February 29, 1980 the Missouri Association for Health, Physical Education, Recreation and Dance became incorporated as an association.

Editorial Policy

The Missouri Journal of Health, Physical Education, Recreation, and Dance is the official publication of the Missouri Association for Health, Physical Education, Recreation and Dance and is published yearly. The Journal operates on a nonprofit basis and does not pay the contributing authors. The annual membership fee includes a subscription to the Journal. The Journal is sent to all members of the Association.

Views and opinions expressed in the articles printed herein are those of the authors and not necessarily those of the Editors or the official policy or position of the Missouri Association for Health, Physical Education, Recreation and Dance. Nonprofit organizations or individuals may quote from or reproduce the material herein copyrighted by the Association for noncommercial purposes provided full credit acknowledgements are given.

Authors are solely responsible for: 1) their data and its treatment; 2) the ethical treatment of research participants; 3) meeting federal and state guidelines for the protection of human subjects in research; 4) informing participants of all features of the research that might reasonably be expected to influence willingness to participate; and 5) crediting the original source of material. The co-editors of the Journal strongly recommend and expect that authors obtain the informed consent of research participants and state that they have done so in the Methods section of their article.

The Journal accepts submissions in three categories: editor-reviewed articles and materials, refereed articles, and student articles. See the contributor guidelines in the back of this issue.

All correspondence concerning the publication of the Journal should be addressed to Dr. Kathleen Haywood, College of Education, University of Missouri-St. Louis, 1 University Blvd., St. Louis, MO 63121 or haywoodk@umsl.edu and Dr. Scott Strohmeyer, strohmeyer@ucmo.edu. Manuscripts must be submitted as Word documents.

NOTE: The Missouri Journal of Health, Physical Education, Recreation and Dance began using volume numbers with the 1991 issue, which was designated volume 1. Earlier issues do not bear a volume number.
## Table of Contents

**Scholar Address**  
Solving the Mystery by Rheba Vetter ................................................................. 5

**Refereed Paper**  
Effect of Softball Color on Batting Performance in Players and Non-Players by Hannah Runez, Nikki Moss, Megan Frkovic, and Anna Jones ................................................................. 8

**Refereed Paper**  
Effect of Standard Push-Up and Perfect Push-Up™ Training on Global and Regional Body Composition and Muscle Endurance by Andrew Piotter, Greg Daum, Jorden Bax, and Jerry L. Mayhew .......... 14

**Student Paper**  
The Prevalence of Guaranteed Scholarships in College Athletics by Alex Washam ......................................................................................... 25

**Refereed Paper**  
Effect of Kinesio Tape on Muscle Strength of the Upper Trapezius by Courtney M. Meyer ...................................................................... 29

**Editor Review Paper**  
The Rise of Women Sportscasters: A Struggle from Sideline to Centerfield by Tara Arnold, Steve Chen, and William Hey ......................... 36

**Refereed Paper**  
A 4-Week Safe Routes to School Educational Curriculum and Pre-Post Knowledge of Fourth Grade Students by Jamie Harvey, Gary Liguori, Gene Ezell, and Meredith Zinke .............................................................. 44

**Refereed Paper**  
Difference in Step Counts of 8th Grade Girls During Single Gender and Coeducational Team Games by Shaina Dochtermann Arnold and Carla D. Smith ........................................................................ 52

**Abstracts from the Student Poster Session** ................................................................................. 58

**Guidelines for Authors** ................................................................................................................. 65
Reviewers for the 2015 *Missouri Journal of Health, Physical Education, Recreation and Dance*

Ken Bias - University of Central Missouri  
Justin Kraft - Missouri Western State University  
Britt Johnson - Missouri Western State University  
Sheri Beeler - Missouri Southern State University  
Rheba Vetter - Northwest Missouri State University  
Janice Nelson - Missouri State University  
Michael Bird - Truman State University
Note. The actual 2014 scholar address given November 15, 2014 was a dance accompanied by voice with the following original monologue:

Since the beginning, we have stumbled upon and solved the unknown from our experiences. From experience we have found meaning and made sense of our world. Life is a mystery. It is like a deck of cards. Along life’s journey we are dealt a few cards at a time. Each separate card may be an isolated event or a universal truth. So, we probe the hidden and tap into experience to uncover a secret which bubbles to the surface of consciousness. We become attentive to the repetitive patterns. In essence a participant observer looking for signs, the “tells”; hopefully asking the right questions as we seek new solutions to complex problems searching for truth. If we remain open minded and stay true to the process of exploration, illumination bursts forth. In the end we are compelled to embrace change and new realities. Thus, exploring life’s mysteries always arouses wonder and excitement.

Dance ended.
Discussion ensued.
The following paper is a tangible representation of the dance content. The question remains as to how one can enter an ephemeral dance into a permanent journal.

There are many mysteries throughout life. Some are small, and others stupendous; such as figuring out where a misplaced item is located or medical research discoveries, respectively. Mysteries occur and are solved daily, weekly or over a longitudinal period. Each mystery has its own hierarchical level of importance for the finding of a solution.

In order to decipher a mystery, one must engage in a complex process of solution finding and solving. This process requires connection building between the known and the unknown. Connections maintain balance and provide sense and meaning making in life. All people construct various types of connections daily. However, some individuals work in professions that require engagement in meaning making processes: artists,
researchers, teachers and leaders.

The path meaning making meanders is an intricate thinking activity involving several steps. First observation transpires with the data gathering and problem finding level of thinking. Second deductive analysis and awareness of parts occurs. Gestation in thinking follows. Inductive synthesis and concept making comes fourth. Last, the performance of critical evaluation reinforces the solutions to a mystery.

These steps occur within a creative, a research or a learning process. This progression dissembles and reassembles repeatedly, sometimes arriving at a finished product and at other times moving on to another focal point within a related problem. In fact, some of the characteristics of an artist or researcher are that they do not settle for the first answer that comes to mind. They may move between thinking deductively, the general to particular, and inductively, from parts to whole, searching for the solution that is the best fit. Likewise, teachers and leaders observe situations, analyze what is occurring, and take as much time as possible to synthesize responses and critically evaluate possible solutions in order to move others forward on a path of growth.

Growth requires individuals to take risks by moving into the unknown, which is inherently uncomfortable. The evolving process brings a person to the threshold of a room not previously entered and demands he or she cross the barrier into a world of exploration. As one explores, risks are taken in order to find solutions which are not easily unearthed. In the end progress ensues.

Engagement with exploration and risk taking develops greater levels of comfort with serendipitously working through, in and around vagueness rather than doing the expected or predictable. The more artists, researchers, leaders and teachers become facile with exploration processes, development of a perceptive and critical eye for discerning optimal solutions results.

Artists, researchers, leaders and teachers foster their own and others’ complex thinking processes by 1) respecting the unusual, 2) valuing individuality, 3) offering self-initiated learning opportunities, and 4) organizing non-evaluated practice or learning sessions. Often, the process is more important than the product, because a positive process empowers an individual’s self-esteem. A healthy self-esteem supports ongoing personal advancement. The confidence fostered through improvements enables tolerance of the divergent thinking process within art making, research projects, teaching differentiated learners, and leading others.

Tolerance of this dynamic thinking process and its results engenders learning. One discovers that positive findings can be as important as negative results or mistakes. Learning transpires, providing an individual perseveres to correct mistakes or review the process that led to a particular result. The new knowledge leads to a deeper awareness of the world.

Much is still unknown in the world and ripe for discovery. The power in discovery is to notice the unseen and not previously thought. Discovery
is the essence of visionary thinking because it dynamically integrates subconscious with conscious perceptions. A visionary thinker attends to personal experiences and transforms that experience into an important sensorial awareness; the perceived sentient experience lies within memory waiting to be revisited. Through reexamination, authentic connections form.

The reexamination entails asking the right questions. A good question is objective and unbiased. Open ended impartial questions allow for a variety of responses. The process of pursuing an answer is more important than the product, because a process is not an end in itself. Products are finite, frequently with finite uses. If an artist, researcher, teacher or leader seeks a particular answer, an authentic problem seeking and solution finding process may not ensue. Thus, genuine answers may not be illuminated, and vague generality persists while clarity remains elusive.

Too often seeking authentic answers does not follow the path of least resistance and conformity. Finding truth is a mixture of linear and circuitous routes that transcend routine parameters. These roads are rarely easy or straightforward. Often the difficulty in meandering along the road causes as much intellectual discomfort as stimulation. With persistence, one develops the ability to change and develop along the solution finding process. Ultimately, with innovative solutions, change occurs and fresh realities are embraced.

In closing, the challenge is to solve the cliffhangers. To accomplish this, one must not settle for the easy answers and act complacently. It is important for people to pursue the most accurate solution to mysteries. By so doing, individuals develop complex thinking skills and build self-esteem simultaneously. This in turn not only enables people to transform the world but to acquire a deeper understanding of the world.
Effect of Softball Color on Batting Performance in Players and Non-Players

Hannah Runez, Nikki Moss, Megan Frkovic, and Anna Jones

The purpose of this study was to examine the effect of ball color on hitting performance in college softball players and non-players. Yellow and white balls were shot from a pitching machine, and a scoring system was used to determine the quality of the hits. Each participant received 40 pitches with ball color randomly presented. There was no significant difference in hitting score between yellow and white balls for either players or non-players ($p = 0.07$). Players had significantly higher ($p < 0.001$) hitting scores than non-players for both ball colors. There was no significant participant x ball color interaction ($p = 0.08$). The hitting score with yellow balls ($44.3 \pm 4.9$) was significantly higher ($p = 0.03$) than for white balls ($38.3 \pm 7.0$) for players indicating a slightly better ball placement. The better ball placement by players suggested a greater practical effect of the yellow ball on hitting performance.

The color of various objects may affect many elements of sports performance. It can help identify certain objects (Tanaka & Presnell, 1999), affect mood (Perotti, 1974; Wexner, 1954), or aid in visual acuity for objects in motion (Mizusawa, Sweeting & Knouse, 1983; Rowe & Evans, 1994). In the early 1900’s when all cars were black, firefighters needed a way to differentiate their truck from other vehicles. Therefore, the decision to paint the fire truck red would identify it to the public (Soloman & King, 1997). However, a study in a large metropolitan area found red fire engines were over three times more likely to be involved in an accident than yellow fire engines, causing the authors to conclude light colors are perceived as more visible (Soloman & King, 1995).

Since white is the lightest color in the visual spectrum, it seems logical that it was chosen for the original cover on baseballs and softballs. While white may be perceived as more visible, research concludes that the human visual system is most sensitive to the band of colors between the wavelengths encompassing greenish-yellow (or lime-yellow) and neon yellow colors (Soloman & King, 1995). Rowe and Evans (1994) discovered men and women hit blue racquetballs better than they did yellow or green ones, but the environment inside a racquetball court (i.e., all white)
is different than the multi-color background of most softball fields.

In 1992, the NCAA mandated that softballs should be neon yellow under the supposition it would increase safety in the sport (Berklan, 1992). While there were no data to support this supposition, players believed that using yellow softballs would increase the quality of hits due to the brightness of color and the ability to see it better than a white ball. An early study evaluated the difference in hitting ability between yellow and white softballs in college players who were accustomed to using white softballs and had only recently begun using yellow softball (Morris, Zimmer, Mayhew & Piper, 1994). The results noted no difference in hitting ability, suggesting there was little effect of ball color on hitting in softball players.

Since the early study, there have been no other evaluations of the effect of softball color on hitting performance. Because it has been 22 years since the change to yellow balls, current players have always played with softballs yellow in color. If the yellow color provides a clearer vision of the ball, current players should produce better hitting scores using the yellow balls than with white balls. Therefore, the purpose of this study was to determine difference in the hitting quantity and quality between yellow and white softball.

**Methods**

Eleven college varsity softball players and 11 women athletes (non-players) from other sports volunteered to participate. The study was approved by the university institutional review board for human subjects. After explaining the protocols for the study, each athlete signed an informed consent document. Testing was conducted over two separate days during the Fall on a regulation softball field. The same bat (Demarini 33/23 model) was used by all participants, and each participant wore a helmet with a facemask. The same bat was used to eliminate an additional variable. Bats differ in weight and can affect the resulting hit depending on material, size and model. Participants performed practice swings with and without balls to familiarize themselves with the bat ahead of actual hitting performance.

Prior to scoring the hits, participants were given four practice swings, two with white and two with yellow balls in no specific order. This served as familiarization for participants, allowing them to become accustomed to the speed and placement of the ball coming from the pitching machine. The speed of the pitching machine was set at approximately 8.9 m/s (20 mph). Cones were placed in the infield and chairs in the outfield to help batters see the placement of their hits and allow better determination of the hitting score. The scoring system was similar to that used in a previous study (Morris et al., 1994) and is illustrated in Table 1. In the first hitting trial, participants received, on average, 20 pitches in a random order of yellow or white balls, with approximately six seconds between each pitch.

Following each participant’s first hitting session, she was sequestered away from the field for approximately three to five minutes so as not to be able to see other hitters’ performances. Upon returning to the field for their second trial, participants again received four practice swings in random order of yellow and white balls, followed by 20 more trials in random order for a total of 40 hitting attempts with an equal number of white and yellow balls. The maximum potential score for each participant was 200 points.
Table 1
Hitting Scoring System

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Foul ball , missed hit, or no swing</td>
</tr>
<tr>
<td>1</td>
<td>Slow ground ball or infield pop fly</td>
</tr>
<tr>
<td>2</td>
<td>Solid ground ball</td>
</tr>
<tr>
<td>3</td>
<td>Forceful hit up the middle, a ball to the outfield, or a pop fly to the outfield</td>
</tr>
<tr>
<td>4</td>
<td>A hit into the gaps</td>
</tr>
<tr>
<td>5</td>
<td>Home run</td>
</tr>
</tbody>
</table>

Results

A participant x ball color (2 x 2) ANOVA with repeated measures over the second factor indicated there was no significant difference in hitting score between yellow and white balls for either players or non-players ($p = 0.07$). Players had significantly higher ($p<0.001$) hitting scores than non-players for both color balls (see Table 2). There was no significant participant x ball color interaction ($p = 0.08$).

Table 2
Comparison Of Hitting Performance Between Players And Non-Players

<table>
<thead>
<tr>
<th>Variable</th>
<th>Players (n = 11)</th>
<th>Non-players (n = 11)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White Ball</td>
<td>Yellow Ball</td>
</tr>
<tr>
<td>Hits</td>
<td>17.4 ± 2.1</td>
<td>17.9 ± 1.5</td>
</tr>
<tr>
<td>Batting Average</td>
<td>0.868 ± 0.106</td>
<td>0.895 ± 0.072</td>
</tr>
<tr>
<td>Hitting Score</td>
<td>38.3 ± 7.0</td>
<td>44.3 ± 4.9</td>
</tr>
</tbody>
</table>

There was no significant difference ($p = 0.51$) in the number of hits for white and yellow balls by players, which produced no significant difference in batting average. However, the hitting score with yellow balls was significantly higher ($p = 0.03$) than for white balls, producing a large effect size ($ES = 0.99$). This was not the case in the non-players where the number of hits, batting average, and hitting score were similar between white and yellow balls, with trivial effect sizes for each.
Discussion

The major finding of this study was that there was no significant difference in the number of successful hits between white and yellow softballs produced by college softball players. When the effectiveness of the hits was evaluated using a scoring system, which gave more points for better ball placement, the players had higher scores when hitting yellow balls, with an effect size confirming the practical importance of the difference. Since the color of the balls was randomized using the pitching machine, the difference registered by the softball players suggests yellow balls may allow better hitting performance. However, it was noticed that the white softballs had different seams and a smoother surface than the yellow balls; the yellow balls had more of a ridge along the seam. This difference appeared to cause the white softballs to travel lower and dip slightly more than the yellow softballs when delivered from the pitching machine. The degree to which this might have affected the hitter’s ability to make good contact with the white balls remains in question. Future testing should be done using balls with similar stitching patterns to eliminate any possible flight pattern deviations.

A second aspect of ball velocity in this study was the level used for our subjects. In order to allow non-players to have more opportunities to hit the balls, the velocity was set much lower than would be experienced in a normal softball game. In the only other study that measured hitting proficiency with yellow and white softballs, pitching machines velocities were 1.9 to 2.5 times faster than in the current study (Morris et al., 1994). In this study, there was no significant difference in hitting score across the three ball velocities or between colors of softballs (Morris et al., 1994). Due to the slight difference in the scoring system between the two studies, it is difficult to determine how much effect the slower velocity in the current study had on actual game-like performance. Doubtless the slower speed contributed to the higher batting average noted for players in the current study and may have also improved their hitting score (Berg & Killian, 1995). It would be beneficial to repeat this study using only trained college players and use pitching speeds closer to those often noted in games (Knudson & Kluka, 1997; Szymanski et al., 2011).

While pitching machines are typically fairly constant in producing ball velocity, there may have been some variability in the machine used for this study. A radar gun would have been beneficial to assess the consistency of ball velocity from the pitching machine. If there was a significant variability in ball velocity across trials or between softballs of different color, it might have affected hitting scores among both players and non-players. However, since balls were delivered randomly, it is unlikely slight variations in pitching machine velocity greatly affected performance.

During the experiment, it appeared that some participants were not putting their best effort forward. This could have caused some participants to not execute a full-speed swing at certain balls in an attempt to simply make contact with the ball. This was apparent more in the non-players who might possess a lesser level of coincidence-anticipation than in the players (Millslagle, 2000) and could have had a lesser visual perception of the field
In addition, softball players have been shown to have better skill in tracking the path of a pitched ball (DeLucia & Cochran, 1985). These differences could have contributed to the lower scores for non-players.

In conclusion, it appears there is generally little difference in hitting yellow or white softballs in trained softball players and non-players. Non-softball athletes had very similar results for all aspects of their hitting performance, indicating that ball color had little effect on their ability to hit a moving object. In trained softball players, however, it does appear that yellow balls allow them to produce better meaningful hits as indicated by better ball placement in the field of play. This may be due to their consistent years of training with the yellow ball making it a task-specific phenomenon (Szymanski et al., 2011).

References


Effect of Standard Push-Up and Perfect Push-Up™ Training on Global and Regional Body Composition and Muscle Endurance

Andrew Piotter, Greg Daum, Jorden Bax, and Jerry L. Mayhew

The purpose of this study was to compare the effectiveness of training with the Perfect Push-Up™ exercise device versus regular pushups. College men (n = 37) were measured for body size, composition, and push-ups endurance before and after training. Both training groups exercised every other day for three weeks following the routine suggested by the Perfect Push-Up manufacturer. A control group performed only pre- and post-training testing. After training, the increase in maximum number of push-ups performed was significantly greater for the regular push-up group than for controls but not significantly different from the Perfect Push-Up group. Both the Perfect Push-Up and regular push-up groups made significant increases in chest circumference, arm cross-sectional area, and LBM, while the regular push-up group had a significant reduction in triceps skinfold. Therefore, a regular push-up exercise routine produces similar changes in muscular endurance and body composition measurements to those from a specially designed push-up device.

Push-ups are one of the simplest and most widely used methods for exercising the upper-body musculature. They are frequently used by school children (McMannis, Baumgartner & Wuest, 2000), public service workers (Williford, Duey, Olson, Howard & Wang, 1999), older adults (Tsuturni, Don, Zaichkowsky & Delizonna, 1997), military personnel (Dyrstad, Soltredt & Hallen, 2006), and athletes (Meir, Newton, Curtis, Fardell & Butler, 2001). The exercise involves the posterior arm, anterior chest, and several back muscles to lower and raise the body in a horizontal position. Push-ups require no equipment and rely on a portion of the body weight as the resistance for the exercises. Previous studies have found the resistance weight during a push-up to be 40% to 75% of body weight depending
on the body position during the exercise (Ebben, Wurm, VanderZanden, Spadavecchia, Durocher, Bickham & Petushek, 2011; Gouvali & Boudolos, 2005; Suprak, Dawes & Stephenson, 2011). The typical progression in the exercise, therefore, relies on increasing the number of repetitions or sets.

Recently, several commercial sources have offered push-up devices which claim to enhance the muscular development and endurance of the chest, arms, and shoulders beyond conventional push-ups. One of the most popular of these devices is the Perfect Push-Up™, a rotating disc with handles allowing the hands and forearms to turn as the push-ups are performed. Despite the claims made by the manufacturers, there is little scientific information on the degree of change in strength or muscle size to be gained by the use of such devices. Only one study has been indentified which performed actual measurements of the Perfect Push-Up (Youdas, Budash, Ellerbusch, Stucky, Wait & Hollman, 2010). The authors used electromyography (EMG) to determine the neural activity level in four muscles utilized in a push-up and concluded the Perfect Push-Up offered no advantage over conventional push-ups in muscle activation.

Since the only study of the Perfect Push-Up evaluated muscle activity on a single occasion, there has been no investigation of the effect of training with this device. It would be beneficial to strength and conditioning specialists, athletic coaches, and fitness enthusiasts to assess the effect of training with the Perfect Push-Up on muscle development and endurance. Therefore, the purpose of this study was to compare the effectiveness of the Perfect Push-Up to conventional push-up training for their effect on regional and global body composition and muscle endurance.

Methods

Subjects. The subjects for this study were a convenience sample of active college men who were not participating in a varsity sport. Criteria for inclusion were inactive to moderately physical active with no history of resistance training in the previous six months and no previous shoulder or chest injury. This study was approved by the Institutional Review Board, and subjects signed a written consent form which informed them of the specific details of the study.

Test Procedures. Harpenden skinfold calipers (John Bull Company, Birmingham, England) were used to measure the triceps skinfold before and after training. Flexed arm and chest circumference were measured with a flexible tape. Three measurements were made at each site, and the average used for analysis. Arm muscle cross-sectional area corrected for fat tissue was estimate using the procedure of Gurney and Jelliffe (1973). Lean body mass (LBM) was determined from a hand-to-hand bioelectric impedance analysis (BIA) device (Body Logic, model HFB-306).

Upper-body endurance performance was measured by maximum push-ups to fatigue. No cadence was imposed (LaChange & Hotobagyi, 1994), but subjects were encouraged to pace themselves to achieve the
maximum number of regulation push-ups. During the test, subjects were admonished to maintain a straight body position and flex the elbows to approximately a 90-degree angle to allow the chest to touch the fist of a partner placed on the floor (McManis, Baumgartner & Wuest, 2000). No more than a three-second pause was allowed between push-ups, and all pauses were to be in the extended position.

Training Procedures. Subjects were randomly assigned to one of three groups: a control group (n = 12) that performed only pre- and post-training testing, a regular push-up group (n = 12) that performed regulation push-ups (i.e., hands on the floor), and a Perfect Push-Up group (n = 13) that performed the same exercise routine using the commercially available training device.

The training program, as recommended by the Perfect Push-Up manufacturer, is described in Table 1. The regular push-up group and Perfect Push-Up group performed push-ups in three positions: regular push-up with the inside border of the subject’s hands at the outside edge of the shoulder joint, wide grip push-ups with the hands 10-15 cm outside the shoulder joint, and narrow grip push-up with the hands five centimeters on either side of the midline of the sternum. The number of sets and repetitions performed for each subject was determined by the initial maximal push-up performance as described by the Perfect Push-Up manufacturer (Table 2). Each subject was instructed to permit only enough rest between sets which would allow completion of the designated number of repetitions for the next set.

Statistical Analysis. Means and standard deviations were calculated for all variables. A multivariate analysis of variance (MANOVA) was used to determine significance in the pre-to-post-training differences variables. Effect size (ES) was used to assess the practical impact of the training program on each group. Coefficient of variation was calculated by dividing the difference between pre- and post-training means by their respective standard deviations and converting to a percentage to assess the degree of variability in a given measurement.

Results

Following three weeks of training, none of the pre-training to post-training body composition or anthropometric measurements had improved significantly ($p>0.05$) among the three groups (Table 3). Maximal push-up performance was improved significantly ($p<0.05$) in all three groups. Regular push-up training produced a slightly greater improvement in muscular endurance (15.6 repetitions) than Perfect Push-Up training (11.2 repetitions), but the change in the Perfect Push-Up group was not greater than the no-training control group (Figure 1). The change in push-up work paralleled the change in push-up performance (Table 3).
Table 1

Three Week Perfect Push-Up Workout Schedule

<table>
<thead>
<tr>
<th>DAY 1</th>
<th>DAY 2</th>
<th>DAY 3</th>
<th>DAY 4</th>
<th>DAY 5</th>
<th>DAY 6</th>
<th>DAY 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Set Wide</td>
<td>OFF</td>
<td>1 Set Regular</td>
<td>OFF</td>
<td>1 Set Wide</td>
<td>OFF</td>
<td>1 Set Wide</td>
</tr>
<tr>
<td>1 Set Close</td>
<td></td>
<td>1 Set Close</td>
<td></td>
<td>1 Set Close</td>
<td></td>
<td>1 Set Close</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DAY 8</th>
<th>DAY 9</th>
<th>DAY 10</th>
<th>DAY 11</th>
<th>DAY 12</th>
<th>DAY 13</th>
<th>DAY 14</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>2 Sets Regular</td>
<td>OFF</td>
<td>1 Set Wide</td>
<td>OFF</td>
<td>1 Set Regular Chair</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>1 Set Close</td>
<td></td>
<td></td>
<td></td>
<td>1 Set Wide</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DAY 15</th>
<th>DAY 16</th>
<th>DAY 17</th>
<th>DAY 18</th>
<th>DAY 19</th>
<th>DAY 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Sets Regular Chair</td>
<td>OFF</td>
<td>2 Sets Regular Chair</td>
<td>OFF</td>
<td></td>
<td>Post-tests</td>
</tr>
<tr>
<td>1 Set Wide</td>
<td></td>
<td>1 Set Wide</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Set Close</td>
<td></td>
<td>1 Set Close</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2

Set Repetitions Based on Maximum Push-up Performance

<table>
<thead>
<tr>
<th>Maximum Push-Ups</th>
<th>Regular Position</th>
<th>Wide Position</th>
<th>Narrow Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4, 3, 2, 1*</td>
<td>4, 3, 2, 1*</td>
<td>4, 3, 2, 1*</td>
</tr>
<tr>
<td>10</td>
<td>8, 6, 4, 2</td>
<td>8, 6, 4, 2</td>
<td>8, 6, 4, 2</td>
</tr>
<tr>
<td>20</td>
<td>14, 10, 6</td>
<td>14, 10, 6</td>
<td>14, 10, 6</td>
</tr>
<tr>
<td>30</td>
<td>20, 12, 8</td>
<td>20, 12, 8</td>
<td>20, 12, 8</td>
</tr>
<tr>
<td>40</td>
<td>26, 14, 10</td>
<td>26, 14, 10</td>
<td>26, 14, 10</td>
</tr>
<tr>
<td>50</td>
<td>30, 16, 12</td>
<td>30, 16, 12</td>
<td>30, 16, 12</td>
</tr>
</tbody>
</table>

*Knee Pushups
All 13 members of the Perfect Push-Up group made greater improvement in push-up than the random variation of two push-ups noted from repeated testing as suggested by Negrete et al. (2010), with a range of improvement of 5 to 19 push-ups. The regular push-up group had 10 of its 12 members make greater improvement than random variation, with a range of improvement of 4 to 32 push-ups. Interestingly, 8 of the 12 members of the control group made an improvement greater than random repeated testing variation, with a range of 4 to 21 push-ups. In the regular push-up group, 75% of the participants improved endurance by more than 20%, while only 39% of the Perfect Push-up group made as much improvement, a value that was comparable to the control group (40%). However, there was greater variation in the performance change in the regular push-up group (CV = 75%) than in the Perfect Push-Up group (CV = 63%).

At pre-training, push-up performance was negatively related to body weight and triceps skinfolds (Table 4). While push-up performance was not significantly correlated with flexed arm circumference, it was significantly correlated with arm muscle cross-sectional area. After training, the negative relationship between push-up performance and body weight increased while the relationship with triceps skinfold decreased. Furthermore, the relationship of push-up performance to arm circumference and arm muscle cross-sectional area both decreased following training. However, the change in arm muscle cross-sectional area was positively related to the change in push-up performance (Figure 2). To the contrary, chest circumference was not significantly related to push-up performance at pre-training or post-training for any of the groups. In addition, the change in chest circumference was also not related to the change in push-up performance.

Discussion

The most important outcome of this study suggests training with regular push-ups performed with hands at various positions produced greater percent improvements in standard push-up endurance and work capacity than the specialized Perfect Push-Up training device. The lesser improvement made using the Perfect Push-Up might be attributed, in part, to the elevated position of the device. Ebben et al. (2011) recently noted ground reaction force was significantly lower when push-up hand position was elevated by 30 cm. Thus, the smaller improvement made by the Perfect Push-Up group might be explained, in part, by the modest height of the device (approximately 10 cm) which could have resulted in less muscle activity being exerted during push-up performance.
Table 3

Effect of Push-up Training on Regional and Global Body Composition and Muscle Endurance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control (n=12)</th>
<th>Regular Push-Up (n-12)</th>
<th>Perfect Push-Up (n=13)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-training</td>
<td>Post-training</td>
<td>ES</td>
</tr>
<tr>
<td>Age (yr)</td>
<td>20.0 ± 0.7</td>
<td>20.3 ± 0.9</td>
<td>19.5 ± 0.8</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>180.0 ± 6.8</td>
<td>180.5 ± 7.2</td>
<td>0.07</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>80.0 ± 11.4</td>
<td>80.4 ± 11.8</td>
<td>0.04</td>
</tr>
<tr>
<td>LBM (kg)</td>
<td>69.3 ± 6.3</td>
<td>68.7 ± 6.3</td>
<td>-0.10</td>
</tr>
<tr>
<td>Arm Cir (cm)</td>
<td>34.2 ± 2.5</td>
<td>34.5 ± 2.8</td>
<td>0.12</td>
</tr>
<tr>
<td>Arm CSA (cm²)</td>
<td>83.3 ± 13.0</td>
<td>85.4 ± 14.3</td>
<td>0.16</td>
</tr>
<tr>
<td>Chest Cir (cm)</td>
<td>99.4 ± 5.2</td>
<td>100.2 ± 6.6</td>
<td>0.15</td>
</tr>
<tr>
<td>Push-Ups</td>
<td>43.2 ± 16.3</td>
<td>49.0 ± 17.0*</td>
<td>0.36</td>
</tr>
<tr>
<td>Push-Up Work^</td>
<td>2,172 ± 760</td>
<td>2,468 ± 744*</td>
<td>0.39</td>
</tr>
</tbody>
</table>

*Push-Up Work - Body weight (kg) X 0.64 X Push-Ups (% body weight estimate from Ebben et al, 2011)
* Significantly different from pre-training
^ Significantly greater than control group
^ Significantly greater than Perfect Push-Up
Electromyographic (EMG) studies of various shoulder muscles have noted greater muscle activation with different hand positions in the push-up (Cogley, Archambault, Fibeger, Koverman, Youdas & Hollman, 2005; Gouvali & Boudolos, 2005). Youdas et al. (2010) used EMG to compare muscle activation between conventional push-ups and Perfect Push-Ups. The authors found Perfect Push-Up exercise to produce slightly more muscle activation of the triceps and pectoralis major only when performing shoulder width push-ups. When performing wide-based and narrow-based push-ups, conventional push-ups produced more muscle activity in the triceps, pectoralis major, serratus anterior, and posterior deltoid. The authors concluded that the Perfect Push-Up do not enhance muscle recruitment compared to the use of regular push-ups. In a previous study, muscle activation levels for the trapezius from 10 push-up revolutions performed on a cuff-link device were significantly lower than for standard push-ups (Tucker, Campbell, Swartz & Armstrong, 2008). Statistical analysis indicated standard push-ups produced twice as much muscle activation as the exercise device. Since an association between motor neuron activation (EMG) and muscle force generation has been observed (Lloyd & Besier, 2003; Solomonov, Baratta, Shoji & D’Ambrosia, 1990), it seems reasonable to assume greater muscle activation during different hand positions in regular push-ups creates greater muscle force and probably contributing to the greater muscular endurance improvement noted in the current study.

Figure 1. Comparison of Percent Change in Push-Ups Among the Training Groups.
Figure 2. Relationship Between Change in Arm Cross-Sectional Area and Change in Push-Up Performance Following Training (n=37).

Table 4

Correlations Of Anthropometric Variables And Body Composition With Push-Up Performance Before And After Training (N = 37)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-Training</th>
<th>Post-Training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Push-Ups</td>
<td>Push-Up Work</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>-0.57**</td>
<td>-0.41*</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>-0.42*</td>
<td>*0.10</td>
</tr>
<tr>
<td>BMI (kg/m^2)</td>
<td>-0.05</td>
<td>0.20</td>
</tr>
<tr>
<td>LBM (kg)</td>
<td>-0.31</td>
<td>-0.01</td>
</tr>
<tr>
<td>%fat</td>
<td>-0.40</td>
<td>*0.22</td>
</tr>
<tr>
<td>Arm Cir (cm)</td>
<td>0.24</td>
<td>0.46</td>
</tr>
<tr>
<td>Arm CSA (cm^2)</td>
<td>0.37*</td>
<td>0.57**</td>
</tr>
<tr>
<td>Triceps SKF (mm)</td>
<td>-0.57**</td>
<td>-0.41*</td>
</tr>
<tr>
<td>Chest Cir (cm)</td>
<td>-0.04</td>
<td>0.23</td>
</tr>
</tbody>
</table>

*Significant at p<0.05 **Significant at p<0.01
Studies have indicated different relative amounts of body weight are lifted during various types of push-ups. Suprak, Dawes, and Stephenson (2011) found 69% of body weight was supported in the up position, while 75% was supported during the down position of a push-up. Ebben et al. (2011) found relative weight supported during a push-up to range from 74% when the feet were elevated to 41% when the hands were elevated. Thus, the high-repetitions produced, modest weight being lifted, and greater muscle activation during regular push-ups would support the endurance training nature of this exercise and explain the gains in push-up repetitions and push-up work noted in the current study (Table 3).

The Perfect Push-Up device is purported to isolate the pectoralis major muscles during the push-up movement and hence should offer greater development to that muscle group. Youdas et al. (2010) did find this to be true for the shoulder-width and wide-base push-ups but not for the narrow-based push-ups. However, the differences were not statistically significant, and the effect size was small (ES = 0.18). While neither push-up group in this study produced significant increases in chest or arm circumference (Table 3), the relatively short period of training may not have allowed sufficient time to show more than a modest effect on muscle size. Previous research has indicated the first few weeks of resistance training is dominated by neural disinhibition rather than muscle hypertrophy (Moritani & deVries, 1979). Perhaps a longer training period may have produced significant increases in both arm and chest circumferences.

Esco, Olson, and Williford (2008) investigated the relationship of anthropometric variables with a 60-second push-up test. They found a positive correlation of push-ups to height \( r = 0.30 \) and a negative relationship with body mass index \( r = -0.31 \). The current study found negative correlations for both height and weight with push-up repetitions and work capacity (Table 4). Interestingly, the greater the LBM of the current subjects, the fewer push-ups performed, although the more arm muscle mass, the greater the number of push-ups achieved. A ratio of arm cross-sectional to LBM had a consistent relationship with push-up performance before \( r = 0.64, p<0.01 \) and after training \( r = 0.64, p<0.01 \), suggesting that the big the arm muscle relative to total body muscle provided an advantage in push-up performance. Since chest circumference was not strongly correlated with push-up performance, the ratio of arm size to chest circumference had only a moderate relationship to push-up performance \( r = 0.48 \). Thus, push-ups might be considered more of an arm exercise than a chest exercise.

In conclusion, it appears short-term training with conventional push-ups is as effective as the use of a specialized push-up training device for producing increases in muscle endurance and work capacity of the upper body. Push-up training and evaluation are widely used in a variety of settings. It is, therefore, reassuring that individuals wishing to train the upper-body musculature need not resort to costly devices to produce meaningful changes in performance. Greater long-term application of
conventional push-up training programs might also produce measureable modifications in upper-body size and composition.

References


**ANDREW PIOTTER** is a 2013 graduate of Truman State University. He is currently a 3rd year student in the DPT program at the University of Iowa, Iowa City, IA.

**GREG DAUM** is a 2014 graduate of Truman State University. He is currently a first-year medical student at A.T. Still University, Kirksville, MO.

**JORDEN BAX** is a 2014 graduate of Truman State University. He is currently a consultant for Cerner Solutions in Kansas City, MO.

**JERRY L. MAYHEW** is a professor in the Health and Exercise Science program at Truman State University.
The Prevalence of Guaranteed Scholarships in Collegiate Athletics

Alex Washam

Organized collegiate team sports began in the 1800’s. While the first competitions were intermural by the end of the 19th century schools were playing intercollegiate sports and were beginning to offer students scholarships to play sports for the university. At this time, though, there were no rules or regulations on these scholarships, nor rules on how they were to be awarded. Early in the 1900’s the National Collegiate Athletic Association (NCAA) was formed with the goal of protecting young athletes from being exploited; however, the NCAA did not regulate scholarships that were granted to student athletes at this time.

By the 1950’s the NCAA had become more vigilant in overseeing collegiate athletics and protecting the student athletes. In 1952 the first of many efforts was made to reform athletic scholarships. A special committee known as the Athletic Reform of the American Council on Education was formed. This committee recommended that scholarships be awarded based solely on academic need rather than athletic ability (Gerdy, 2006). This reform measure was not adopted. In 1989 the NCAA President’s Commission also proposed reform for the athletic scholarships based on need, and again the proposition was defeated.

The athletic scholarships that student athletes receive do not cover the entire cost of education. While these scholarships do cover room and board, tuition, and books, there are other incidentals that are not included such as the cost of travel to and from campus, toiletries, or extra meals. These expenses can add $2000 - $3000 a year to the student athletes’ expenses (Shaw, 2011). This additional expense leaves student athletes and/or their parents with unexpected bills. The entire point of a “full ride” scholarship is to rid student athletes of all expenses while at school so they can focus on their academics and their athletics (Edmonds, 2014).

The purpose of this paper this paper is to examine the problems of student athletes and the issues relating to the economics of scholarships both for the student athlete and the college/university.

Athletic Scholarships

Athletic scholarships are not easy to obtain. In fact, every year at NCAA institutions, only about two percent of high school seniors win...
sports scholarships (O’Shaughnessy, 2014). Therefore, these scholarships are a rare commodity, only given to those student athletes who have the highest quality of athletic ability and have something to contribute to the university and its athletic department. Many of these young athletes have been planning for years just how to qualify for an athletic scholarship through, not only their exceptional talent, but also through their hard work and diligence. The idea behind all the effort is to receive a “full ride” scholarship, one that will take the burden of paying for college off parents and/or athletes. What too many of these young athletes fail to realize is the fact that there is actually no such thing as a “full ride” scholarship. There is a discrepancy between what the scholarship covers and the actual cost of education. For example, during the 2009-2010 academic year, the average scholarship deficit (out of pocket expense) for Football Bowl Series “full” scholarship athletes was $3,222 (Huma & Staurowsky, 2011). This problem was brought to light many years ago, but is just recently being addressed.

As the NCAA and universities begin to look into this issue, Sidney McPhee, president of Middle Tennessee State University and vice chair of the NCAA working group charged with addressing the scholarship changes said that the NCAA’s attention to the cost-of-attendance issue mirrored efforts elsewhere in academe to beef up awards to attract key students (Sander, Wolverton, & Fuller, 2011). McPhee also added that this is not unusual in higher education. It is unusual that the NCAA and college athletics have not studied this problem in decades. We do it quite regularly on our campuses to be competitive (Sanders, et al., 2011). Universities want to be competitive not only in academics, but also in sports. One of the ways to continue to be competitive in sports is through guaranteed “full ride” scholarships.

Recently the NCAA overturned a previous decision and now is allowing guaranteed multi-year scholarships (Wolverton & Newton, 2013). This decision protects the student athlete from being terminated from a team at the coach’s discretion. Officials at many of the major programs say they renew the vast majority of scholarships every year, and typically cut players only for flunking classes or flouting the law (Wolverton & Newman, 2013). A recent study by Wolverton and Newman (2013) found that few student athletes receive multi-year scholarships. The University of Illinois is leading the way in promoting multi-year scholarships for their student athletes followed by the University of Florida, North Carolina State, Michigan State, the University of Southern Florida, University of Kansas, University of Georgia, and the University of Kentucky. Jason Pappas, an assistant instructor of sports management at Florida State University states that he feels a multi-year scholarship is a great encouragement for student athletes. By offering these scholarships you “send a strong message that you’re committed to develop that student as a whole person, not just an athlete” (Wolverton & Newton, 2013).
Economic Impact

In recent years there have been many ideas and suggestions about how to address the cost of guaranteed scholarships (Wolverton & Newton, 2013). Zola (2013) suggested that a stipend in the neighborhood of $3000.00 per student athlete would help reduce the growing underground compensation system for elite student athletes. While this amount of money does not seem exorbitant, when you multiply that amount by the number of athletes at a university, the total could be staggering. The Knight Commission on Intercollegiate Athletics recently released the results of a survey that explored other ways of paying for these scholarships. These changes could include establishing more regional competition for certain sports, allowing programs to reduce travel costs and missed class time (Huma & Staurowsky, 2011). Kirk H. Schultz, president of Kansas State University, stated that his university planned to spend $1 million per year in additional money to cover the cost of attendance scholarships for their athletes (Wolverton, 2015). To help cover the cost the university took less staff to the Valero Alamo Bowl in which his school was participating. Also some of the employees had to schedule shorter stays. The university also chartered fewer flights using more commercial travel instead (Wolverton, 2015). Now is the time for universities to cut back on frivolous spending and a time to get creative, finding a way to pay for guaranteed “full ride” scholarships.

Another way for universities to absorb the cost of these scholarships is to look into the salaries of coaches. In some of the top Division I schools coaches were making millions of dollars plus a bonus (Huma & Staurowsky, 2011). There is also substantial revenue given to universities through television broadcast agreements and licensing deals for sporting goods such as tee shirts, posters, video gaming, and balls. Because of the sports programs, universities receive these deals, but if it wasn’t for the student athlete, sports programs would not exist. It makes sense that the student athlete should share in this additional revenue, creating another way to offset the cost of athletic scholarships.

Summary

After reviewing information on guaranteed scholarships in collegiate athletics, a definite need for immediate action for the development and implementation of legislation that assures guaranteed ‘full ride” scholarship for the student athlete was identified.

The cost of higher education escalates yearly and the sports program expands yearly; therefore, these issues must be resolved for the student athlete. Creative avenues must be explored and decisions made for the continuance of college sports with the guaranteed “full ride” athletic scholarship. America needs collegiate sports to help fulfill the dreams of many young athletes.
References


**ALEX WASHAM** is an assistant in Facilities and Event Management at Southeast Missouri State University and a graduate student at Western Kentucky University majoring in Athletic Administration. He will graduate in the summer of 2016.
Effect of Kinesio Tape on Muscle Strength of the Upper Trapezius

Courtney M. Meyer

The purpose of this study was to evaluate the effect of Kinesio tape (KT) versus placebo tape (PT) on the isometric shoulder elevation strength of college female athletes. A randomized, single-blind, crossover design divided eleven athletes (18-22 yrs. old) into two groups. Group 1 received the KT first, while Group 2 received the PT first; one week later, the groups were reversed. Each participant performed three isometric shoulder elevation trials, initially without tape, followed 5-10 minutes later by three trials after taping. Participants then wore each tape for three days before being retested in the same manner as before. Statistical analysis found no significant difference ($p = 0.37$) between the KT and PT trials. Shoulder strength was significantly greater after three days for both tape techniques. It does not appear that KT makes a significant difference in shoulder strength performance in female athletes.

Kinesio Tape (KT), a water proof elastic tape developed in the 1970s, has become one of the recent sports rehabilitation fads. The ideology of Kinesiology taping was developed by Dr. Kenzo Kase, a chiropractor from Japan. Dr. Kase founded the method of Kinesio Taping in 1979, and soon began the manufacturing of his product Kinesio Tex (KT) tape (“Kinesio: The original,” 2010). KT tape’s first Olympic appearance and claim to fame arose in 2008, when Kinesio Tex was donated to 58 countries for use during the games (Williams, Whatman, Hume, & Sheerin, 2012).

KT gained most of its popularity in recent years through the use by many Olympic athletes and anecdotal support. However, research on the effectiveness of this product and the benefits associated with its use as a therapeutic aid has just recently began. A recent meta-analysis regarding the effectiveness of KT suggested that while KT may have some small benefits for improving strength and range of motion, it had little benefit for injury prevention (Williams et al., 2012). However, Kamper and Henschke (2013) were critical of that review, indicating that a true meta-analysis approach was not followed and only studies with positive significant outcomes appeared to be included.

The effect of KT on muscular strength and motor performance seems to be equivocal. Some studies have suggested that application of KT does...
little to enhance strength and power performances (Chang, Chou, Lin, Lin & Wang, 2010; Kummel, Mauz, Blab & Vieten, 2011; Sedge, Kroskie & Docherty, 2012), while other studies have noted positive effects of KT on strength and motor performance (Aktas & Baltaci, 2011; Kim, Kang, Kim & Oh, 2014;Mohammadi, Kalantari, Naeimi, Poureetzad, Shokri, Tafazoli & Kardooni, 2014; Vithoulka, Beneka, Malliou, Aggelousis, Karatsolis & Diamantopoulos, 2010). One area that appears underexplored is the effect of various taping applications on the shoulder muscles and joint performance. Since shoulder impingement syndrome is one of the most common upper-body injuries (Jobe, Coen, & Screnar, 2000; Kaya, Zinurgglu, & Tugcu, 2011), it would benefit the current body of literature to determine the effectiveness of this product with regard to producing strength increases in athletes. Therefore, the purpose of this study was to determine the effects of Kinesio Tape on muscular strength performance of the upper trapezius of the shoulder in female athletes.

Methods

The design of this study was a randomized, single-blind, crossover trial. Eleven college female athletes (18-22 yrs. old) volunteered to participate. Athletes sustaining an upper extremity injury within the six months prior to this study were declined from participation. Participants were randomly placed in two groups: Group 1 received Kinesio Tape (KT) for week one and Group 2 received Leukotape as a placebo tape (PT) for week one. Both tapes were tan in color to aid in blinding the subject to each type. The taping method followed the proper KT application pattern for application to the upper trapezius muscle as described by Kase, Willis, and Kase (2003). The tape was applied to the dominant arm of participants by a certified athletic trainer familiar with KT application techniques. Following the first set of trials, participants were given a week off before performing the same procedure with the opposite tape condition.

Each participant was strength tested before (no tape) and after tape application using an isometric dynamometer. The test consisted of three maximal three-second isometric shoulder shrugs on the dominant arm, separated by 30 seconds rest (Figure 1). There was approximately five to ten minutes rest between tests. Following strength testing, each participant wore the tape applied based on grouping for three days. After three days, each participant again performed three trials of the isometric shoulder shrug. The tape was then removed with adhesive removal wipes (to minimize discomfort), and another three isometric trials were performed. The average of each three-trial performance set was used to perform a tape type x trial (2 x 4) ANOVA with repeated measures over the second factor.

Results

Analysis indicated that there was no statistically significant difference ($p = 0.37$) between the KT and PT trials (Figure 2). There was a slight decrease in strength measurement immediately after the application of both taping types (Figure 3). However, at three days post-tape, shoulder shrug strengths were significantly higher ($p<0.001$) for the taped and
untapped conditions than those produced during the initial strength trials regardless of taping type (Figure 3). After removing the tape, there was slight decrease in shoulder strength for both taping types (Figure 3). Despite the non-significant difference between KT and PT across the four trials, the average effect sizes comparing the taped versus the untapped condition was small and similar for KT (ES = 0.21) and PT (ES = 0.26). The average effect size for the difference between the KT and PT across the four conditions was 0.57, suggesting a medium impact of KT on performance.

Figure 1. Isometric Shoulder Shrug of the Dominant Arm.
Figure 2. Comparison of shoulder elevation strength with Kinesio Tape and placebo tape in college female athletes (n=11).

Figure 3. Percent changes in shoulder elevation strength between trials with Kinesio Tape and placebo tape in college female athletes (n=11).
Discussion

The major outcome of this study was that Kinesio tape does not appear to produce a statistically significant increase in shoulder elevation strength in female college athletes compared to placebo tape, either initially or over the recommended three days of wear. However, trials 1 and 2 on day 1 were significantly lower than trials 3 and 4 that were performed 3 days later. This could suggest there may be a learning effect on the performance of this isometric strength test, since it is not a movement that is routinely performed during training. The average strength increase across the four trials under KT (5.9 ± 8.3%) was slightly less than the average of PT (6.9 ± 7.5%), which might lessen the impact on effect size for determining the practical importance of KT. Previous research on untrained women revealed 13%, 21%, and 12% increases in 1RM isoinertial bench press, squat, and arm curl, respectively, across four trials in a 12-day time span (Riberio, Nascimento, Salvador, Gurjao, Alvilar, Ritti-Dias, & Cyrino, 2014). Thus, it is likely that some of the increase in shoulder elevation strength can be attributed to participants becoming more comfortable with the test.

The medium effect size between the two tape types across the four conditions in this study could suggest that there might be some practical benefit to the application of KT for shoulder elevation (upper trapezius) strength that is independent of the statistical significance. Many of the other studies reporting significantly greater effects of KT on strength performance have not reported effect sizes. Data provided in the study by Hsu, Chen, Lin, Wang, and Shih (2009) on the change in lower trapezius strength in baseball players with and without KT allowed calculation of an effect size of 0.70, despite no significant difference between the KT and PT conditions. However, data in the grip strength study by Chang et al. (2010) produced an effect size of only 0.09 between the KT and PT conditions. Since the grip strength test is more common than a trapezius strength test, it would seem to support the idea of test familiarity is likely to be a factor in the comparison between a KT and PT condition.

It is worth noting that strength scores deceased in the current study by 3.9% (±20.5%) for KT and 3.7% (±20.2%) for PT immediately following tape application (Figure 3). To the contrary, Mohammadi et al. (2014) found a 7.6% increase in grip strength immediately following KT application. It has been suggested that KT application might enhance force sense or the ability to generate force to a set standard (Chang et al., 2010), but this may not have a great implication for maximal force generation, since KT has been shown to have no effect on motor nerve conduction velocity (Lee, Lee, Park, Lee, Jeong, Son, & Kim, 2011). Thus, cutaneous stimulation provided by KT should have little effect on maximal motor nerve synchronization that would produce a peak strength response. Given the equivocal nature of the few studies on the effect of KT on muscle strength, the issue remains controversial and deserving of further study.

Future studies on the effect of KT on muscle strength should consider several factors to solidify the internal and external validity of the findings. Since familiarization with the strength test appears to be a major issue confounding the outcome of KT studies, test subjects should be given a series of practice trials on whatever strength test is selected, to insure a
steady baseline before initiating tape application. Such an approach would at least allow the calculation of the smallest worthwhile difference, which would provide an indication of how much improvement would be needed to show a true effect of the tape condition as opposed to random test variation. Furthermore, strength tests should be selected that have distinct relevance to sports application. For example, internal shoulder rotation strength might be germane to baseball players, while forward shoulder flexion strength might be applicable to volleyball players. Finally, perhaps the effect of KT on sport-specific performance such as pitching speed or volleyball spiking velocity should be evaluated to ascertain whether KT actually produces sufficient increase of performance to offset the high cost of its constant use.

References


Mohammadi, H. K., Kalantari, K. K., Naeimi, S. S., Pouretezad, M., Shokri,


COURTNEY MEYER is a 2014 graduate of Truman State University and a certified athletic trainer. She is currently working on her Master’s degree in Exercise Science at West Texas A & M University.
The Rise of Women Sportscasters:  
A Struggle from Sideline to the Centerfield  

Tara Arnold, Steve Chen, and William Hey

While striving for success in the field, female sportscasters were constantly challenged by gender stereotypes and biases, sexism, and unfriendly working environments and conditions. We highlight how those aforementioned challenges affected female sportscasters and address the importance of fighting stereotypes, biases, and unfair treatments in order to achieve true gender equality for future female sportscasters.

Key words: female sportscasters, sport broadcasting, gender equality

Female sportscasters have come a long way since the late 1930’s and early 40’s when Mrs. Harry Johnson of Omaha, Nebraska helped set this career path and trend for other women (Billiot & Grubb, 2010). Soon Jane Chastain, working for CBS, became the first woman to conduct play-by-play of a live sporting event. Then Lesley Visser became the first female NFL Superbowl sideline reporter and first female NFL broadcast analyst. Suzyn Waldman was the first radio bear reporter to cover the New York Yankees baseball and the Knicks basketball teams (Nash, 2014; Grubb & Billiot, 2010).

Before the Title IX era, there was very little opportunity for women to participate in sports, much less be a female sport journalist or sportscaster. When Title IX became a law in 1972, its passage helped increase the number of women sports broadcasters (Skerski, 2006). With the help of this legislation, women were given more opportunities, not just in sport participation and career choices, but a sense of empowerment and gender equality. Women made strides with more participation in sports and more employment in sport jobs. For example, the number of female sports reporters increased from 3% to 7% from 1996 to 1999 (Etling & Young, 2007). According to a report in Sports Illustrated, there were fewer than 50 female sportscasters on the air in 1991 (Skerski, 2006). A decade later, the USA Today reported the number had increased to 127 (Skerski, 2006).
Within 20 years, female sports broadcasters have continued to break that glass ceiling. More and more female sportscasters are seen or heard on television and radio while analyzing, commentating, and doing play-by-play.

Many women had gained opportunities to be sport journalists between the 1970s and 1990s. The number of female journalists reached a peak in 1999 (Morrison, 2014). A report of Women’s Media Center indicated in 1999 36.9% of reporters who worked in newsrooms were women. Yet, when that same subject was revisited in 2012, the number of women in newsrooms seemed to be stagnant at 36.9% (Morrison, 2014). Although Title IX help tremendously in improving the chances for women to become sportscasters, there are still many barriers to true gender equality in this male dominated field. Undoubtedly, the number of female journalists increased exponentially since the 1970s, but the percentage of women working in sport journalism remained relatively low (Hardin & Shain, 2005).

Female sportscasters were constantly bombarded and troubled by issues such as gender stereotypes and biases, sexism, and unfriendly working environments and conditions. We will address those specific challenges and stereotypes routinely faced by the female sportscasters and discuss the importance of changing the stereotypical cultural norms to foster a proper environment to nurture future female sportscasters.

Triad Challenges for Female Sportscasters

With a rise in the number of female sportscasters, more obstacles came that prevented female broadcasters from reaching success. We address three main categories of challenges that female broadcasters frequently faced in their jobs.

Gender Stereotypes and Biases

For a female sportscaster or journalist, credibility will always be questioned and challenged. Regardless of the position or the talent level that a female journalist has, she will constantly be challenged because of her gender (Gunther, Kautz, & Roth, 2011). Existing gender biases influence some to question female sportscasters’ knowledge of sports.

Women are more often questioned about their credibility than their counterparts. The pressure to prove their sports knowledge is tremendous. According to the interviews of Gunther et al. (2011), three female broadcasters strongly felt that they had to prove themselves to be better than their male counterparts in order to retain their credibility. Some female broadcasters were clearly better qualified than men at the same level, but the tendency was to bunch them in lower paid levels (Strong, 2007). Female broadcasters would have to be “over-the-top competent” to get credibility from sports fans (Strong, 2007). According to Gunther et al. (2011), one respondent’s boss even stated to her that television viewers...
will always test her knowledge, because she is a female.

It is hard for a female broadcaster to convince people that she really knows what she is taking about. During a job interview, women are frequently quizzed with the most obscure information (or events) to prove their worthiness as a sports anchor (Grubb & Billiot, 2010). Grubb and Billiot (2010) further stated that every time a female broadcaster transfers to a different division, she starts over to establish her credibility. Mistakes made by a woman are subject to more scrutiny than those made by her male counterparts (Grubb & Billiot, 2010). Any mistake that she makes will reflect on her credibility (Gunther et al, 2011). Female reporters are aware that if they make a mistake, people will regard it as incompetence while errors committed by male counterparts are usually dismissed as isolated incidents (Skerski, 2006). Female broadcasters would seem to be either objects of criticism or objects of adoration (due to their attractive appearance).

Authoritativeness and gender biases affect the public’s perceptions toward female sportscasters, because many viewers and listeners thought females were less credible and authoritative than males. For this reason, network executives assume that audiences won’t accept women in analyst roles for masculine sports, such as football and basketball and therefore only allow female sportscasters to commentate in “gender-appropriate” sports such as gymnastics and figure skating (Greer & Jones, 2012). Andy Rooney, the famous CBS 60 Minutes commentator, once expressed, “the only thing that really bugs me about TV’s coverage is those damn women they have down there on the sidelines, who don’t know what the hell they are talking about” (Grubb & Billiot, 2010, p.89). This statement clearly illustrates disrespect toward female reporters and arrogance and male-chauvinism by the male reporters.

Cultural hegemony has been used to the explain power relations and dominant ideology in cultural institutions, including media and sports (Hardin & Shain, 2006). Gender-role beliefs and sexist attitudes have also been referred as “male hegemony,” the dominance by men who block women from entering men’s fields (Etling & Young, 2007). Male hegemony is an integral part of the culturally ingrained system in the United States that positions men as rational minded people, and, thus, naturally suited to control the culture (Hardin & Shain 2005). In sports, male hegemony has been excessively prevalent and resistant to change (Hardin & Shain, 2006). Therefore, it is no surprise that female sportscasters would encounter a strong degree of male hegemony. Male broadcasters try maintain their dominant role in sports and do not want women to involve in this field. Professional values of sport broadcasting (such as, toughness and detachment) perpetuate the “macho” culture in newsrooms (Hardin & Shain, 2006). Female reporters who wish to be successful are expected to adopt this masculine culture. However, when they adopt this culture, they are viewed as being pushy, choosy, and mouthy (Hardin & Shain, 2006). We can see the ideology of male hegemony puts a woman sportscaster
who tries to fit in and be accepted in a dilemma.

**Sexism and Appearance**

Another challenge that woman sportscasters often encounter is “sexism and appearance.” Although there are some females who believe this ideology can be worked toward their advantage, in the field of sport broadcasting, women are often hired for their appearance rather than their knowledge or skills (Billiot & Grubb, 2010). Male producers and directors would rather have someone who looks pretty in front of the camera than one who knows sports. Hiring female broadcasters with an attractive appearance is a major concern of the network executives. Showing an attractive image in front of the screen was a higher priority for female sportscasters (Grubb & Billiot 2010). Executives solely would hire a woman who looked good on television over someone who had knowledge or skills, regardless men or women. Many experienced female broadcasters worry about whether or not they would be replaced by a younger woman (Grubb & Billiot, 2010). That is what these female professionals face in the industry. Their jobs and youth are at jeopardy. Nevertheless, male audiences like to see sexy reporters as much as sports. For this reason, networks continue to increase their ratings by incorporating and promoting female sex appeal (Skerski, 2006). Unforeseen consequences of enforcing women broadcasters to emphasize their sex quotient in order to fit in the male dominant culture arise as well (i.e., potential increase of sexual harassment) (Skerski, 2006).

Sexism is strongly associated with negative attitudes toward female sportscasters. It alone explained 47.8% of the variance for negative attitudes toward female sportscasters (Etling & Young, 2007). It is also a main reason for so much criticism of a female sportscaster’s credibility. Given the masculine nature of sports broadcasting, male sportscasters are perceived to be more authoritative and credible than female announcers (Etling & Young, 2007). Etling and Young’s study (2007) discovered that male broadcasters perceived as less attractive received higher credibility ratings than did women perceived as more attractive and knowledgeable. This finding indicated that a sex stereotype does exist in public perceptions of male and female sportscasters.

On the ABC Sports Night show, women sportscasters were perceived as acting unprofessionally, displaying “motherly qualities,” and lacking sports knowledge compared to the male characters (Painter & Ferrucci, 2012). Additional criticisms toward female sportscasters include: (1) they choose their personal lives over work, and (2) they are hypercritical on ethical issues and deviant behaviors of male athletes. Painter and Ferrucci (2012) suggest that these fictional portrayals and stereotypes have a powerful impact on the self-image and confidence of women sportscasters.
Unfriendly Working Environment and Condition

As the sexism intensifies, sexual harassment arises. Many female sportscasters have experienced aggressive, and vulgar comments made by players, coaches, fans, and other male broadcasters. Cat calling and derogatory sexual comments by players towards the female reporters continued to be problematic in the locker room and on the sidelines (Gunther et al., 2011). Ines Sainz, a reporter on Mexican TV, once indicated NFL players made sexually suggestive comments to her in the locker room after practice (Gunther et al, 2011). Kirk Minihane, a Boston sport reporter, verbally attacked female reporter Erin Andrews numerous times (Grenoble, 2014). He may be entitled to his opinion and criticisms of Ms. Andrews’ professional ability, but his insulting personal attacks (such as, “If Erin Andrews weighed 15 pounds more, she’d be a waitress”) have gone beyond professional behavior. Further, he had no intention to apologize for his behavior (Grenoble, 2014, para. 3).

Female sports reporters are severely discriminated against in the male locker room (Herman, 2013). They often face obstacles and frustrations that their male counterparts do not even imagine much less encounter (Grub & Billiot, 2010). While reporting on the game-day, female reporters had to work especially early, because they were not allowed to enter the locker rooms after the games (Herman, 2013). Women were consistently asked to stand outside of the locker room to wait for coaches and players, while male reporters were able to enter the locker room immediately. Some male reporters intentionally prolong their interview session with players, knowing females would have less time to make their deadline (Gunther et al., 2011). In the early 1970’s, women sportscasters were not permitted to work in the press box as were male reporters (Nash, 2014). Jeannie Morris had to cover the NFL game outside the press box in a blizzard (Grubb & Billiot 2010). It wasn’t until 1978 that the league issued a rule granting male and female reporters equal access to the locker rooms and other facilities (Gunther et al., 2011). The harassment and discrimination that women sportscasters experience consistently reminds them of their role in a male-dominated culture (Grubb & Billiot, 2010).

If the aforementioned challenges are not enough, imagine how frustrating it is that female sport journalists have to outperform and please their male peers to stay on the job, but still have no chance for receiving promotion (Morrison, 2004)! According to investigations of job satisfaction of female sports journalists, despite the existence of sexism and stereotypes, female professionals were most dissatisfied with their potential chances for promotion on their job (Smucker, Whisenant, & Pedersen, 2003). Broadcasting rooms and newsrooms clearly can be a very unfriendly environment for female professionals.

Implications and Future Directions

Sports broadcasting is such a male dominated field that women
sportscasters, as the minority, are under a great deal of pressure to prove themselves to stand out from the crowds, and to become socially accepted by their male peers. This follows the “theory of tokenism.” This theory explains that members of a minority group are in a “token status” when they compose less than 15 percent of the workforce (Hardin & Whiteside, 2009). Female broadcasters are considered tokens, because they are severely underrepresented in numbers and highly visible within their organizations. According to Hardin & Whiteside (2009), tokens are under enormous pressure to perform and have little leverage in the workplace. They are more likely to be subject to harassment and discrimination, which are two issues that have historically plagued female sports journalists (Hardin & Whiteside 2009).

While dealing with their job, female sportscasters also need to defend their own credibility and fight against sexism, gender bias, and dominant male hegemony. They strive to succeed being the minority under the threats of losing their job due to lack of attractiveness and potential sexual harassment and discrimination. These challenges come like a revolving door that never ends. Although the rise of women sportscaster is evident, how can we expect anyone to be successful while facing so many obstacles? Several broadcasters and journalists have offered professional advices that would help a young female prospect entering the field of sport journalism and broadcasting (Vanderberg, 2010; Yandoli, 2012; Camacho, 2013; Clapp, 2014; Deitsch, Keith, & Shore, 2014; Wikihow, n.d.). In addition to preparation of basic professional skills (such as reading and writing) and knowledge and development of passion and love for the profession, experts also suggested young prospects to be ready for unforeseen hatred, criticism, discrimination, and scrutiny. Ultimately, we wish to train more men and women to enter the field of sport journalism with unbiased perspectives and a respected professional manner. We believe that sport educators have the moral responsibility to educate our youth about the inappropriate male hegemonic ideology and inaccurate discriminatory stereotypes toward the female sport journalists and broadcasters. We should celebrate the accomplishment of those exemplary female role models, such as Rachel Nichols and Jemele Hill (Vanderberg, 2010; Deitsch et al, 2014). They have worked hard to prove that females can be successful and knowledgeable sportscasters. Female journalists should not be and do not need to be forced to conform under the presence of male hegemony and sexism. These types of negative cultural norms in sport journalism and broadcasting must be stopped and changed so that true gender equality can be achieved one day soon.

References


In the late 1970’s, Denmark was the first country to use the term “Safe Routes to School” (SRTS) with the effort spreading internationally throughout Europe, Australia, New Zealand, Canada and the United States. The U.S.’s first SRTS program began in 1997 in New York which was quickly followed by Congress funding two pilot SRTS programs through the U.S. Department of Transportation.

Congress eventually went on to pass federal legislation in July 2005 to establish a National SRTS program to heighten awareness on bike and pedestrian safety routes to school. The program was charged with encouraging children and families to use cycling or walking as a means of transport between home and school. Today, SRTS programs are active in all 50 states and the District of Columbia. In addition, the first national Bike to School Day occurred in May 2012 with favorable gains for children to bike and walk to schools. The inaugural event involved 950 schools in 49 states then increased the next year by 80% to 1,705 schools in all 50 states (Trends in walking and bicycling, 2013).

The purpose of this research study was to determine the knowledge of pre- and post-test scores from four SRTS lessons in four public elementary schools. The secondary purpose was to determine whether socioeconomic status (SES) status affects students’ knowledge outcomes as they relate to SRTS.

Background and Literature Review of Safe Routes to School

Since 2005, nearly $1.15 billion in federal funding has benefited almost 15,000 different schools across the U.S. Federal funding in the state of Tennessee has ranged from $1 million in 2005 to $3 million in 2012, to improve the overall quality of life through enhancing children’s health, easing traffic congestion and improving air quality (Building & Sustain a Program, SRTS).

Previous research on SRTS issues has shown there is a need to reverse
the decades-long decline in walking and biking to school (Sirard, Riner, Mciver, & Pate, 2005; Lee, Tudor-Locke & Burns, 2008; Rodriguez & Vogt, 2009; Stewart, 2011). SRTS national center has collected data on walking and bicycling to school since 2007 with 2013 data collected from more than 8,000 schools nationally. In lower SES schools, as determined by household income or rates of free and reduced lunch (FnR), the percent of students reporting walking to school increased in both the morning (21.8 to 27.6%) and afternoon in (24.6 to 31.5%) in the afternoon, yet the percent reporting bicycling decreased from 0.9% to 0.7% over the same time.

Contrasted to walking, cycling requires obtaining equipment and training necessary for children to bike safely to and from school. This includes bike and helmet maintenance, and how to ride a bike (www.saferoutesinfo.org). Another study reported that 9-10 year olds would prefer changing to cycling to school than any other transportation mode. Of the 1,362 children surveyed, 80% reported owning a bike; however, only 39% owned a helmet and 26% reported wearing a helmet (Christie, et.al, 2011, 946).

In March 2006, SRTS awarded $364,000 to the city of Chattanooga with federal funds to be distributed amongst seven public elementary schools. The emphasis was for infrastructure improvements and the development of pedestrian and bicycle safety education program for the designated schools in the district (www.saferoutesinfo.org). This research is unique as the first study documenting SRTS pre and post cognitive scores with the SES and (FnR).

**Methods**

Public elementary school principals and physical educators from various Hamilton County, TN elementary schools were invited to participate in the SRTS program. For this study, four separate Grade 4 elementary schools were used with a total of 165 children fully participating during the 2010-2012 school years. All children were requested to complete a 10-question survey about cycling knowledge prior to receiving four separate SRTS curriculum lessons. An identical post-survey was administered at the conclusion of the curriculum to all the same children. The ten questions were chosen from the original 20 true-false questions entitled Bicycling In Kids Education.

The SRTS lessons were delivered as part of a university course for Pre-service education majors trained to plan and lead the four SRTS lessons. Each student-teacher trained with the local bike education agency to prepare the curriculum and assure consistency amongst the schools lessons.

All classroom materials were part of the SRTS program including the Safe Kids Coalition National Grant. Curriculum priorities were emphasized for bike and pedestrian safety and the education training included the rules of the road for cyclists and pedestrians, helmet usage,
SRTS history and bicycle components.

Following the two-day teacher training, the university student-teachers worked closely with the elementary physical educator to determine which time and days to lead the SRTS lessons.

The original lesson SRTS lesson pack was developed by the League of American Bicyclist which included ten bicycle safety lessons (Kids II Instructor’s Manual). Lessons were designed for children to learn traffic awareness skills, correct helmet fit and use, bike handling, bike fit, safety checks and how to check where to ride. One goal stands: to teach knowledge and skills necessary for safe bike operation to a variety of cyclists for use in a variety of settings. (Kids II Instructor’s manual, n.d.) However, due to time constraints, four condensed lessons were created and distributed to the university students. The university instructor of the course served as the supervisor. Each student planned four SRTS lessons, attended the assigned elementary class and taught the four lessons on bike and pedestrian safety.

Lesson one included a pre-test of 10 true-false questions (Appendix A) based on prior knowledge about bicycle safety and rules. From there, the student began instruction of helmet use and protection, described bicycle safety check with the ABCs (Air in tires, Brakes and Chains) and identified the purpose of traffic signs.

Lesson two incorporated bicycle handling skills such as door zone, stop/start, shoe laces tucked in shoes. Pedestrian safety skills (www.pedbikeinfo.org) encourage children to look left, right and left again before crossing the street. Look the driver in the eyes to secure entering the pedestrian zone or intersection.

Lesson three for SRTS condensed lesson incorporated a simulated street scene where children can act as drivers, pedestrians, street-sign holders, and cyclists. Applying rules of the road with hand signals, scanning, and bike/helmet safety offer a more realistic view of learned information.

Lesson four reviewed the rules (cognitive) and application (affective and psychomotor) for bike and pedestrian safety along with the post-test of 10 true-false questions.

A paired sample t-test was used to determine changes in pre-/post-knowledge scores for the grade 4 participants, grouped by school. A repeated measures test was used to see if school SES influenced test scores at baseline or follow-up. All tests were conducted with SPSS v. 21 and alpha was set at $p<.05$.

Each of the four schools was assigned an SES score ("Very Low" or "Low") based on the percent of students receiving free and reduced lunch (FnR) at the respective schools. The very low (VL) SES schools (OK and CH) had > 90% of students receiving FnR, and included 108 students. The low (L) SES schools (LV and BA) reported 60-90% of students receiving FnR, and included 44 total student subjects.

Results
When grouping all four schools, a paired sample t-test showed a significant improvement in overall test scores (Pre 6.39 [+/-1.854 v. Post 6.91 [2.275], \( t = -3.426, \text{df}=137, p=.001 \)).

When categorizing the schools by SES, independent sample t-test showed no baseline difference in knowledge scores between the L and VL groups (L = 6.45 (+/-2.085) v. VL = 6.49 (+/-1.753), \( t = -0.109, \text{df}= 150, p=.913 \)).

Repeated measure testing, however, showed a significant interaction between post-test scores and SES category (L = 7.60 [+/- 2.425] v VL = 6.6 [2.146], \( t = 3.1672, \text{df} = 136, p = 0.002 \)), indicating that SES had an influence on changes in post-test scores. The percent change in scores also differed greatly, at 15.8% and 1.6%, respectively.

Figure 1 is a representation of the magnitude of change between the L and VL schools separately.

\[ \text{Figure 1. Pre and post test scores results of Grade 4 subjects (2010-2012)} \]

Discussion and Conclusion

The National Safe Routes to School Program has been in effect since 2005 to promote children walking and biking to school and has offered federal, state, and local funding to promote its main theme.

The purpose of this research study was to assess the effect of a 4-lesson education curriculum on knowledge of SRTS lessons with fourth grade students in Chattanooga, TN. The secondary purpose was to determine if SES, based on FnR rates, had an effect on pre-post scores. Our results
showed no difference in baseline SRTS knowledge scores amongst schools with different SES categories, and that overall, fourth graders in this study improved their SRTS knowledge after the 4-week curriculum. Because there was no difference in baseline scores, it is unlikely the usual past exposure to biking was much different between the groups. However, the VL schools did not show any improvement in post-scores (<2%) compared to the more than 15% improvement for the L schools, which could be partly attributed to household support for biking.

In general, assessment of post-intervention knowledge scores is important to determine the worthiness of any intervention. In this case, one group showed statistically and practically significant increases in SRTS knowledge, which can help foster positive attitudes and behaviors towards biking, not to mention the possibility of increasing interest in biking as a form of recreation and transport. At the same time, the lack of improvement in the VL group indicates a different approach may be needed as SES drops below a certain threshold, possibly an expansion of the number of lessons or more in-depth repetition of the basic SRTS principles.

The results of this study are consistent with previous studies that show schools with low SES are capable of gaining significant changes in pre- to post-test scores, and that there is an association between changes in test scores and SES. A 9-week study of 61 elementary students from low SES schools resulted in positive changes in post test scores in three of the four literacy markers (Apel, 2013). Reid and Ready (2013) looked at the impact of SES on 2966 pre-kindergarten students receptive language, expressive language, and mathematics learning with their results showing a positive association between SES and the learning outcomes.

A few limitations to this study should be noted. Reading comprehension may not have been the same for all of the students, however, the materials are designed for elementary school students. Also, baseline understanding of biking, bike equipment, and bike safety may have differed amongst the students; however, the baseline scores indicated this was not the case in this population. All SRTS lessons were presented by pre-service, non-licensed teachers, rather than by certified and skilled educators. Only low and very low SES schools were represented in this study. Though the test was limited to 10 true/false questions, it was based on the League of American Bicyclists Kids II instructor’s manual. The four condensed lessons were a necessary function of fitting into an academic schedule, yet covered the critical biking topics from the manual.

This study showed that a brief educational curriculum could increase SRTS knowledge amongst fourth grades, though household SES status may influence the magnitude of learning to be had. Our results of improved scores may make it more likely that a student will choose to walk or ride a bike as transportation to and from school or use either for recreational purposes, or even encourage other family and friends to do the same. Further research that includes broader SES categories, longer
lesson plans, and longer-term follow up on both knowledge and behavior are needed. However, these results should offer encouragement to local schools as a means to implementing SRTS principles to help encourage more students to consider walking and biking to and from school.

To advance the SRTS program, some suggestions may inspire school stakeholders to engage pedestrian and bike safety for the community.

- Develop a school wide bike share program.
- Give mobility to homeless students; bikes \((\text{sinc: and helmets})\) loaned to churches, and shelters where many students reside.
- Enhance opportunities for disabled children.
- Establish a fitness club.
- Conduct more bike safety trainings (Safe Routes Matter, 2014)

References


Education and Development, 24(8) 1082-1111.


Appendix A

Safe Routes to School (SRTS) Pre and Post-test

Teacher name ________________________________ Date: __________
School ________________________________

Bicycling In Kids Education
Pre and Post-Test

Write T for True or F for False. This is not for a grade by your teacher.

1. You should ride your bicycle on the left side of the street so that you can see the cars coming at you.
   _____

2. Traffic laws are made for bicyclists as well as cars.
   _____

3. It is safe for 2 people to ride on a bike if one is on the handlebars.
   _____

4. A bike in poor condition is safe if the driver is skilled.
   _____

5. Listening to music on headphones is a good way to relax while riding a bike.
   _____

6. A cyclist should only look straight ahead when crossing an intersection.
   _____

7. You should watch for doors opening on parked cars.
   _____

8. Hitching or holding on to a car with your bike is safe if the cyclist is watchful.
   _____

9. Scanning for traffic means looking for cars, bikes, and other road users.
   _____

10. Bicycle riders should observe all traffic signs and signals.
    _____
Refereed Paper

Difference in Step Counts of 8th Grade Girls During Single Gender and Coeducational Team Games

Shaina Dochterman Arnold and Carla D. Smith

Research has found conflicting evidence for girls’ activity levels in single gender classes compared to coeducational settings. This study measured girls step counts of eighth grade girls, in four different team games. Each game was played in both single gender and coeducational settings. It was hypothesized that girls would have higher step counts in coeducational games than in single gender games. Results indicated a significant difference in step count in speedball (t = -3.29, p < .01) and basketball, (t = -3.50, p < .00). However, the significant difference was not in the hypothesized direction; steps were higher in single gender games. There was no difference in step count during coeducational or single gender floor hockey and soccer games.

Prior to 1972, physical education in public school was primarily separated by gender (Hannon & Williams, 2008). With the passing of Title IX, schools were required to provide equal opportunity for both genders. This included access to high quality physical education activities (Hannon & Williams, 2008). As schools grappled with ways to efficiently meet these requirements, they began to place boys and girls in coeducational physical education classes. The only time it was recommended to separate by gender, was during contact sports such as wrestling, football, and hockey (Hannon & Williams, 2008). The wisdom of coeducational classes continues to be debated, particularly for the traditional junior high age student (Penny & Evans, 2002).

Although Title IX is now over 40 years old, teaching in the coeducational setting is still a challenge for teachers, with 44 percent reporting trouble teaching in this setting. The pressure on girls to act feminine is still strong, and is often emphasized by the comparison of girls and boys by teachers (Gibbons & Ebbeck, 2011). Activities still maintain a gender appropriate or inappropriate designation, and some specific activities are still preferred by males, while others are preferred by females. When planning lessons,
70% of physical education teachers consider gender preference, and 50% consider students’ opinions on activities to include in the curriculum (Hill & Cleven, 2005).

At least 60 minutes of moderate to vigorous intensity physical activity (MVPA) is recommended daily for adolescents (Van Acker, da Costa, De Bourdeaudhuij, Cardon, & Haerens, 2010). Healthy People 2010 recommended daily physical education and MVPA for at least 50 percent of the class time (Van Acker, et. al., 2010). Unfortunately, it is during the preadolescent and adolescent years that girls’ physical activity levels begin to plummet. By the fifth grade girls start to fall behind boys in terms of baseline physical activity levels (Hannon, Ratliffe, Holt, & Thorn, 2005). By seventh to eighth grade, girls are mostly sedentary, with the percentage reporting sedentary activity level rising with each grade level (Hannon & Ratliffe, 2007). The United States National Risk Behavior Survey (1990) found that the proportion of girls that report being sufficiently active drops from 31% in the ninth grade, to 17% in the twelfth grade (Hannon & Ratliffe, 2007). It is clear that girls become less active as they get older, and teachers continue to struggle with strategies to counteract this rise in inactivity.

The purpose of this study was to investigate whether eighth grade female students, in a DoDD (Department of Defense Dependent) school, were more active in single gender team games or coeducational team games. It was hypothesized that female students in coeducational games would have higher by step counts, due to a higher level of competition and intensity due to the presence of male students.

Through the elementary grades girls typically perform at or above the ability level of boys. However, in the coeducational physical education classroom after elementary grades, girls tend to be more at risk for receiving ineffective learning experiences due to gender role stereotypes. During adolescence, boys tend to become stronger and faster than girls, increasing their athleticism and ability levels (Derry & Phillips, 2004), while girls are likely to develop physical anxieties due to a variety of puberty related challenges, such as body image issues related to weight gain (Perry & Pauletti, 2011).

Many studies have been done on adolescent girls’ perceptions of enjoyment and preference in coeducational and single gender physical education. Results are mixed. Girls report some benefits of participating in physical education with boys, such as working harder in games (Constantinou, Manson, & Silverman, 2009). Girls like having boys in the class because it makes playing games more enjoyable and they tend to enjoy the interaction with boys in certain activities; particularly, those that are lower intensity, such as volleyball, flexibility, and gymnastics (Hannon, Ratliffe, Holt, & Thorn, 2005).

However, girls also identify negatives of coeducational activity classes. Girls report not enjoying coeducational physical education when boys are extremely competitive, or when the learning environment seems physically and emotionally unsafe (Constantinou, Manson, & Silverman, 2009). Boys tend to dominate team games, such as flag football, by taking main positions, such as receiver and quarterback, which does not allow girls to fully participate or gain those skills (Hannon, Ratliffe, Holt, &
There are also mixed feelings about single gender physical education. Female students in single gender classes scored higher in perceived physical competence, effort, and enjoyment, than female students in coeducational settings, possibly because girls are less likely to interrupt classmates and more likely to help each other (Minjeong & Gill, 2011). Fewer interruptions in class means teachers can spend less time on management and more time on skill development and game play. For students this means more time spent on task and a more positive learning environment. A positive learning environment makes it easier for girls who may be less skilled and/or less athletic to comfortably challenge themselves when learning new skills and acquiring mature motor patterns as well as the knowledge and strategy necessary to play competitive games (Derry & Phillips, 2004). Girls in single gender classes often feel more comfortable communicating with each other and the teacher, which means more student-teacher interactions. As a result girls in single gender physical education often have more confidence, better grades, and better communication skills within the classroom (Minjeong & Gill, 2011).

Research has also compared classes that begin as coeducational, and then split into single gender during game play. This type of setting could be positive since it does provide girls with some of the benefits of both a coeducational setting and a single gender setting. When all three settings were compared, taking into account teacher interactions in each setting, no significant difference in activity levels were found (Hannon & Ratliffe, 2005), although teacher interactions were higher in the split-coed and single gender settings than in the coeducational class (Hannon & Ratliffe, 2005). Although female students in single gender physical education seem to acquire many benefits, there are still some negatives. In general it has been found that girls spend less time participating in MVPA in single gender physical education than girls in coeducational physical education (Hannon & Ratliffe, 2005) although they tend to prefer single gender physical education (Hannon, Ratliffe, Holt, & Thorn, 2005). Teachers must be creative in planning and organizing lessons to ensure that girls’ activity levels provide the maximum amount of health benefits. To meet this goal teachers must experiment with a variety of activities, as well as classroom organization, grouping and gender mix.

Method

Participants included 13 eighth grade females in a physical education class in a Department of Defense Dependent School outside the United States. Two physical education teachers, both female, one with seven years experience and one intern teacher, conducted all physical education classes. Consent was gained from the parents by sending a consent form a week before the study began that stated if they did not want their child to participate they should sign and return the form within a week. Approval to conduct the study was obtained from the University Institutional Review Board, the school administration, and the teacher of record before the start of the study. The students and parents were provided written informed consent and assent forms one week before the study started.
Gopher 5-Function Auto-Timer Pedometers™, model number 83-520, were used to monitor activity levels during participation in team sport games in physical education class. Pedometers have shown the ability to provide reliable and valid measurements of activity levels in adolescents in previous studies (Hannon, Ratliffe, Holt, & Thorn, 2005). Before the start of data collection, students were instructed on the proper use of the pedometer. This included how to properly attach it, and not opening the pedometer during the activity. Students were assigned a number that corresponded with the number on their pedometer to ensure they used the same pedometer each time. As an additional precaution, each pedometer was taped shut to ensure that students would not open them during the activity and invalidate the results.

Prior to the start of each class the researcher completed the following protocol with the pedometers: reset all pedometers to zero; put one box containing the thirteen pedometers on steps for easy access; made sure the number on each pedometer was visible to be easily identified by students; had access to a list with students names and assigned pedometer numbers in case students forgot their number. Every day of class students were reminded not to open the pedometers. After each class the researcher recorded step counts from each pedometer on an Excel spread sheet, reset the pedometers to zero, and returned them to the box.

Students enrolled in the physical education class participated in four different team games: soccer, floor hockey, speedball, and basketball. Each class period lasted 90 min with data collection occurring for 30 min. Each team game was played twice, once in a coeducational setting and once in a single gender setting. This resulted in a total of eight collections, four coeducational and four single gender games.

During the coeducational data collections, students were placed in mixed gendered teams, with only the female players using pedometers. The researcher noted the time that game play started to ensure the 30 min of data collection. Immediately following the end of game play or the 30 min, students were instructed to remove their pedometers and allow the researcher to record the number of steps. During data collection for single gender game play, male students were separated to the other side of the gym. All female participants were placed on single gender teams and all players attached pedometers.

Statistical analysis of the data for this study was conducted on a personal computer using Statistical Package for Social Science (SPSS 19.0). Data were entered into an Excel spread sheet after every class day. There were no issues with students tampering with the equipment or missing collection dates. Data from all thirteen females were used for the final results. Mean and standard deviation of steps were compared between coeducational and single gender settings. Due to missing data with the small sample size a repeated measures test could not be performed. Therefore, a paired $t$-test was run for each sport to determine differences in activity levels of females in coeducational versus single gender settings. A Bonferroni Correction was done to decrease the chance of error, due to the use of four different tests. Therefore, an alpha level of .0125 was used to determine statistical difference.
Results

Results for step count during floor hockey \((p = .94)\) and soccer play \((p = .02)\) showed no significant difference between coeducational and single gender game play. Results for speedball \((p = .01)\) and basketball \((p = .00)\) showed a significant increase in steps when girls participated in single gender game play. Table 1 provides mean and standard deviation for step counts during coeducational game play and single gender game play. See Table 2 for \(t\)-value and \(p\)-value for each separate team activity. The data are presented in the order collected; coeducational soccer data was collected first and the last data collection was single gender basketball.

Table 1

<table>
<thead>
<tr>
<th></th>
<th>Co-ed</th>
<th>Single Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soccer</td>
<td>1838.43 ± 231.95</td>
<td>2416.14 ± 555.56</td>
</tr>
<tr>
<td>Floor Hockey</td>
<td>1543.22 ± 619.55</td>
<td>1538.89 ± 345.65</td>
</tr>
<tr>
<td>Speedball</td>
<td>1266.60 ± 814.16</td>
<td>1982.40 ± 1021.65</td>
</tr>
<tr>
<td>Basketball</td>
<td>1424.62 ± 714.19</td>
<td>2270.92 ± 970.08</td>
</tr>
</tbody>
</table>

*Values in Mean ± Standard Deviation*

Table 2

<table>
<thead>
<tr>
<th></th>
<th>(t)-value</th>
<th>(p)-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soccer</td>
<td>-3.01</td>
<td>.02</td>
</tr>
<tr>
<td>Floor Hockey</td>
<td>.09</td>
<td>.94</td>
</tr>
<tr>
<td>Speedball</td>
<td>-3.29</td>
<td>.01*</td>
</tr>
<tr>
<td>Basketball</td>
<td>-3.50</td>
<td>.00*</td>
</tr>
</tbody>
</table>

*\(p < .0125 = \text{significant difference between co-ed and single gender pedometer step counts}\)
Discussion

The results of this study indicate that female eighth grade students took significantly more steps in single gender speedball and basketball games. However, step counts were similar in single gender and coeducational floor hockey and soccer. The results of speedball and basketball units are inconsistent with the findings of Hannon & Ratliff’s (2005) study that found no significant difference in female activity from coeducational to single gender physical activity, although this difference was not in the hypothesized direction.

Step counts in soccer were similar in both coeducational and single gender classes, possibly due to its popularity and familiarity with students. Soccer was a very popular sport in Germany, and a popular sport at this school, located in Germany.

Both floor hockey and speedball were relatively novel activities to students. However, speedball produced significantly higher step counts in the single gender setting, while floor hockey did not. Speedball and basketball have an ‘air game’ component that is similar, meaning that participants pass the ball in the air to another player. This could be a skill that was not as well developed by students in a community where soccer, which is a ground game, is more popular. This may have caused female students to feel less comfortable playing these games with males. When males tend to dominate team games (Hannon, Ratliff, Holt, & Thorn, 2005) it is hard for females to improve their skills. In the single gender class, girls may have been more motivated to practice skills without worry.

Because floor hockey is less appealing to females (Hill & Cleven, 2005) it was thought that female activity levels would be higher during single gender game play than coeducational game play. However, floor hockey was new to students; neither male nor female students had developed any ‘mastery.’ This may have prevented more assertive students from dominating game play, thus keeping step counts similar in both settings.

This research suggests that females might be more active in particular activities, when they are allowed to play in a single gender setting. Due to these results, a teacher might deem it wise to separate males and females during games that include skills that are new to students, or games in which skills have not yet been mastered. The single gender setting allowed females to increase practice of the skill, rather than struggling to gain possession of the ball from more dominant male players. However, because there are benefits from interacting in coeducational activity setting, the physical educator should carefully consider which setting will be best for all students, given the type of activity.

In conclusion, this study indicated that eighth grade girls were more active during single gender than during coeducational games of speedball and basketball. There was no difference in step counts between single gender and coeducational games during floor hockey or soccer. Further research should include more data collection during a variety of activities in both single gender and coeducational settings. Teachers must be willing to experiment with a variety of games, activities and gender groupings to increase adolescent girls’ activity levels in the physical education context.
References


SHAINA ARNOLD is a 2012 Graduate of Truman State University, Master of Arts in Education. She currently teaches Health/Physical Education and coaches girls’ Basketball and Track and Field at Scotland County R-1.

CARLA SMITH, Ph.D., is an Associate Professor in the Department of Health and Exercise Science at Truman State University. Smith received her Doctoral degree in Physical Education Pedagogy from the University of Arkansas, Fayetteville. Her area of expertise is physical education teacher preparation.
Validity: A Pilot Study of the 8 Tactile Point Bioelectrical Impedance using the GE Lunar Prodigy DEXA in Body Composition Assessment
C. Rosen; C. Walker; B. Dunn; R. Downs; B. Jones; Missouri Baptist University, St. Louis, MO & Logan University, St. Louis, MO
Faculty Mentors: Guy Danhoff & Robert T. Davidson

Body composition is the accepted method to determine number of risk factors by the ACSM guidelines and can be measured by many different apparatuses; one of them being bioelectrical impedance. Previous research had suggested it was a less accurate method of measurement, but with new technology emerging in bioelectrical impedance, this warrants more research to be done with these new devices. Purpose: This study evaluated the validity of the Biospace InBody 720 body composition analyzer to the gold standard GE Lunar Prodigy DEXA when comparing body composition measurements. The Biospace InBody 720 presents a compact, portable body style that has the ability to be used on a wider variety of body types than the gold standard DEXA.

Methods: Eight subjects (4M, 4F, mean age=22M, 23.5F) were tested first on the BioSpace InBody 720 body composition analyzer and immediately after tested on the GE Lunar Prodigy DEXA by a trained technician. The subjects completed a 12 hour fast, refrained from alcohol consumption for 24 hours, and refrained from exercise for a minimum of 36 hours before testing.

Results: The measurements used for comparison were Body Fat Percentage results from both apparatuses. The results show that the BioSpace Inbody 720 and the GE Lunar Prodigy are similar when comparing Body Fat Percentage measurements and they are not quite significantly different ($t(7) = 1.91, p = 0.0985$). Conclusions: No significant difference was found when comparing the two types of body composition measurement apparatuses. Results suggest that that BioSpace InBody 720 provides accurate data during the measurement of body composition.
Variations in Cardiac Function of Anaerobic and Aerobic Athletes
Andrew Brimhall, Matt Stanage, Thania Lozano, and Danielle Herrick
Evangel University
Faculty Sponsor: Keith Hardy PhD, MPT

One of the most researched abnormalities, athlete’s heart, is left ventricular hypertrophy (LVH), typically characterized by an increase in cardiac mass (left ventricular hypertrophy) in anaerobic athletes and increase in internal diameter in aerobic athletes. It is also known that heart rate variability (HRV) are typically lower in highly trained aerobic athletes. Little research has been done in studying these differences specifically between aerobic and anaerobic athletes. The purpose of the study was to quantify the differences in anaerobic and aerobic athletes’ heart rate variability (HRV) and strength of left ventricular contraction (RV5+SV1) to determine if LVH was present. Thirty-seven college athletes (N = 37), 21 male and 16 female athletes volunteered to participate representing five different sports (10 football players, 10 volleyball, 5 basketball players, and 12 cross country athletes), were then separated into two groups based upon the nature of their sport: aerobic (17) or anaerobic groups (20). An EDAN 12-Channel Electrocardiograph model SE-1200 was used to analyze each participant’s HRV and determine if LVH was present (RV5+SV1 ≥ 2.6mV). Results for LVH (RV5+SV1) and HRV were each analyzed using a one-way analysis of variance (ANOVA). This analysis failed to reveal a significant difference among HRV, F(3, 33) = 1.95. ANOVA did however reveal significant differences among LVH, F(3, 33) = 5.58. A post-hoc Tukey test identified significant differences  p < .05 between aerobic males and both the male and female anaerobic groups. Results suggest that aerobic training may result in LVH more often than anaerobic training.

Effects of Static and Dynamic Stretches On Jump Height in Collegiate Athletes
Asia Cogiel, Kelsey Kapella, Emily Musy, and Aimee Sudek
Evangel University
Faculty Sponsor: Keith Hardy PhD, MPT

Stretching prior to activity is an essential part of physical preparation. The purpose of this study was to examine how a power movement, specifically the vertical jump, is effected by different stretching protocols. Evangel University collegiate athletes (N = 35; age 19.5 ± 1.4 years) representing three different sports men’s basketball (10), women’s basketball (8), and women’s volleyball (17) were tested. Testing involved using a no warm-up, static warm-up, and dynamic warm-up protocols prior to a vertical jump test in order to determine if there were any significant differences in vertical jump heights between the different warm-ups. The results were analyzed using a one-way analysis of variance (ANOVA) through the use of SPSS software. The results of this study showed that there was no significant difference in vertical height jump trials of the athletes tested using three stretching protocols on vertical jump performance $F(2, 72) = 2.10$. Post-hoc Tukey tests revealed a significant difference between the
women’s basketball and volleyball teams’ overall vertical jump height ($p < 0.05$) with the volleyball team resulting in higher vertical jump heights on average. Results suggest that the stretching protocols used in this study had no effect on improving vertical jump height.

**Differences in Optimal Performance Experiences between Male and Female College Athletes**

*Chad Farris & Shane Midgyett*

*Missouri Western State University*

*Faculty Advisor: Dr. William Russell*

**Introduction:** The study of optimal performance is a relatively new phenomenon in sport psychology. Male and female athletes alike share similar experiences of flow states within their own domains of optimal performance. Research has found that “flow” is not only associated with a psychological state within each individual athlete but also associated with peak performance or being in “the zone”. **Purpose:** The purpose was to examine differences in optimal performance experiences (flow) among male and female NCAA Division II college athletes. **Methods:** A total of 42 college age student-athletes (N= 18 males and N= 24 females) across five different sports from Missouri Western State University (N= 18, men’s football, N= 10, women’s soccer, N= 5, women’s basketball, N= 7, women’s volleyball, and N= 2, women’s softball) using the Flow State Scale (FSS; Jackson & Csikszentmihalyi, 1999). Participants were selected based on those athletes whom the researchers perceived would possess certain characteristics associated with flow states in their respective sport. **Results:** The results of the research show that although both male and female college athletes reported having experienced flow states at some point in time in their career, male and female collegiate athletes did not significantly differ between various dimensions of their perceived flow states ($p > .05$). **Conclusions:** Even though no significant differences in flow across gender were found, there were significant differences found across sport in 5 of the 9 flow dimensions (clear goals, concentration, sense of control, loss of self-consciousness, autotelic experience) as measured by the FSS. The researchers agreed that it was necessary to take a secondary approach, and examine whether or not there were any significant differences in flow experiences across sport. **Implications:** Future research should examine flow occurrence in a wider variety of male and female sports at different NCAA levels.

**Stress and Negative Coping among College Students in Missouri**

*Linnea Heimsoth, Katherine Reysack*

*Truman State University*

*Faculty Sponsors: Dr. Roberta Donahue & Dr. Alicia Wodika*

The Missouri College Health Behavior Survey (MCHBS) is an extensive on-line survey conducted annually across 21 college and university campuses, both public and private, since 2007. The instrument is designed
to assess risk behaviors associated with leading causes of morbidity and mortality among college students. The purpose of this research project was to analyze years 2012 (Truman n= 412, State n=9,151), 2013 (Truman n= 527, State n=9,599), and 2014 (Truman n=480, State n=8,994) regarding patterns and trends in average alcohol consumption, binge drinking, stress levels, leadership positions, and negative implications of alcohol usage at Truman State University compared to the state-wide average. Truman students reported higher levels of stress than the Missouri average. The percentage of students who reported that stress considerably interfered with their academic performance was approximately 23% in 2012, 20% in 2013, and 15% in 2014, which were all higher than the Missouri average. In addition, more Truman students indicated that alcohol helped them cope with stress. Students also reported elevated rates of binge drinking and unwanted sexual contact. In 2014, the percentage of university students who reported binge drinking was 10.4% higher than the Missouri average. Many Truman students viewed alcohol as a positive way to escape the stressors associated with a highly selective college environment. On the other hand, in 2014 Truman students responded that they were 6.5% less likely than the Missouri average to drive after consuming alcohol. These results highlight areas of concern at Truman and form a baseline for program implementation and evaluation of progress toward campus goals and objectives for Truman’s Partners in Prevention coalition. This study suggests specific targets for future stress and alcohol-related behavioral and educational interventions at Truman State University.

**What’s a Sport: Understanding College Student’s Beliefs of What Makes an Activity a Sport**

*Matthew Karner*

*Truman State University*

*Faculty Mentor: Liz Jorn*

There is much debate about the term sport and the aspects that distinguish games vs. activities vs. sports. The purpose of this study was to understand college students beliefs of what are the main differences between activities and sports. Students (n=241, age=19.9± 4.72) were surveyed using Likert, open-ended and ranking questions. Results indicated that 52.3% believed that competition is the best word to distinguish sports from activities followed by skills (24.9%). A ranking of 10 activities had students choosing basketball as the most representative sport with darts as the least. Competitive cheerleading was the most diversely ranked activity and shows the clear debate about activities that are judged such as gymnastics and dance. Results showed that 65.1% strongly disagreed/disagreed that you can have a sport without physical activity. Only 54.4% agreed/strongly agreed that all Olympic events are sports. Maybe this study will shed light on this controversial discussion among sport enthusiasts.
Examination of Reasons of Sport Participation and Physical Activity Enjoyment between High School Athletes across Specialization Status
Margaret Lee
Missouri Western State University
Faculty Advisor: Dr. William Russell

Introduction: Athletes who participate in a single sport (“specializers”) are often thrust into highly structured and competitive environments which may foster burn out and negative feelings regarding that sport, and physical activity in general. Previous research has indicated that youth athletes who participate in a variety of sports report higher levels of physical activity enjoyment than specialized youth athletes. Purpose: The purpose of this study was to determine if high school athletes who specialize in a single sport differ in their physical activity enjoyment compared to athletes who play multiple sports. Methods: Participants were 121 high school athletes (M age=15.70, SD=1.22) who participated in summer camps in the sport of volleyball (n= 40), soccer (n=33), wrestling (n=6), or tennis (n=42). All participants completed a survey packet asking whether they specialized in a single sport, their reasons for sport participation, and their physical activity enjoyment (PAES, Kendzierski & DeCarlo, 1991). All participants completed the survey packet during registration for their respective sport camp. Results: Individual independent t-tests comparing “specializers” and “nonspecializers” on their reason for sport participation were nonsignificant (p>.05). In addition, no significant difference was found on physical activity enjoyment between specializers and nonspecializers (t(119) =1.50, p=.14). Conclusion: These results suggest that specializers and nonspecializers were similar in their reasons for sport participation and general physical activity enjoyment. Primary reasons for sport participation may be more similar than different in these two groups of athletes among non-elite youth athletes. Implications: Since no differences were found in this non-elite sample, future research should examine these variables in more elite youth sport settings.
Manuscripts, research abstracts and art material are invited from any individual within the profession or from other disciplines or organizations and will be carefully considered for publication. Publication is subject to space availability. In submitting a manuscript for publication, the author should include a statement that it has not been published or accepted for publication elsewhere. Articles and materials are accepted in three categories: editor-reviewed articles, refereed articles, and student articles.

Editor-reviewed submissions are evaluated in terms of their contribution to knowledge, practice, theory, scholarly presentation, and relevance to the profession and readership. Revisions may be required.

Manuscripts submitted to the refereed section should be data-based (numerical or text) articles or substantial reviews of research literature. They are sent to three reviewers for a blind review and vote as to acceptability. Publication is contingent on revisions required by the reviewers. Authors should indicate their desire to have their manuscript refereed. Please note that referees hold manuscripts to the highest standards, particularly in regard to research methodology and currentness. The Missouri AHPERD Journal might publish refereed articles that are more practitioner-oriented than national journals or pertinent to Missouri, but articles must be of the highest quality.

The Editors are committed to publishing the best student paper submitted in any year, but additional student papers may be published. Supervising professors may assist students but cannot co-author manuscripts for this section.

Journal contributors must submit material for the refereed section by December 1st and material for the editor-review section by January 15th. The editors are subject to referees for timely reviews.

Authors must follow the directions given in the current edition of the Publication Manual of the American Psychological Association (www.apa.org). An exception is that authors should use the “insert table” function in word processing their manuscript rather than using tabs. Figures should still be placed at the end of the article or sent as a separate file. Because the Journal is published online, figures may be in color.

Authors should e-mail manuscripts (by attachment) to Dr. Kathleen Haywood, haywoodk@umsl.edu, and Dr. Scott Strohmeyer (strohmeyer@ucmo.edu). Manuscripts should not exceed 24 pages including references and tables. Where human participants are involved, authors should include a statement that institutional review board approval was obtained and that the informed consent of any and all human participants was obtained. A phrase to this effect should be in the article.

Material is received only with the understanding that the Editors and publisher are not responsible for loss or damage. Material will be returned only upon written request made at the time of submission.

A tradition of the Journal is to provide a brief biographical sketch of each author. Please include degrees, titles, department and institution affiliation, job responsibilities, and any state association offices held.