. Procedure: A total of 30 observations were recorded from...
Two highly skilled kickers by a high speed Locam camera and a 16 mm Bolex camera. Kicks were filmed at 200 and 64 frames per second respectively. Data were analyzed on the Vanguard Motion Analyzer. Result: A significant relationship was found to exist between the criterion variable (range of motion) and the predictor variable (plant leg angle in the x-y axis) accounting for 86% of the variation in the criterion variable. A significant relationship was found to exist between the criterion variable (foot distance) and the predictor variables (upper trunk angle) and (plant leg angle in the x-z axis) accounting for 86% of the variation in the criterion variable. No significant relationships were found between the criterion variables, projection angle, linear ball velocity and linear knee velocity with any of the predictor variables. Significant differences were seen between the two styles of kicking in some variables. Conclusion: Plant leg angle in the x-y axis has a significant effect on the range of motion in kickoffs in football. Upper trunk angle and plant leg angle in the x-z axis have a similar effect upon foot distance of the plant leg to point of placement of the ball. If the plant leg angle is known, it is possible to predict the range of motion of the kickoff. If the upper trunk and plant leg angle in the x-z axis are known, it is possible to predict foot distance of the plant leg to point of placement of the ball. The plant leg angle in the x-y axis for an effective kickoff in football may vary between styles. The plant leg angle in the x-z axis for an effective kickoff in football may vary between styles.

Suomi, Rory. EFFECTS OF A LOWER LIMB STRENGTH TRAINING PROGRAM ON BALANCE MEASURES IN MEN WITH MENTAL RETARDATION, 1991. P.E.D., Indiana University (Paul R. Surburg). (308pp 4 f $16.00) PE 3400

Twenty-two men (23-39 years) with mild to moderate mental retardation (IQ= 36-70) were randomly assigned to a strength or control group to assess the effects of lower limb strength on postural sway measures. Isokinetic evaluation of knee extensor, hip abductor, flexor and extensor strength were measured using MERAC and Nicholas dynamometers. Sagittal sway, lateral sway, radius and total sway area measures were assessed on a Kistler force platform during Rhomberg, tandem and one-legged stances, and lateral sway was recorded during a beam walking task. Each dependent measure was independently analyzed using a planned comparison approach with a 2 x 2 ANOVA. After 12 weeks of strength training on hydraulic strength training equipment (Hydra-Fitness, Inc.) the strength trained subjects exhibited significant increases on 6 of 8 isokinetic (14.5 to 82.7%) and 10 of 12 isometric 1.8%) measures. In general, increased lower limb strength did not result in reduced postural sway measures. Results demonstrated that subjects with mental retardation can achieve strength gains via hydraulic resistance training, however increases in lower limb strength were not associated with reductions in postural sway measures.

Tardie, Gregory B. THE EFFECTS OF BODY SEGMENT LENGTH AND HEAD POSITION UPON SIT AND REACH FLEXIBILITY PERFORMANCE, 1992. M.S., Slippery Rock University (Gary S. Pechar). (64pp 1 f $4.00) PE 3369

The purpose of this study was to determine the relationship between sit and reach performance using both the flexed and neutral head positions in secondary school age men and women. In addition, differences in sit and reach flexibility between the flexed and neutral head positions and between men and women were investigated. Subjects tested were 50 males and 50 females ranging in age from 14-19 years enrolled in regular physical education at Lake Region High School, Naples, Maine. Subjects were tested performing the sit and reach test using a flexed (FL) and neutral (NE) head position. Trunk length, arm length, and leg length were determined to investigate the relationship of body segment lengths and sit and reach performance. Subjects performed three sit and reach trials for each head position. Results demonstrated significantly greater sit and reach performance for males and females using the neutral position; (Males 29.57cm NE and 28.34cm FL), (Females 32.43cm NE and 31.07cm FL). There were non-significant relationships between trunk length, arm length, and leg length for females. There were non-significant relationships between arm length and leg length for males, however, there was a significant relationship between trunk length and sit and reach performance. Non-significant relationships were reported between males and females in sit and reach performance (males X=30.15cm and females x=32.74cm). Results indicate that limb length is not a significant factor sit and reach performance, though trunk length is a significant factor influencing sit and reach performance in males. Head position was also found to be a significant factor influencing sit and reach performance.
The purpose of this study was to examine the relationship between Q angles measured in the subtalar pronated position and Q angles measured in the subtalar neutral position in college age women. The Q angles of 100 women were measured in both the subtalar pronated and neutral positions with the use of a specially modified goniometer. The subjects were categorized according to their degree of subtalar pronation (mild, moderate and severe). The mean change in Q angle was 1.67 for the mild pronators, 2.1 for the moderate pronators and 2.78 for the severe pronators. These differences were statistically significant (p<.01) at the .05 alpha level. The means, ranges, and changes in Q angles were calculated and the implications of these calculations were discussed. These findings suggest that the understanding and correcting of patellofemoral mechanics is dependent upon the interrelationship of foot and leg function.

Vander Linden, Darl W. EFFECT OF MUSCLE LENGTH ON MOTOR UNIT FIRING BEHAVIOR IN HUMAN TIBIALIS ANTERIOR MUSCLE, 1989. Ph.D., University of Iowa (Carl G. Kukulka). (184pp 2 f $8.00) PE 3401

Muscle length influences the contractile properties of muscle. When muscle is lengthened, the relaxation phase of the muscle twitch is prolonged. When muscle is shortened, however, the relaxation phase is shorter in duration. Previous investigators have shown that motor unit firing rate slowed as the relaxation phase increased in duration during fatigue. This study hypothesized that motor unit firing rate would be influenced by muscle length during isometric contractions. Motor unit firing rate of the tibialis anterior muscle was studied under increasing and decreasing isometric contractions, as well as during steady isometric contractions at three muscle lengths. 20 young, normal male subjects were used for the study. During steady contractions, motor unit firing rate increased more rapidly per Newton-meter of dorsiflexion torque in shortened muscle than in neutral length or lengthened muscle (p<.05). Very brief initial interspike intervals occurred rate of 5% MVC/second, motor unit firing rate at recruitment was increased in duration during fatigue. This study hypothesized that motor unit firing rate would be influenced by muscle length during isometric contractions. Motor unit firing rate of the tibialis anterior muscle was studied under increasing and decreasing isometric contractions, as well as during steady isometric contractions at three muscle lengths. 20 young, normal male subjects were used for the study. During steady contractions, motor unit firing rate increased more rapidly per Newton-meter of dorsiflexion torque in shortened muscle than in neutral length or lengthened muscle (p<.05). When dorsiflexion torque was normalized to maximum at each muscle length, however, no significant differences were found in motor unit firing rate among muscle lengths. During isometric contractions that increased at a rate of 5% MVC/second, motor unit firing rate at recruitment was significantly greater in shortened muscle than in lengthened muscle (p<.05). Very brief initial interspike intervals occurred more frequently in shortened muscle than in either neutral length or lengthened muscle. This study suggested that muscle length does influence motor unit firing rate during steady contractions against loads that are not normalized to maximum torque. Increased motor unit firing rate at recruitment in shortened muscle may be explained by adjustments made to take up the slack in the passive elements of the muscle and tendon when muscle is shortened.

Villarroel, Jose M.V. THE EFFECT OF TWO TYPES OF PLYOMETRIC TRAINING IN IMPROVING VERTICAL JUMP ABILITY IN FEMALE COLLEGE SOCCER PLAYERS, 1992. M.S., Springfield College (William J. Considine). (135pp 2 f $8.00) PE 3446

The purpose of this study was to determine the effect of two types of plyometric training on vertical jump performance and peak power. Ss for this study were 26 varsity and junior varsity female college soccer players aged 18 to 21 years from Springfield College. They were randomly divided into one of the two groups, and randomly assigned to one of the two treatment groups. Ss trained twice a week, completing three series of 10 jumps over hurdles per session, during a 6-week training period. Group one jumped successively over the hurdles (two-foot jump) which were spaced at 1.50 cm, with a height of 50 cm. Group two jumped over the hurdles with two walking steps before each hurdle jump. Hurdles were spaced three meters, with a height of 50 cm. Using The Vertec, Ss performed 3 trials on a pre-test, three weeks later, and at the end of the training period. The mean was recorded as the best vertical jump measurement in each testing day. A 2 x 3 factorial ANOVA with one repeated factor was used for the statistical analysis. Mean centimeters jumped and mean peak power were (p<.05) significant when the 3 testing days were compared. A Newman-Keuls analysis indicated significant test to test gains over the 3 testing days. A non-significant (p>.05) difference was found when both plyometrics training mean scores for vertical jump were compared. No significant (p>.05) interaction between programs and testing days was found.


This study investigated the assumption that the Anticipatory Postural Adjustments (APA) seen in the Gastrocnemius muscle prior to a backward movement of the trunk in trained individuals is due to a high speed of movement rather than to the level of training. Subjects were 7 elite gymnasts. They were required to bend their trunk backward in submaximal and maximal speeds. The Gastrocnemius and Tibialis Anterior muscles were activated earlier than the Erector Spinae muscle in trained individuals who performed the task at a maximal speed. In the same subjects performing the task in a submaximal speed, the onset of the Gastrocnemius and Tibialis Anterior muscle burst appeared to follow that of the Erector Spinae. This suggested that the muscle pattern exhibited by the subjects in the maximal speed condition, which has previously been attributed to training level occurred in part due to the difference in movement speed between trained and untrained subjects. It was also indicated that the activation of the Hamstrings muscle group was temporally similar to the activation of the Erector Spinae in both the submaximal and maximal speed conditions. This was consistent with the role of the Hamstrings as a prime mover for backward movements of the trunk. Trained individuals moving the trunk backward in a maximal speed also moved simultaneously their hip and knee in the forward direction. In contrast, when trained individuals were moving the trunk backward in submaximal speed condition movements at the knee and ankle followed the movement of the hip. This indicated that the distally anticipated pattern is a primary consequence of movement speed and may be only secondarily associated with training level. Another finding was the ability of some subjects in the submaximal speed condition to use a different order of initiating movements at the hip, knee and ankle joints than other subjects to execute the motor task.
This study investigated selected kinematic and kinetic variables of the overgrip giant swing on the uneven parallel bars. The subjects were 15 club gymnasts, who ranged in age from 10 to 18 years. Four judges ranked the 15 overgrip giant swings. Based on the judges rating, three groups were formed. Group 1, the highly skilled, and Group 3, the lower skilled, were compared on kinematic and kinetic variables. The top rail of the bars was instrumented with strain and torque gages to measure forces and torques directly on the bar. Joint reaction forces and net muscle moments were calculated for the elbow and shoulder joints. Comparisons between the two groups were made on absolute and temporal occurrences of events within the skill, body segment orientations, joint angles, body segment velocities and acceleration patterns and the path of the total body center of gravity. There were significant differences between the highly skilled and less skilled gymnasts for the horizontal velocity of the total body center of mass (4.9 and 4.4 m/sec, respectively) and the relative time of occurrence of the maximum vertical velocity of the center of mass. Significant differences were shown between the groups for peak velocity of the ankle and hip. Group 1 had a velocity of 11.0 m/sec for the ankle and 6.2 m/sec for the hip. Group 3 showed velocities of 9.6 and 5.6 m/sec, respectively. There were also significant differences for several segmental velocities and accelerations (foot, shank and arm), which were due to body position chances as the gymnasts completed the descent phase of the skill. There were no significant differences between the groups on the kinetic variables. The total group mean maximum resultant force on the bar was 3.1 times body weight, which occurred in the second quadrant of the skill. The maximum mean torque on the bar was 41.3 Nm. Mean elbow joint reaction forces were 1.6 times body weight for the vertical force and 0.7 times body weight for the horizontal force. The shoulder joint calculations were 1.6 and 1.3 times body weight for the vertical and horizontal forces respectively.

Yan, Jin H. AGE-RELATED CHANGES IN THE RELEASE POINT, VELOCITY AND ACCELERATION IN GIRLS' OVERARM THROWING PERFORMANCE, 1992. M.A., San Jose State University (V. Gregory Payne). (92pp 1 f $4.00) PE 3373

Sixty untrained Caucasian girls aged two to seven years volunteered to be subjects in the research project. Each age group (2-3, 3-4, 6-7 years) consisted of 20 subjects. To determine the differences in the release point of girls’ overarm throwing performance, all subjects were videotaped in the Biomechanics Laboratory at San Jose State University. The Peak Three-Dimensional Motion Measurement System was used to examine the spatial position of release point, the velocity and acceleration at release. One way ANOVAs indicated that there were significant age-related differences (p<.05) in the three dependent variables. Correlation analysis revealed low relationships between release point and the body weight (r=.20), height (r=.19), and arm span (r=.19). Therefore, the findings suggest that under the condition of no training experience in throwing, age is a major factor influencing the release point in girls’ overarm throwing performance.

The purposes of this study were (a) to determine the accuracy of four body impedance analysis (BIA) analyzers to estimate the body fat percentage of obese women before and after weight loss and to compare these values to those derived from skinfold fat measures and a criterion method of densitometry, (b) to examine the accuracy of BIA to detect changes in body composition in these women, and (c) to examine the variance contributed by each variable in the manufacturer’s supplied regression equation to estimate body composition with each analyzer. Sixty-three women were randomly assigned to one of the experimental conditions: (a) diet only, (b) diet and aerobic exercise, (c) diet and resistance exercise, and (d) diet and aerobic plus resistance (combined) exercise. The 3-site skinfold estimate for body composition assessment underestimated (p<.05), body fat percentage at pre- and post-test, while circumferential measures overestimated body fat percentage. Differences in BIA predicted relative fat and the criterion measure of densitometry were found. The Vallhalla, RJL, and Bioanalogics analyzers tended to underestimate pre- and post-test body fat percentage. The Xitron analyzer overpredicted pre-test body fat percentage and detected the highest pre-test mean resistance values and the lowest post-test values with statistically significant differences in these values between testing intervals. A significant interaction between analyzer and time was found. Measured change in body fat percentage revealed no significant effect for treatment condition with the Bioanalogics analyzer values significantly lower than the criterion method and the other three analyzers. The Vallhalla, RJL, and Xitron analyzers each measured changes in relative fat that were not different (p<.05) than the criterion method of densitometry. Stepwise multiple regression revealed that resistance contributed only 4 and 2.5% to the explained variance in the Bioanalogics and Xitron analyzers, respectively. The variable height/resistance accounted for 26% of the variance, while resistance/height2 explained only 2% of the variance. In conclusion, BIA did not accurately assess body fat percentage or changes in body fat percentage in obese women in this study. The resistance detected by the analyzer contributed very little information to the prediction of body fat percentage.

The purpose of this study is to determine the effectiveness of intermittent pneumatic compression, using the Jobst Boot, and intermittent compression with cold, using the Jobst Cryo/Temp (ICT), in reducing post acute ankle lymphedema. A third group was treated with just elevation and acted as the control group. A pre-treatment and post-treatment water displacement measurement were taken after one 30 minute treatment as an indirect method to determine the effectiveness on pitting ankle edema. Thirty college age male and female subjects were used in this study. Each subject was evaluated by a graduate/staff athletic trainer or a physician at the University of North Carolina Student Health Service. Each subject presented a unilateral ankle sprain with pitting edema that did not require cast immobilization or surgery. The subjects were assigned to one of the three treatment groups. A three by two repeated measures analysis of variance was performed yielding a significant interactive effect (p<.0046). Therefore a Tukey’s HSD post hoc test was performed yielding a 15.645 ml. minimum difference between treatment means necessary for significance. It was concluded from these
findings that the Jobst Cryo/Temp is significantly more effective in the reduction of post-acute ankle lymphedema than either the control treatment, or the Jobst Intermittent Compression Pump.

Arnhold, Pamela A. AN ASSESSMENT OF SELECTED FITNESS COMPONENTS OF PRESCHOOL CHILDREN, 1993. M.S., Slippery Rock University (Gary S. Pechar). (59pp 1 f $4.00) PE 3454

The investigation included 26 children ages three to five enrolled in preschool programs in the Grove City and Slippery Rock area. The children were tested in five areas of fitness according to the AAHPERD Physical Best Fitness Program. Data were collected on each child in the following areas: Half-mile run/walk for cardiovascular endurance, sum of two skinfold measurements for body composition, sit and reach for flexibility, number of sit-ups completed in one minute for abdominal strength and endurance, and modified pull-ups for upper body strength and endurance.

Means, standard deviations, and range of scores were calculated for each group on each test. A Kruskal-Wallis ANOVA was used to compare the three age groups in each of the five tests. The mean sum of skinfold and sit and reach scores for all age groups met the Physical Best Health Fitness Standards for 5-year-old boys and girls. The mean sit-up score, however, did not reach the standard for 5-year-old boys and girls. There were no significant difference at the .05 level based upon the Kruskal-Wallis ANOVA between the age groups in any of the selected fitness components. The children were, however, able to perform each of the tests indicating that physical fitness can be assessed at the preschool level using existing assessment batteries.

Bauer, Shari R. COMPARISON OF HYDROSTATIC WEIGHING TO BIOELECTRICAL IMPEDANCE ANALYSIS IN WOMEN GREATER THAN THIRTY PERCENT BODY FAT, 1991. M.S., University of Wisconsin-La Crosse (John P. Porcari). (64pp 1 f $4.00) PE 3406

Twenty-five female Ss age 18-65 years who had participated in a community weight loss class volunteered to have their body composition determined via hydrostatic weighing (HW) and bioelectrical impedance analysis (BIA). All subjects were greater than 30% body fat. It was discovered that bioelectrical impedance analysis using the BES 200Z analyzer significantly (p<.05) underpredicted percent fat in all 25 subjects, compared to HW. Percent fat predicted using the BES 200Z analyzer was poorly correlated (r=.59) to percent fat using HW. Mean percent fat determined by BIA was 33.9 ± 6.39 compared to 42.8 ± 6.30 using HW. Mean fat free mass (FFM) was significantly overestimated (p<.05) using BIA (54.8 ± 6.89) compared to HW (44.1 ± 6.80). New prediction equations were developed for the impedance analyzer. The highest correlation for a developed prediction equation was r=.97. This equation predicted FFM using the variables height squared (ht2), weight, age, impedance (R), and waist-to-hip ratio (WHR). Further investigation needs to be done to validate the accuracy of this equation for the BES 200Z analyzer.


There is controversy in the literature regarding anatomical structures which contribute to Medial Tibial Stress Syndrome (MTSS), and a lack of accuracy in some reports, of musculature associated with this pathology. Fifty cadavers were dissected and the attachments of the soleus, flexor digitorum longus (FDL) and tibialis posterior (TP) muscles, and the deep crural fascia (DCF) were measured. The soleus and FDL muscles, and the DCF were found to be the structures most frequently attached at the site of MTSS. TP was not found to attach at or near the site of MTSS. Results support literature evidence that the soleus and DCF are most likely to be responsible for MTSS.

Blanpied, Peter R. THE COMPARISON OF ACTIVE PLANTARFLEXOR MUSCLE STIFFNESS BETWEEN YOUNG AND ELDERLY HUMAN FEMALES, 1989. Ph.D., University of Iowa (Gary L. Smidt). (271pp 3 f $12.00) PE 3378

Interactions between humans and their environment involves forces that are imposed on and produced by the body. Muscles resist externally applied forces with a certain stiffness. While changes in properties of muscle have been associated with the aging process, differences in muscular stiffness between young and elderly humans is unknown. The purposes of this study were to compare the plantarflexor stiffness (1) of young and elderly females, (2) at four velocities of stretch, (3) after three different rates of pre-stretch force increase, (4) at three different ankle positions, and (5) after a six week plantarflexor strengthening exercise program. Sixteen young (20-30 years) and 15 elderly (60-70 years) females were positioned prone with their left knee in 90 degrees of flexion. A Kin/Com hydraulically powered dynamometer measured force and controlled ankle motion. Ankle angle was determined by double integration of an accelerometer output. Isometric plantarflexion force was increased in a ramp manner until 20%, 30%, 40%, 50%, or 60% of their isometric maximum was achieved. The Kin/Com then rapidly moved their ankle from 6 degrees of plantarflexion to 6 degrees of dorsiflexion, stretching the plantarflexors. The young subjects went through additional testing to address purposes 2, 3, and 4 above. All subjects then exercised their left plantarflexors using a spring resisted exercise device for six weeks, three times per week. Stiffness was defined as the slope of the torque to ankle angle relationship for the first 62 milliseconds of stretch. This relationship was very linear except for a small portion at stretch onset which exhibited higher stiffness. No difference in plantarflexor muscular stiffness existed between the young and elderly groups. No difference in stiffness was demonstrated at different velocities of stretch. At higher pre-stretch torque levels, stiffness was less when the rate of muscle activation was fast than when slow. Within the range used, stiffness appeared to be independent of ankle position. A six week exercise program increased the amount of torque that the subjects produced, but did not appear to change the stiffness of the musculotendinous unit.

Botenhagen, Kim A. COMPARISON OF SKINFOLD MEASUREMENTS UNDER NORMALLY HYDRATED AND DEHYDRATED CONDITIONS IN FEMALES AGES 14 TO 54, 1992. M.A., San Francisco State University (Daniel Alejandro-De Leon). (72pp 1 f $4.00) PE 3379

In order to investigate the relationship between dehydration and skinfold measures, twenty females were placed in a sauna at 170° F. until each lost approximately 1% of body weight. Six skinfold
measurements (chest, triceps, subscapula, abdominal, suprailiac, and thigh) were taken every five minutes for thirty minutes prior to the sauna treatment and the same procedure was conducted immediately afterward. Significant differences between the means for the hydrated and dehydrated conditions were noted only in the thigh and in the total of the six skinfold sites. Following the sauna treatment, the initial skinfold measures for the triceps, chest, suprailiac and total were significantly greater than the last measures. Peripheral vasodilation caused by extreme heat is a possible explanation for the skinfold increases. An inference that could be drawn from this study is that individuals assessing fitness should administer tests that may produce vasodilation, such as a stress test, after skinfold measurements. Practitioners should also consider dehydration as a potential variable when estimating percent body fat using the skinfold technique.


The purpose was to determine the current trends in the surgical reconstruction and rehabilitation of the anterior cruciate ligament in predominantly athletic individuals in the United States. The information was compared to previous surveys conducted in 1980 (Paulos et al., 1981) and 1984 (Bilko et al., 1986) noting the changes taking place over that time period. In addition, the author sought to determine the degree to which “accelerated rehabilitation programs” were being implemented, noting any regional differences throughout the U.S. Surveys were sent to the head athletic trainer at 130 colleges and universities in 44 states to be filled out and returned by team orthopedic surgeons. Fifty-four surveys were returned from 31 states. Many changes and advancements have been made in rehabilitation over the past nine years including early achievement of extension, full weight bearing and ROM. Only 13% of the respondents, however, were implementing accelerated and aggressive rehabilitation programs as researched and established by Dr. K. D. Shellbourne (Shellbourne & Nitz, 1990). No regional differences in practices across the U.S. were evident. It would appear that although advancements have been made in this area, highly accelerated and aggressive rehabilitation programs are, as of yet, more a trend in the literature, than practice.


The purpose of this study was to examine the effectiveness of plyometric training for intercollegiate athletes in a training setting on the variables of speed, strength, and power. Twenty-one female and 30 male NCAA Division III track and field athletes at Ohio Northern University served as subjects. The subjects were divided by gender, track group (power or endurance) and randomly assigned to either an experimental group which participated in plyometric training, or a control group which did not perform any of these drills. The experimental group trained three times per week with each session lasting 20-40 minutes. Each subject was tested three times during the 14 week study. A repeated measures analysis of variance with three between factors and one within factor was used in comparing the variables among the groups for pre-test, mid-test and post-testing periods. The between factors were gender (males/females), track group (power/endurance) and treatment group (control/experimental), and the within factor was the three test periods. A total of six assessment tests were administered. The skinfold measurements showed a four-way interaction between gender (males greater than females), between test period (post-test greater than pre-test), between track group (power greater than endurance) and between control and experimental groups. No other test demonstrated any significant difference for the control group compared to the experimental group. The 40-yard dash showed a three-way interaction for the experimental group between gender and between track group. The test for flexibility also showed a three-way interaction between test period, between gender and between track group. Isokinetic testing for power (180, 240 and 300 degrees) and the standing long jump showed a significant result for gender and track group. Isokinetic testing for strength (60 degrees) and the vertical jump test showed significant results for gender, test period and track group. No other significant results were shown.


Standard qualitative research methods were used to investigate and describe the experiences of four first year athletic trainers working at the high school level. Data were collected over a six month period from live observations, formal and informal interviews, document analysis, and log notes. Four case narratives were written describing the first year for each athletic trainer as they experienced it. A cross-case analysis was conducted to identify commonalities, and differences among the four athletic trainers. The novice athletic trainers, in general, felt prepared to perform their duties at the high school. However, much of what they learned and practiced in their undergraduate experiences were not necessarily what they encountered in the “real” world. Each athletic trainer’s job performance was clearly influenced by the: “fitting in” process encountered during the first year; dual job responsibilities; available facilities and equipment; level of support from the athletic director; and peer support received. The tasks of prevention, evaluation, and treatment were performed most frequently, and rehabilitation relatively infrequently. The largest proportion of time was spent covering athletic practices and games. Recommendations for preparation programs include: provide high school athletic training experience for advanced students; include subject matter covering the adolescent athlete; present the tasks in an integrated approach; address the realities of athletic training; provide information on state regulation; and provide increased opportunities for hands on techniques. Recommendations for high schools and beginning athletic trainers are also presented.


A total of 27 Ss from the University of Wisconsin-La Crosse, ages 19-34 yrs, volunteered to participate in the validation study of the Q-Plex I Cardiopulmonary Exercise System developed by the Quinton Instrument Company. Each S performed a constant
The accuracy of measuring VO$_2$ and VO$_{2max}$ is dependent upon VE validated using the Parkinson-Cowan meter. Unfortunately, since occurred, the VE volumes of the Q-Plex could not be legitimately compared to the volumes obtained with the Parkinson-Cowan meter and the Tissot spirometer. These results indicated there was a much larger discrepancy in volumes obtained between these methods than those initially reported. These differences were of sufficient magnitude to question the accuracy of using this meter to validate VO$_2$ and VO$_{2max}$. Since it was impossible to determine the cause of this error, or at what point in the study it occurred, the VE volumes of the Q-Plex could not be legitimately validated using the Parkinson-Cowan meter. Unfortunately, since the accuracy of measuring VO$_2$ and VO$_{2max}$ is dependent upon VE volumes, neither of these volumes could be compared. Within the limitations of the present study, it was concluded that the gas analyzers in the Q-Plex demonstrate accuracy comparable to that of the micro-Scholander technique.

Durrett, Michael. INFARED INTERACTANCE: RELIABILITY AND VALIDITY IN DETERMINING BODY COMPOSITION, 1991. M.S., Washington State University (Lawrence D. Bruya). (64pp 1 f $4.00) PE 3317

Infrared interactance was assessed for validity in measuring body composition compared to hydrodensiometry and skinfolds. Reliability of infrared measures was also tested. Subjects were 32 Caucasian males between 25 and 39 years of age. Infrared measures were assessed at 9 sites using two wavelengths 940 nm and 950 nm. Skinfold measures were taken at 8 sites with the mean of three measures used. Body density was determined by hydrodensiometry, with residual volume determined by plethysmography. Body fatness was calculated using the formula by Brozek et al. (1963). Associations between body density via hydrodensiometry and infrared interactance resulted in a significant correlation (r=0.83 for 940 nm, and r=0.85 for 950 nm) only at the biceps site. Waist circumference was also significantly correlated with body density (r=0.92). Reliability coefficients indicated that repeated Infrared measures were reliable (r=0.97 for 940 nm, and r=0.96 for 950 nm) at the biceps site. Analysis of variance indicated that the best predictor of body density included one optical density and waist circumference (R$^2$=0.93, s.e.e.=0.0043). Infrared interactance was demonstrated to be a valid method of determining body density in this population, yet simple anthropometric measures proved to be as valid, more reliable, and much less costly.

Eyestone, Edward D. EFFECT OF WATER RUNNING AND CYCLING ON VO$_{2max}$ AND 2-MILE PERFORMANCE, 1990. M.S., Brigham Young University (A. Garth Fisher). (64pp 1 f $4.00) PE 3314

The purpose of this study was to compare water running, cycling, and running in maintaining VO$_{2max}$ and 2-mile-run performance over a 6-week training period. Thirty-two trained subjects between the ages of 18 and 26 were evaluated for maximum oxygen uptake (VO$_{2max}$) and 2-mile run performance. Subjects were stratified by a 2-mile-run pretest into high, medium, and low fitness levels and then randomly assigned to water running, cycling, or running conditions. The three groups trained with similar frequency, duration, and intensity over a 6-week training period. The only difference was the modality of training. Results of a posttest indicated no significant differences in change of VO$_{2max}$ or 2-mile run times among the three training groups, or among the three initial fitness levels, nor was there any interaction. It was concluded that over a 6-week period, runners who cannot run due to soft tissue injury can maintain VO$_{2max}$ and 2-mile-run performance equally well with cycling or water running.

Feisner, Ernst D. A COMPARISON OF TWO ANKLE REHABILITATION EXERCISES FOR ECCENTRIC STRENGTH DEVELOPMENT, 1993. M.A., University of North Carolina at Chapel Hill (William E. Prentice, Jr.). (45pp 1 f $4.00) PE 3462

Using a Kin-Com isokinetic dynamometer, the dominant ankles of sixteen subjects were tested eccentrically at 60 and 120 degrees per second. The ankles were tested in dorsiflexion, plantarflexion, eversion, and inversion. Following testing, the subjects were assigned to either the BAPS Board or T-Band group. The BAPS board group trained three days per week for six weeks on the BAPS board. The T-Band group trained three days per week for six weeks using Theraband tubing and following Tomaszewski’s protocol. At the end of the training period the subjects were tested again on the Kin-Com. A randomized complete block ANOVA was used to analyze the scores for the difference between the pretest and post-test results. There was no significant variance found in the results.

Garcia, Rebekah. A COMPARISON OF GRIP STRENGTH IN YOUNG ATHLETES AND NON-ATHLETES, 1991. M.S., Texas Woman’s University (Barbara E. Gench). (81pp 1 f $4.00) PE 3320

The investigator accumulated and assessed data to determine differences in grip strength between young female athletes and non-athletes. Secondary purposes were to determine instrument reliability and collect normative data. The 125 subjects were 12 to 18 years of age. Data were collected using subjects in the Denton Independent School District using a Jamar Dynometer Model 2A3. Grip strength was tested three times for each hand on successive days. A two-way multivariate analysis of variance with repeated measures revealed a significant difference between female middle school and senior high school athletes and non-athletes. There was also a significant difference in grip strength between the middle school students and the senior high school students with the older students demonstrating greater grip strength scores. The Jamar Dynometer Model 2A3 proved to be a reliable instrument in measuring female grip strength (r=.93).

Gardner, Kim A. THE EFFECT OF ASPIRIN ON THE HEALING OF MUSCLE CONTUSION, 1992. Ph.D., Brigham Young University (Rulon S. Francis). (193pp 2 f $8.00) PE 3464

Male albino rats were mechanically traumatized by machine on their biceps femoris muscle and subjected to one of two aspirin dosages in solution, by means of a gastric cannula. Aspirin
dosages were 50 mg/kg and 100 mg/kg. The purpose of the experiment was to determine if either level of aspirin was superior to the other, or if aspirin was superior to no aspirin in the course of the healing process. The rate of healing was determined by a count of erythrocytes, the nuclei of healing cells, the percent of collagen fibers and a differential count of healing cells. Aspirin has a beneficial effect on healing rate for up to eight days following contusion injury, but then exerts adverse effects on certain critical cells.

Graham, Bruce J. A COMPARISON OF HYDROSTATIC WEIGHTING AND DISPLACEMENT PLETHYSMOGRAPHY FOR DETERMINING BODY DENSITY OF YOUNG ELITE FEMALE GYMNASTS, 1993. M.S., University of Oregon (Gary A. Klug). (66pp 1 f $4.00) PE 3384

Density and percent fat of a group of 16 female gymnasts (mean age 13.6 years) was determined using two types of balance for hydrostatic weighing and by water displacement. For the two balances there was no significant difference in the mean body density (Scheffé F=0.046, alpha=0.01) nor in the reliability. Use of a snorkel slightly improved reliability without affecting mean density (F=2.387, p=0.1258). Water displacement gave a different density (mean=1.077 g/cm³, S.E.=0.0051) and percent fat (mean=9.7%, S.E.=2.14) compared to hydrostatic weighing (mean=1.058 g/cm³, S.E.=0.0021 and 17.9%, S.E.=0.93 respectively). Water displacement proved less reliable than hydrostatic weighing. Due to the poor agreement and lower reliability, the proposed method of water displacement could not be recommended over hydrostatic weighing.

Greiwe, Jeffrey S. RELIABILITY OF VO2max ESTIMATES FROM THE AMERICAN COLLEGE OF SPORTS MEDICINE SUBMAXIMAL CYCLE ERGOMETER TEST, 1993. M.S., Ball State University (Leonard A. Kaminsky). (80pp 1 f $4.00) PE 3465

The purpose of this investigation was to determine the reliability and validity of VO2max estimates from the ACSM submaximal cycle ergometer test compared to a maximal cycle ergometer test. Thirty healthy male and female subjects aged 21-54 volunteered for this study. Each subject performed a maximal cycle ergometer test and two ACSM submaximal cycle ergometer tests. At least 48 hours elapsed between the maximal test and the first submaximal test while at least 24 hours elapsed between the two submaximal tests. Heart rates were recorded from a radio telemetry monitor and from 15 second palpation of the radial artery. A trained technician performed all palpations and was blinded from the telemetry monitor during testing to eliminate any bias. Maximal oxygen uptake (VO2max) was estimated by extrapolating submaximal heart rates, measured by palpation (PALP) and also from radio telemetry monitor (MON), to an age predicted maximal heart rate for each submaximal trial. To determine inter-test reliability between submaximal trials, correlational analysis and t-test were performed. A correlation of r=.863 and r=.767 were found between the two trials for MON VO2max and PALP VO2max, respectively. Paired t-test revealed no significant difference (p<.01) between MON VO2max and PALP VO2max. Although there were no significant differences between trials, the mean was typically lower for MON VO2max. Significant differences were found between the right and left ankles in muscle peak torque strength at all three speeds analyzed by multiple 3 x 2 x 2 (group by side by test) analyses of variance. All analyses of variance were tested at the .05 level of significance. The results demonstrated no statistically significant differences between the three treatment groups and between the pretest and posttest scores for the ankle kinesthesia test. Significant differences were found between the right and left ankles in muscle peak torque strength at all three speeds tested for inversion, 30°/sec for inversion, 30°/sec and 60°/sec for dorsiflexion. Significant differences were found between the three treatment groups in muscle contraction time to peak torque measures for ankle inversion at 30°/sec, 60°/sec and 120°/sec. The control group was significantly faster than the athletic tape and ankle brace groups at all three speeds tested in inversion. The ankle brace group was also significantly faster than the athletic tape group at 30°/sec and 60°/sec, but not at 120°/sec. The results of the study indicated that the application of ankle prophylactic devices do not cause a change in ankle kinesthesia. The application of ankle prophylactic devices do not cause a change in ankle peak
torque strength. The application of ankle prophylactic devices do not cause a change in ankle muscle contraction time to peak torque.


The purpose of this study was to examine the effects of a 10-week step aerobic training program on the body composition of college-aged women (mean age=19.6 yrs). Forty-six apparently healthy females between the ages of 18 and 25 years participated in the study. Subjects in the experimental group exercised 3 times per week for 10 weeks. The average intensity maintained during exercise was 150 bpm which represented 76% of HRmax. Eighteen experimental group Ss and 23 control group Ss were hydrostatically weighed and had maximal buttocks, thigh, and calf girths measured prior to and at the end of the study. The variables analyzed included body weight, maximal buttocks girth, maximal thigh girth, maximal calf girth, residual volume, lean body mass, fat weight, body density, and percent body fat. The results showed a significant (p<.05) decrease for the experimental group in maximal thigh girth (1.0 cm). No significant (p>.05) between-group differences were observed for body weight, maximal buttocks girth, maximal calf girth, body density, LBM, fat weight, or percent body fat.

Isabell, William K. THE EFFECTS OF ICE MASSAGE, ICE MASSAGE WITH EXERCISE, AND EXERCISE ON THE PREVENTION AND TREATMENT OF DELAYED MUSCLE SORENESS, 1991. M.S., Brigham Young University (Earlene Durrant). (108pp 2 f $8.00) PE 3472

This study investigated the effects of ice massage, ice massage with exercise, and exercise on the prevention and treatment of delayed muscle soreness. Twenty-two subjects were randomly assigned to one of four treatment groups. Preexercise measures were recorded for range of motion, strength, perceived soreness, and serum creatine kinase levels. Subjects performed approximately 300 concentric/eccentric contractions of the elbow flexors with 90% of their 10 repetition maximum to induce muscle soreness. Postexercise assessments were made at 2, 4, 6, 24, 48, 72, 96, and 120 hours on the dependent variables. An analysis of variance indicated significant differences (P<.05) in all variables with respect to time. However, no significant mode of treatment or mode of treatment/assessment time interaction was present. Decreases in range of motion and flexion strength correspond with increases in perceived soreness. Insignificant mode of treatment/assessment time interaction suggests that the use of ice massage, ice massage with exercise, or exercise alone is not effective at significantly reducing the symptoms of delayed muscle soreness.


The purpose of this study was to determine the validity of the predicted maximal MET equations on the Schwinn Air-Dyne bicycle ergometer for a population of females between the ages of 19 and 29 years. Twenty-five female Ss volunteered to take part in the study. Twenty-one of the 25 Ss reached a VO2max (l/min) that was defined by 1 of 2 criteria for a “true” maximal test. Predicted maximal METs were compared to measured maximal METs obtained while exercising on the Schwinn Air-Dyne. Two heart rates were obtained during an 8-minute submaximal test. Predicted maximal METs were determined for each subject in an equation that used an age predicted maximal heart rate and the two submaximal heart rates. The “true” VO2max test was used to determine measured maximal METs. A Pearson product-moment correlation and paired t-test revealed a high positive correlation (r=.88) and a significant difference between the means of predicted maximal METs and measured maximal METs (p<.05). The difference between the means of predicted and measured maximal METs was 4.6%. Predicted maximal METs underestimated measured maximal METs by 0.56 METs. The predicted maximal MET equations were therefore considered to be valid for determining maximal METs for purposes other than research.

Karawan, Ariel. THE EFFECTS OF TWELVE WEEKS OF WALKING OR EXERSTRIDING ON UPPER BODY MUSCULAR STRENGTH AND ENDURANCE, 1992. M.S., University of Wisconsin-La Crosse (John P. Porcarri). (104pp 2 f $8.00) PE 3427

This study determined potential changes in upper body muscular strength and endurance as a result of walking with the use of specially designed walking poles (Exerstriders). Ninety-two inactive females, 20-49 yrs, volunteered to participate in the study. Ss were randomly assigned to one of three groups: Exerstriders (E), who walked using the Exerstriders; Walkers (W), who participated in a conventional walking program; and Controls (C). E and W participated in a supervised 12-week walking program, exercising 4 days per week, for 20-45 min per session, at 70-85% of maximal HR. Ss were assessed for upper body muscular strength and endurance before and after training. Strength (lb) was assessed using 1-RM tests for triceps pushdown and a modified lateral pulldown exercise. To assess muscular endurance, Ss performed a 1 min bout of alternating arm pulls on a modified Biokinetic Swim Bench apparatus. Total work output (kpm) was...
used as the criterion measure. Changes in muscular strength and endurance were analyzed with repeated measures ANOVA and Tukey’s post-hoc tests. E had sig (p<.01) increase (37%) in muscular endurance from pre to posttesting, which was greater than the non sig (p>.01) increases shown by W (14%) and C (5%). There were no sig (p>.01) changes in pushdown or pulldown strength in any group. It would appear that although Exerstriding can result in substantial increases in muscular endurance, it may not provide sufficient stimulus to increase strength. A longer training period may be needed to alter this parameter.

Keetch, Anita. EFFECTS OF ADHESIVE SPRAY AND PREWRAP ON TAPE ANKLE INVERSION BEFORE AND AFTER Exercise, 1992. M.S., Brigham Young University (Earlene Durrant). (93pp 1 f $4.00) PE 3429

The purpose of this study was to determine the effects of adhesive spray and prewrap on taped ankle inversion before and after exercise. Subjects consisted of nine females and seven males with no history of lower limb injury in the past 12 months, neurological conditions, lower extremity fractures, disease or surgery, or multiple ankle sprains (more than two). One taping configuration was applied with various taping materials: spray and prewrap, spray only, no spray or prewrap, prewrap only. Subtalar ankle inversion was evaluated using high speed cinematographic techniques with an inversion platform that suddenly inverts the ankle to 35°. Three trials were measured before and after 16 minutes of figure-of-eight running and 20 unilateral heel raises. All four taping methods significantly reduced inversion before and after exercise. Inversion support following exercise was greater for taping methods that did not use prewrap (p=.069) and best for methods using spray without prewrap.


The purpose of this study was to determine if a six week exercise program for the abdominal and low back musculature would show a significant difference in strength between an experimental group and a control group of healthy subjects. Included in the study were 21 females and 3 males who trained 3 times a week with twelve different exercises. Data was collected pre and post exercise utilizing the Isostation B100 (Isotechnologies, Hillsborough, NC). The training group significantly improved in flexion–extension average torque (p<.05). These data indicate that an exercise program may be beneficial in increasing strength in the abdominal and low back musculature.

Koenig, Joseph M. A COMPARISON OF BODY DENSITY AND PERCENT BODY FAT USING FUNCTIONAL RESIDUAL CAPACITY AND RESIDUAL VOLUME AND DEVELOPMENT OF IMMERSED FUNCTIONAL RESIDUAL CAPACITY AND RESIDUAL VOLUME PREDICTION FORMULAS, 1990. M.S., University of Wisconsin-La Crosse (William Floyd). (86pp 1 f $4.00) PE 3431

This study developed prediction formulas (PF) for residual volume (PRV) and functional residual capacity (FRC) using the variables ages (A), height (Ht), weight (Wt), chest depth (CD), and smoking history (SH) in 100 male subjects between the ages of 18-69 years. A and Ht were the only variables which contributed significantly to PRV. A, Ht, and Wt were the only variables to contribute significantly to FRC. A test-retest correlation between two trials of RV (R=.99) and FRC (r=.98) determinations indicated that reliable measures were taken by the closed circuit oxygen dilution technique. Through the use of multiple stepwise regression the following PRV and FRC formulas were developed:

PRV (liters) = .0260376(A) + .0256005(Ht) - 3.89794
FRC (liters) = .0493365(Ht) + .0116958(A) .0091931(Wt) - 6.20966

The standard error of estimate (S.E.E.) of the PRV and FRC formulas (241 and 403 mls, respectively) were all lower than those reported by Boren et al. (1966) (B), Crapo et al. (1982) (C), Goldman and Beekman (1959) (GB), and Grimby and Soderholm (1963) (GS). The variation R2 attributed to the independent variables was .72 and .41 for PVR and PFRC, respectively. These R2 values were higher than those reported by B, C, and GS. Using the data obtained in this study, an ANOVA with repeated measures followed by a Scheffe’ post hoc test determined significant differences (p<.05) between PRV and the PF of C and GB. Significant differences (p<.05) were also determined between PFRC and the PF of B, C, GB, and GS. A further purpose of this study was to compare body density (BD) and percent body fat (%BF) determined at the RV and FRC lung volume maneuvers in the hydrostatic weighing procedure. There was no significant difference (p>.05) between BD at RV and FRC. There was, however, a significant difference (p<.05) in %BF at RV and FRC.

Langill, Robert H. PREDICTION OF TRIATHLON PERFORMANCE FROM VENTILATORY THRESHOLD MEASUREMENTS, 1993. M.P.E., University of British Columbia (E. C. Rhodes). (89pp 1 f $4.00) PE 3389

The purpose of this study was to predict Ironman Triathlon (2.4 mile swim, 112 mile cycle, 26.2 mile run) performance times from ventilatory threshold (TVent) measurements of swimming, cycling, and running. Ten trained triathletes (mean age=29.7yrs, ht=179.8cm, wt=76.8kg, bodyfat=11.4%) performed progressive intensity tests for treadmill running, cycle ergometry, and tethered swimming. The excess C0, elimination curve was used to determine TVent in each component sport with the resulting estimated times of 64.2, 380.0, 174.5, 672.8 minutes for swimming, cycling, running, and overall time respectively. Individual estimates were then compared to actual segment and overall times to produce the following linear regression equations for predicting actual from estimated time (in minutes):

actual swim=1.15 * estimated swim - 6.75
actual cycle=0.22 * estimated cycle + 262.6
actual run=3.03 * estimated run - 267.1
actual overall=(-3.58 * est. swim) + (-0.10 * est. cycle) + (3.76* est. run) + 291.35

Significant correlations of r=0.83, 0.70, 0.76, and 0.89 were calculated between swim, cycle, run, and overall estimated versus actual times respectively. Thus, between 49 and 69% of the variance in actual time is explained by TVent for that component sport. Also, 78% of the total variability was accounted for by the TVent estimation when the three sports were combined. These findings suggest that while TVent is able to account for a significant
The potential influence of the menstrual cycle on percent body fat (% BF) measurements from bioimpedance analysis (BIA) was investigated on 36 female Ss (19-40 yr). Subjects were divided into 2 groups based on oral contraceptive agent (OCA) use. Those women not using an OCA were placed into the OFF group (n=20) and those using an OCA were placed into the ON group (n=16).

The menstrual cycle was divided into 4 phases: premenstrual, menstrual, postmenstrual, and intermenstrual. All subjects were weighed and tested for %BF using BIA a minimum of 12 times, at least 3 times within each cycle phase. Subjects were also underwater-weighed a single time, approximately at the middle of their respective cycles. Repeated measures ANOVAs were used to test significance between and within groups for weight, resistance, and %BF across the 12 measurements and across the 4 phases. No significance was found for any variable tested with the exception of weight within each group across the 12 measurements (p<.05). Percent body fat data from hydrostatic weighing (HW) were compared to BIA values from each of the 4 phases using a repeated measures ANOVA and Tukey’s post-hoc tests. No significant differences were found (p>.05) between HW and BIA was .78, SEE=3.3%.

Overall, neither OCA use nor the menstrual cycle itself appeared to influence %BF measurements from BIA.


The purpose of this study was to compare the effectiveness of two treatments in reducing pitting ankle edema. One group was treated with the Jobst Cryo/Temp (JCT), the other group was treated with the Wright Linear Pump (WLP). A third group was treated with elevation and acted as a control group. Water displacement measurements were taken before and after one 30 minute treatment as an indirect method to calculate the effects on pitting ankle edema. Twenty seven college aged male and female subjects were divided into 3 groups and were treated at least 24 hours post injury. A significant repeated measures effect was found (p<.0001). This meant that a 30 minute treatment using either the WLP, the JCT, or elevation was successful at reducing pitting ankle edema.

Marguardt, Janis R. STRENGTH GAINS CONSEQUENT TO TEN WEEKS OF UNIVERSAL OR BOWFLEX TRAINING, 1992. M.S., University of Wisconsin-La Crosse (John P. Porcari). (108pp 2 f $8.00) PE 3433

A strength training program was undertaken to determine if a home strength training device (Schwinn Bowflex) could result in similar improvements in strength compared to a more traditional method (Universal). Seventy-two men and women, aged 20-55 yrs, were randomly assigned to Universal (U) (N=26; M=14, F=12), Bowflex (B) (N=25; M=13, F=12), or Control (C) (N=21; M= 11, F=10). Following a 1 week orientation period, Ss were tested with OEF equipment and free weights for 1 RM strength on: chest press, chest fly, shoulder press, tricep extension, bicep curl, lat pulldown, upright rows, leg extension, leg curl and leg press. Additionally, U and B were tested for 1 RM on their respective training apparatus. Ss trained 3 days per week for 10 weeks with sets, repetitions, and intensities matched between groups. Data were analyzed using repeated measures ANOVA and Tukey’s post-hoc tests. There were no significant differences (p>.05) in relative strength gains between males and females, thus data were collapsed across genders. Utilizing OEF equipment and free weight testing, strength significantly increased (p<.05) in B (14.5%) and U (19.3%) with no change (p>.05) in C. The only significant difference (p<.05) between B and U were for leg curls (5% vs. 17%) and upright rows (8% vs. 15%). For the group specific testing, overall strength significantly increased (p<.05) for both B (23.5%) and U (25.5%). Skinfold (chest, tricep, bicep, abdominal, subscapular, and suprailliac) and girth (bicep relaxed, bicep flexed, and thigh) measurements were taken with a Harpenden caliper and tape measure, respectively. There were no significant (p>.05) differences between B, U, and C groups except for the chest skinfold with U having a significant decrease (p<.01). There were no significant differences (p>.05) between groups for girth measurements except a small but significant (p<.05) increase in the bicep flexed measurement for B (1.9%) and U (2.2%). These data indicate that significant improvements in strength can be obtained using the Schwinn Bowflex, and gains are comparable to traditional resistance training methods. Changes in body composition should not be expected following a 10-week strength training study.


The purpose of the study was to identify the major differences between the CAHEA athletic training educational essentials and NATA educational essentials and address the impact of those changes on educational programs. Three of the five athletic trainers on the Joint Review Committee for Athletic Training responded to an eight-item questionnaire. Responses from the survey were compared and contrasted. CAHEA will permit more flexibility in teaching methods than NATA. CAHEA does not mandate an 800 hour minimum clinical experience, but the NATA board of certification requires the completion of hours prior to taking the certification exam. Fair practices and nondiscriminatory policies were believed to be more strict with CAHEA, assuring proportion of triathlon performance time other factors such as fatigue, dehydration, terrain, heat, etc. are confounding the overall prediction.
students were not abused in the service capacity and were exposed to a variety of male and female sports. Financially, the accreditation fees were increased. Long term changes were anticipated as: 1) Administrative and content essentials being weighed separately, 2) Departmental move to medical or allied health departments, and 3) Increased academic responsibilities and less clinical responsibilities on program directors.


Ss for this study were 30 college-aged females, 18-32 yr. Each subject underwent BIA using three different electrode configurations: standard (right hand/right foot) placement (SP); cross-body (left hand/right foot) placement (XBP); and total cross-body (right hand/ left foot and left hand/ right foot) placement with two sensitivity levels (TXB). The testing order for each configuration was randomly assigned. The resistance value from each configuration was used to calculate conductance (H²/ R ) scores and FFWBIA from the equation of Lukaski et al. (1986). Pearson product-moment correlations with a Fisher Z transformation, repeated measures t-tests, and 1 x 3 repeated measures ANOVA with a Tukey HSD analysis were used to analyze the data. A critical validity coefficient value was set at .60. The relationship between the SP, XBP, TXB with two sensitivity levels and LBM was p=.90, .89, .44, and .38, respectively. There was no significant (p>.05) difference between the XBP and SP correlation coefficients when measuring a female population using three different configurations for BIA and HW. The relationship between FFWBIA and LBM, when using the SP and XBP configurations, were p=.90 and .89, respectively; while the relationship between LBM and FFWBIA from TXB configuration with either sensitivity level, did not exceed .60. The mean conductance score for subjects who were bioimpeded using the SP configuration was significantly (p<.05) higher than the mean score for XBP. The mean LBM scores for females, using the SP, XBP and HW, were significantly different from each other. The mean LBM score for subjects who were HW was significantly (p<.05) higher than both FFWBIA scores from the SP and XBP configurations; furthermore, there was no significant (p>.05) difference in the mean FFWBIA scores for either the SP or XBP configuration.

Michaud, Peter. PERCEIVED BENEFITS OF STRENGTH TRAINING FOR YOUTH PARTICIPANTS AS DETERMINED BY ORTHOPEDIC SURGEONS, 1993. M.S., Springfield College (Charles J. Redmond). (113pp 2 f $8.00) PE 3437

An increase in youth sport injuries has occurred due to the increased participation in youth sport programs. Strength training may be an affective way to reduce athletic injuries. However, there is concern about whether prepubescent athletes should strength train because this type of training may place too much stress on the body. Orthopedic surgeons deal with these types of injuries and their opinion on whether the prepubescent athlete should strength train, the type of strength training that should be performed, the possible reasons why prepubescent athletes should not strength train, and the perceived benefits of strength training are valuable. Three hundred and fifty questionnaires were sent to randomly selected orthopedic surgeons in the New England area. Seventy-six questionnaires were returned and analyzed by twelve one-way chi-squares. Orthopedic surgeons did not agree on whether prepubescent athletes should strength train; however, of those orthopedic surgeons who believed prepubescent athlete should strength train, 98% preferred the use of the child’s own body weight as a strength training method. Of those orthopedic surgeons who believed prepubescent athletes should not strength train, 75% thought that epiphyseal plate injuries could occur during strength training. Ninety percent of the orthopedic surgeons who preferred that the prepubescent athlete strength train believed that a decrease in overuse injuries was a possible benefit of strength training. In conclusion, among orthopedic surgeons the controversy of whether prepubescent athletes should strength train remains; however, of those orthopedic surgeons who believe prepubescent athletes should strength train, free weights, machines, body weight, and rubber tubing are preferred methods of strength training and the perceived benefits of a decrease in overuse injuries and increase in muscle mass may be attained.


The purpose of this study was to develop and to determine the reliability and validity of using a hand-held electronic induction densitometer (E.I.D.) for the analysis of percent body fat. Subjects for this study included 80 male and 80 female college students. Their ages ranged from 18 to 28 years. All subjects participated in a three-part body fat analysis. These parts included a three site skinfold, a seven site E.I.D. (six sites for women), and a hydrostatic weight analysis. A correlation coefficient of 0.945 between the first and second E.I.D. tests demonstrated an acceptable level of reliability. Stepwise multiple regressions revealed that none of the E.I.D. outputs correlated significantly with percent body fat. Further development of the E.I.D. design is therefore necessary before it may be considered a valid tool for accurate body fat assessment.

Miller, Matthew K. THE EFFECTIVENESS OF REPEATED SUBMAXIMAL CONCENTRIC EXERCISE AND HEATED WHIRLPOOL IN THE TREATMENT OF DELAYED ONSET MUSCULAR SORENESS, 1991. M.S., Purdue University (Don J. Corrigan). (70pp 1 f $4.00) PE 3330

The purpose of this study was to examine the effectiveness of increasing muscle temperature using a warm whirlpool and exercise when treating delayed muscle soreness. Twenty-two male college students were randomly assigned to one of three treatment groups consisting of exercise, whirlpool and a control group. Measurement of subjective pain levels, thigh circumference, quadriceps flexibility and isometric quadriceps strength at 90° and 135° of extension were used to determine treatment effectiveness. These measurements were taken before and 24, 48, 72 and 96 hours after induced soreness. Subjects ran downhill on a treadmill to initiate soreness. This protocol was effective in inducing soreness, decreasing quadriceps flexibility, and decreasing quadriceps strength significantly from baseline measurements, but failed to increase thigh circumference significantly from time 0 to 72 hours post soreness induction. It was found that time had a significant effect on quadriceps strength, flexibility and soreness.
Subjects in the exercise group had significantly less soreness than the control group 96 hours after soreness was induced, but the two treatments had no effect on quadriceps strength or flexibility. The results indicate that the perceived soreness symptom in delayed treatments had no effect on quadriceps strength or flexibility. The exercises in the exercise group had significantly less soreness than the control group 96 hours after soreness was induced, but the two treatments had no effect on quadriceps strength or flexibility.
who were members of the IRSO. The IRSO conducts tournaments and workshops to promote the sport of rope skipping. Parameters examined included the number of members on a rope skipping team, practices conducted per week, and competitions per season; the length of practice sessions, training season, and of continuous rope skipping, the frequency of practicing backward turning rope skipping skills, and 25 rope skipping skills which included two types of skipping in a squat position and five types of multiple under skills. Teams with at least one injury or more were grouped together and compared to the group of teams with no injuries. Comparisons were made on the parameters examined using a t-test. Teams with injuries were significantly different (p<.05) from teams without injuries in terms of practicing more minutes per session, (93.00±39.40 and 73.30±32.10 min), months of practice (9.07±1.50 and 7.90±2.30 months), and competitions per year (1.70±1.14 and 1.05±1.06).

Ovalle, Steven E. A COMPARISON BETWEEN ANTHROPOMETRIC REGRESSION EQUATIONS AND HYDROSTATIC WEIGHING FOR PREDICTING PERCENT BODY FAT OF ADULT MALES WITH DOWN SYNDROME, 1992. M.S., Oregon State University (John M. Dunn). (111pp 2 f $8.00) PE 3333

The purpose of this study was to compare the accuracy of eight anthropometric regression equations with hydrostatic weighing for predicting the percent body fat of adult males with Down Syndrome (DS). Body fat percentages were predicted for 18 adult males with DS. Skinfold, circumference, and bioelectric impedance analysis data were collected to determine how accurately the regression equations could predict the percent fat of these individuals when compared to hydrostatic weighing. Since hydrostatic weighing involves a number of complex procedures and techniques without head submersion could be substituted for the conventional method of hydrostatic weighing. Paired t-tests revealed that the Kelly and Rimmer (1987) equations showed no significant difference between the body fat data obtained from hydrostatic weighing and the regression equations. For the total lung capacity without head submersion, SEE=2.51, r=.89, p<.05 can be recommended for use. Based on these results, it appears that a constant value of 1.50 L and hydrostatic weighing at total lung capacity without head submersion could be substituted for the conventional method of hydrostatic weighing. Paired t-tests revealed no significant differences in either pilot study, t(3)=.274, p<.05 and t(5)=.314, p<.05, respectively. Pearson product-moment correlations revealed a value of .99 for both pilot studies. Based on these results a constant residual volume value of 1.50 L and hydrostatic weighing at total lung capacity without head submersion were the procedures utilized in the main research study. A one-way repeated measures analysis of variance revealed a significant difference between the body fat data obtained from hydrostatic weighing and the regression equations. For the total lung capacity without head submersion, F(8, 136)=16.15, p<.05. Dunnett’s post-hoc procedure revealed significant differences in five of the eight equations. Of the three equations that did not yield significantly different results, only the Kelly and Rimmer (1987), r=.89, SEE=2.51, p<.05, can be recommended for use. Based on these results, it appears that a constant value of 1.50 L for residual volume and hydrostatic weighing at total lung capacity without head submersion could be utilized when predicting the percent body fat of adult males with DS. This will allow increased numbers of individuals with DS to be hydrostatically weighed. Also, the use of the Kelly and Rimmer (1987) equation will allow researchers and practitioners to utilize an easy, fast, accurate, and inexpensive method of predicting the percent body fat of adult males with DS.

Plummer, Paul E. A COMPARISON OF ATHLETIC ANKLE TAPE TECHNIQUES WITH RESPECT TO ANKLE INVERSION, 1991. M.A., Michigan State University (Eugene W. Brown). (70pp 1 f $4.00) PE 3334

The effects of restriction on ankle motion by athletic ankle taping was studied on twenty (n=20) college football athletes. Pre-exercise and post exercise ankle inversion motion was measured bilaterally under four conditions (a control—no taping, closed basketweave taping, moleskin stirrup taping, and spartan slipper taping). A modified Inman Ankle Testing Machine was used to obtain these measures. The design was a one factor randomized complete block design combined over days. Pre-exercise measures showed no significant (p<.05) difference between taping techniques but they were all statistically more restrictive than the control. There was also an interaction between the right and left foot. Post-exercise measures indicated a significant (p<.05) difference between taping techniques. The spartan slipper was the most restrictive of the taping techniques. The moleskin stirrup and the closed basketweave taping techniques were not statistically different from each other but they were significantly (p<.05) more restrictive than the control.

Powell, John J. THE EFFECTS OF DIFFERENT PERCENTAGES OF DIETARY FAT INTAKE, EXERCISE, AND CALORIE RESTRICTION ON WEIGHT AND BODY COMPOSITION IN OBESE FEMALES, 1991. M.S., Brigham Young University (Larry A. Tucker). (108pp 2 f $8.00) PE 3488

The effect of varying the amount of dietary fat while holding calories constant at 1200 kcals/day was studied in 35 overweight women. Mean percent body fat of subjects was 39.2±6.1 and average age was 38.0±4.97. Subjects were randomly divided into four dietary fat groups: 10%, 20%, 30% or 40% dietary fat regimen. Protein was held constant at 20% while carbohydrate percentage varied in relation to the percentage of dietary fat. All subjects engaged in a five day/week walking program. Body composition, body weight and anthropomorphic measurements were taken at baseline, 6 and 12 weeks. All subjects lost significant amounts of body weight and body fat; however, there were no significant differences in the rate or amount of body weight or percent body fat lost across the four groups during the 12 week dietary and exercise intervention. Hence, it appears that during calorie restriction and exercise for 12 weeks, percent of total calories derived from dietary fat may not influence loss of body weight or percent body fat in adult obese women.

Redmond, Robert A. EFFECTS OF STRENGTH TRAINING ON MUSCLE MASS AND MUSCULOSKELETAL INJURY IN MIDDLE AGED AND OLDER MEN, 1991. Ph.D., University of Maryland (Ben Hurley). (109pp 2 f $8.00) PE 3336

The purpose of this investigation was to assess the effects of strength training on strength, muscle cross sectional area and injury in middle aged and older men. Twenty two sedentary male subjects between the ages of 50 and 69 years volunteered to either a training (N =15) or control (N=7) group. The training group participated in a strength training program three times per week for four months. A 44% increase in total body strength (538±94 vs 773±112 kg, P<0.01) was achieved when four upper body and two lower body strength measures were combined. There was a 7% increase (142±22 vs 153±21 cm², P<0.001) in mid thigh muscle area and a 9% reduction (64±27 vs 58±25 cm², P<0.05) in mid
thigh subcutaneous fat as measured by magnetic resonance imaging. After training there was 87% less of a rise in serum creatine kinase levels than before training (CK) eight hours after an acute exercise bout at the same absolute workload (278 ± 65 IU/L, P<0.01), a 105% decrease in the rise at 24 hours (261 ± 139 vs 127 ± 74 IU/L, P<0.01) and a 71% decreased rise at 48 hours (183 ± 76 vs 107 ± 50 IU/L, P<0.01). The rise in CK levels diminished by 58% eight hours after an acute exercise bout at the same relative workload (278 ± 175 vs 175 ± 82 IU/L, P<0.05), by 71% at 24 hours (261 ± 139 vs 152 ± 73 IU/L, P<0.01) and by 64% at 48 hours (183 ± 76 vs 111 ± 51 IU/L, P<0.0001). Muscle soreness was rated at these same time points. However, symptoms of soreness were only occasionally reported. Therefore, no analysis of these data were made. These results indicate that older men can safely participate in a strength training program intense enough to promote a substantial increase in strength and muscle hypertrophy. Furthermore, a strength training program will allow older men to exercise at the same absolute or same relative workload after training with a reduced risk of disrupting musculoskeletal tissue.


The purpose of this study was to determine the prevalence of dance/movement therapy in Provo and Orem, Utah as an aid to psychotherapeutic healing. The study conducted during June 1991 obtained information from hospitals, health clinics, medical doctors’ offices, rehabilitation centers, physical therapy clinics, nursing homes and private practice offices. The return rate of the questionnaires was 61.06%. Thirty-three percent of the practitioners used dance/movement therapy while 66.6% did not use dance/movement therapy. Ranked first for practitioners’ credentials were medical doctors; from one to five patients were most commonly treated. The age group most frequently receiving dance/movement therapy were 36-55. The preferred treatment method was with individual patients. The most common length of time for treatment during a one week period was less than one hour a week.

Ruiz, Daniel H. THE EFFECT OF CRYOTHERAPY ON CONCENTRIC AND ECCENTRIC STRENGTH IN THE QUADRICEPS MUSCLE AFTER SEQUENTIAL EXERCISE BOUTS, 1991. M.S., Brigham Young University (Earlene Durrant). (71pp 1 f $4.00) PE 3491

This study investigated the effect of cryotherapy on concentric and eccentric strength in the quadriceps muscle after sequential exercise bouts. Nineteen subjects were randomly assigned to all four treatments groups: ice and exercise, ice and rest, no ice and exercise, and no ice and rest. Subjects performed six concentric/ eccentric contractions of the quadriceps muscle four times for each treatment group. Strength measures were taken before treatment, immediately after treatment, 15 and 30 minutes posttreatment. An analysis of variance indicated significant differences (p<.05) in strength. In the ice treatment groups, there were significant decreases (p<.05) from the pretest to 0 minutes posttreatment and a significant increase (p<.05) from 0 minutes to 15 minutes posttreatment concentrically when compared to the control group. No other differences were observed. Eccentrically, in the ice and rest group, there was a significant decrease (p<.05) from the pretest to 0 minutes posttreatment and a significant increase (p<.05) from 0 minutes to 30 minutes posttreatment when compared to the control group. No other differences were observed.

Salazar, Robert E. THE SEASONAL CHANGES IN BODY COMPOSITION OF VARSITY FOOTBALL PLAYERS, 1990. M.S., Brigham Young University (Carl McGown). (54pp 1 f $4.00) PE 3492

The purpose of this study was to determine the seasonal, changes in the lean body mass (LBW), percent body fat (%BF), and total body weight (TBW) of NCAA division I collegiate varsity football players. Pre and postseason hydrostatic measurements of LBW, %BF, and TBW were obtained on 63 varsity football players. The mean scores for LBW, %BF, and TBW for each subject were analyzed by position, strings, and tests. To analyze the data for statistical significance, a 6 (position) X 3 (string) split plot analysis of variance with tests as a repeated measure was used. The analysis revealed a significant difference for %BF for positions. There was also a significant difference for %BF between the pretest and the posttest. All other tests including the interactions were not significant. It was concluded that because of the significant increase in the team’s %BF, more time needs to be devoted to conditioning during the season.


The problem was to examine the effects of two eccentric exercise protocols on muscle soreness and strength of the biceps brachii in eighteen untrained college aged subjects. Each subject performed an eccentric exercise protocol with each arm. One randomly assigned arm performed the high-intensity, low-volume work load and the other arm performed the low-intensity, high volume work load. Muscle assessed before exercise and at post-exercise intervals of 0, 24, 48, 72 and 144 hours. Muscle soreness was measured using a Likert Scale and strength performance characteristics were assessed using a Cybex Isokinetic Dynamometer. A repeated measures analysis revealed no significant difference between the workouts on muscle soreness. However, significant differences in mean measured strength were seen between the two workouts at times 24 and 144 hours post-exercise (P<0.05). Mean measured strength for the low-intensity, high-volume group was greater than mean measured strength for the high-intensity, low-volume group at each time period.


Twenty Ss with no history of ankle sprain and 20 with unilateral chronically sprained ankles were measured to compare concentric and eccentric muscle function about the ankle. Subjects from both the Never Sprained and Chronic Sprain groups were tested on the KinCom Isokinetic dynamometer for the motions of Dorsiflexion and Eversion. Function was also measured at 60, 120, and 189
deg/sec. Peak torque means and mean torque angles were utilized for data analysis. Multiple 2 X 2 X 2 ANOVAs with planned comparisons were utilized for analyses at the .05 level of significance. Results demonstrated no differences among concentric torque means for chronic, noninvolved, dominant and nondominant groups when motions were collapsed. With dorsiflexion, a statistically significant difference existed in concentric and eccentric means for chronically sprained ankles compared to their contralateral side, chronic means were found to be higher. A statistically significant difference was found between the nondominant ankle, stronger eccentrically, than the dominant ankle at all speeds tested. A statistically significant difference existed eccentrically, with the chronic ankle group being stronger at all speeds than the never sprained group. Results demonstrated that lack of muscle strength is not a factor contributing to chronicity. Nondominant ankles, as defined in this investigation, were stronger concentrically and eccentrically than dominant ankles.


The purpose of this study was to compare the effect the Active Ankle™ brace and an unbraced control condition had on ankle inversion range of motion before and after an exercise period. Thirteen subjects who had normal ankle biomechanics and denied history of lower extremity injury in the past year participated in the study. Subjects completed three instructor and video assisted step aerobic practice sessions in order to ensure proper pace and exercise protocol. Ankle inversion angular displacement data were collected in 2 randomly ordered test conditions: an experimental condition which consisted of the Active Ankle™ braces applied bilaterally and a control condition where no braces were applied. The video analysis reference points, new braces and shoes were applied by the same physical therapist. Subjects were tested on a plantar flexion, inversion stress platform which had an initial position of 20 degrees of plantar flexion and was used to lower the ankle into 35 degrees of inversion in the weight bearing position before and after an exercise session. The exercise session consisted of a 20 minute step aerobic program in which the subjects followed a prerecorded exercise videotape. Data collection was completed before and after exercise using a Panasonic AG 450 camcorder at 60 frames per second and the Peak 5 two-dimensional motion measurement system. Displacement data from the right ankle of all subjects were used for data analysis. A cubic spline program was used to smooth the raw displacement data. A two way analysis of variance with repeated measures was used to determine what effect the Active Ankle™ brace and the control had on ankle inversion displacement. The F values at the p<.05 level revealed no significant main or interaction effects. These results indicated that there was no significant difference in support between the Active Ankle™ brace and non-braced control before or after exercise.

Stelke, Elmar J. THE EFFECT OF EXERCISE INTENSITY ON THE EXTENT OF AND RECOVERY FROM FATIGUE OF LONG DURATION, 1993. M.A., University of California at Berkeley (Steven L. Lehman). (67pp 1 f $4.00) PE 3443

Six healthy subjects performed a series of isometric contractions with wrist flexor muscles, alternating between 30 seconds of contraction and 30 seconds of rest. This protocol was followed for one hour or until the desired force was not accomplished at any time in two consecutive 30 second exercise periods. Each subject completed the experiment in four test configurations: at 12.5%, 25%, 50%, and 75% of maximum voluntary contraction (MVC). The sequence was randomized to minimize a possible experimental training effect. To determine the presence of fatigue of long duration (FLD), responses to 2 and 10 Hz stimulation of the ulnar nerve and MVC's were measured before exercise, immediately after exercise, and during recovery at one hour intervals for three hours (less if recovery was complete prior to this point). At other times, rapid wrist flexions were performed and maximum angular velocity of wrist flexion was measured in order to obtain an indication of muscle fiber composition. None of the subjects fatigued with exercise at 12.5% of MVC. After exercise at 25% of MVC two subjects exhibited FLD, while the remaining four subjects did not. The fatigued subjects exhibited a significantly (p<.05) faster maximum angular velocity in comparison to non-fatigued subjects, suggesting that fatigue induced at this intensity of exercise may be associated with specific fiber types. All subjects experienced FLD after exercise at 50% and 75% of MVC. There was no significant difference in the extent of FLD between exercise at 50% of MVC and exercise at 75% of MVC. This may be the result of a shorter average exercise time for the group at 75% of MVC. For those who exercised for an hour at 75% of MVC, FLD recovered slower in comparison to one hour of exercise at 50% of MVC, indicating an intensity-dependent relationship for recovery from FLD.

Stowe, Stephen R. A COMPARISON OF BODY COMPOSITION CHANGES IN MODERATELY OBESE AND EXTREMELY OBESE WOMEN WHO EXPERIENCE THE SAME CALORIC DEFICIT, 1991. M.S., Brigham Young University (A. Garth Fisher). (83pp 1 f $4.00) PE 3444

The effects of a caloric restrictive diet and exercise on body composition were studied for 12 weeks in seven moderately (M) and five extremely (E) obese women who experienced the same total caloric deficit. Subjects were assigned to one of two groups either M or E according to their percent body fat. The women in both groups reduced their caloric intake 600 Kcal/d and total fat intake to 25%. All exercised by walking 5d/wk and progressively increased their exercise expenditure from 100 Kcal/session to 300 Kcal/session during the study. The percent body fat, body weight, and circumference measure losses were significant (p<.01) in both groups. However, the extremely obese group lost more weight than the moderately obese group (p<.05). A program involving a low fat, decreased calorie diet and progressive exercise is recommended for the treatment of all classifications of obesity including the extremely obese.

Svehla, Bonnie G. GRIP STRENGTH PROFILES OF ELEMENTARY AGED MALES AND FEMALES, 1991. M.S., Texas Woman's University (Barbara E. Gench). (86pp 1 f $4.00) PE 3341

The purpose of this study was to establish a normative profile of grip strength for healthy 9-, 10-, and 11-year-old males and females. A sample of right-handed students, 321 males and 318 females, from Denton, Texas, were tested for grip strength of both the right and left hands. Testing was done using a Jamar Dyna-