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2013 Represented Universities

Eastern Washington University
Utah Valley University
Washington State University
Whitworth University
La Sierra University

RESEARCH CRITIQUE ABSTRACTS



IMPACT OF MS ON DISABILITY AND QUALITY OF LIFE

A critique of the work of Wynia et al. (2011), "Change in disability profile and quality of life in multiple..."

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PURPOSE

Multiple Sclerosis (MS) causes a broad spectrum of disabilities and has varying effects on Quality of Life (QOL). The purpose of the reviewed study was to relate the QOL to the varying disabilities of MS with respect to the severity of the disease (Wynia, van Wijlen, Middel, Reijneveld, & Meilof. 2011).

METHODS

Patients attending the Groningen MS Center were selected to fill 378 positions in a five-year study beginning in 2004. Patients were re-evaluated after five years. The evaluation was based on the self-report version of the Expanded Disability Status Scale (EDSS) taken at the beginning of the study. This classified the 378 patients into three groups; low-severity (EDSS 0 to <4.5), moderate-severity (4.5 to <7.5), and high-severity (7.5-10). The MS Impact Profile (MSIP) was applied at the end of the study to assess the change in severity and QOL. The paired samples t-test was used to examine changes.

RESULTS & DISCUSSION

Of the 11 MSIP disability domains, changes were observed in nine of them over the five-year study. Eight of the nine changes were considered statistically significant and relevant in comparison to the original data. Change in disability varied for each severity group (see Table 1).

Overall Change in Functionality for Individual Severity Groups			
	Total Patients	Walking Ability (End of Study)	Gain in Disability
Low Severity	- 96 Patients	- 66 Still Unlimited - 18 Leading to Limitation - 12 Leading to Wheelchair Dependency	- 7 of 10 Categories Increased
Moderate Severity	- 99 Patients	- 51 Limited - 35 Wheelchair Dependent - 13 Improved	- 5 of 10 Categories Increased
High Severity	- 46 Patients	- 44 Still Wheelchair Dependent - 2 Walk with Assist Devices	- Increase in Speech Impairment Only

Table 1. The biggest change was seen in the low severity group, with the most overall categorical increase in disability.

CRITIQUE

The most significant difference in QOL was found to be in the low-severity group, while no significant changes were found in the high-severity group. A strength of the study was that it was the first to examine overall change in disabilities relating to QOL. A limitation was that the study did not account for medications that were taken to slow progression of the disease. Future research should include a fourth group of patients taking progression slowing medications.

REFERENCE

Wynia, K., van Wijlen, A. T., Middel, B., Reijneveld, S. A., & Meilof, JF. (2011). Change in disability profile and quality of life in multiple sclerosis patients: a five-year longitudinal study using the Multiple Sclerosis Impact Profile (MSIP). *Multiple Sclerosis Journal*, 18(5), 654-661.

BEHAVIOR TREATMENT FOR CHILDREN WITH AUTISM

A critique of the work of Delvin et al. (2011), "Comparison of behavioral intervention and sensory-integration..."
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PURPOSE

Sensory-integration therapy (SIT) is a common therapy used among occupational therapists when working with children diagnosed with Autism Spectrum Disorder (ASD). The purpose of the reviewed study was to observe if children with challenging behavior and ASD responded better to SIT or behavioral intervention (BI) practices (Delvin, Healy, Leader, & Hughes, 2010).

METHODS

Four male children, ages 6-11, diagnosed with ASD and showing challenging/self-injurious behavior received random intervals of SIT and BI for 10-13 days. After the random intervals, only the most successful practice was implemented for the remaining 10 days. The SIT involved facilitation of vestibular, proprioceptive, and tactile input 15-minutes prior to class activities. The BI included variable schedules of reinforcement throughout the day. No statistical analysis was used; success was determined based on the extinction of challenging behavior.

RESULTS & DISCUSSION

The four participants displayed varying amounts of challenging behaviors. However, all experienced more incidents during SIT interval days than during BI interval days. The incidents of unwanted behaviors were reduced when only the BI treatment was used for the last 10 days (see Table 1). The study indicated that BI was more effective over SIT in reducing the levels of challenging behaviors because BI identified functional properties of the behavioral disorders. Situational variables of class activities were identified as what triggered the behaviors. The behaviors were reduced with BI when the target behavior was reached in a given situation.

Behavioral Incidents Per Day Among Treatments

Child	Baseline	SIT-Interval	BI -Interval	BI-Alone
1	11.0	16.0	6.0	1.0
2	9.0	6.8	2.6	0.0
3	8.4	8.5	8.4	2.0
4	11.4	7.4	4.2	0.0, 6.0, 4.0

Table 1. The averages showed the amount of challenging or self-injurious behavior that occurred during a given intervention.

CRITIQUE

This study determined BI was more effective than SIT in eliminating challenging behavior in children with ASD. An individualized plan that catered to each child was beneficial because the behavior could be eliminated almost completely. The sample was specific, so results were limited and could not be generalized to all children with ASD. A future recommendation would be to include varying ages and genders in order to get a more accurate sample reading.

REFERENCE

Delvin, S., Healy, O., Leader, G., & Hughes, B. M. (2011). Comparison of behavior intervention and sensory-integration therapy in the treatment of challenging behavior. *Journal of Autism and Developmental Disorders*, 41, 1303-1320.

MUSCLE STRENGTHENING FOR KNEE PAIN

A critique of the work of Nakagawa et al. (2008), “The effect of additional strengthening of hip abductor...”
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PURPOSE

Patellofemoral pain syndrome (PFPS), or runner’s knee, is a common condition seen among young female athletes. The purpose of the reviewed study was to evaluate the effectiveness of additional muscle strengthening along with a quadriceps exercise program in decreasing pain associated with PFPS (Nakagawa, Muniz, de Marche Baldon, Maciel, de Menezes Reiff, & Serrão, 2008).

METHODS

Fourteen individuals diagnosed with chronic PFPS, between the ages of 17 and 40, were randomly sorted into control and intervention groups. Both groups carried out a quadriceps-focused exercise plan five times per week for six weeks. The intervention group received additional exercises which focused on strengthening transversus abdominis, hip abductor, and lateral rotator muscles. An isokinetic dynamometer was used to measure the torque of the knee extensor, hip abductor, and hip lateral rotator muscles of individuals in both groups. Additionally, electromyography (EMG) data was collected on gluteus medius during hip abductor movement. Results were evaluated using a Shapiro Wilks test and a paired *t*-test.

RESULTS & DISCUSSION

Additional hip muscle strengthening reduced pain overall. The intervention group’s pain levels, rated on a visual scale from zero to ten, significantly decreased during dynamic, functional weight-bearing activities (see Table 1). Both groups improved in knee extension torque, but only the intervention group improved significantly in gluteus medius EMG activity during maximal isometric voluntary contraction. Hip control improved because of a focus on trunk, pelvis, and hip muscle recruitment. Intervention individuals developed better hip control, which resulted in less stress on the patellofemoral joint decreased pain.

Pain Level Improvement		
Functional Dynamic Activity	Mean Change in Intervention Group	Mean Change in Control Group
Stair-climbing	-3.0 ± 3.2	-2.4 ± 3.6
Descending stairs	-4.1 ± 2.9	-2.8 ± 2.7
Squatting	-5.4 ± 3.0	-1.8 ± 2.6

Table 1. Individuals in the intervention group showed decreased pain levels in all activities, except during prolonged sitting, when compared to the control.

CRITIQUE

Additional strengthening of hip abductor and lateral rotator muscles indicated effectiveness in treating symptoms in PFPS patients. Detailed exclusion criteria helped in isolating individuals with specific symptoms. The study admitted a lack of significant data pertaining to muscle torque due to small sample size. Further research incorporating a follow-up period should indicate effectiveness of this exercise routine for clinical application in the rehabilitation of PFPS.

REFERENCE

Nakagawa, T. H., Muniz, T. B., de Marche Baldon, R., Maciel, C. D., de Menezes Reiff, R. B., & Serrão, F. V. (2008). The effect of additional strengthening of hip abductor and lateral rotator muscles in patellofemoral pain syndrome: A randomized controlled pilot study. *Clinical Rehabilitation*, 22, 1051-1060.

GOAL-ORIENTED STROKE REHABILITATION

A critique of the work of Kim et al. (2012), “The effect of a task-oriented training on trunk control ability...”
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PURPOSE

Stroke often causes a loss of muscle strength, paralysis, and a decreased ability to perform activities of daily living (ADLs). The purpose of the reviewed study was to evaluate the effectiveness of task-oriented therapy for post-stroke patients in improving trunk control, balance, and gait (Kim, Lee, Bae, Yu, & Kim, 2012).

METHODS

Twenty middle-aged post-stroke patients were randomly assigned to control or experimental groups. Both groups of ten patients received general physical therapy one hour per day, five times per week, for four weeks including joint mobilization, muscle strengthening, and balance training. In addition, the experimental group performed task-oriented training one hour per day, three times per week, which included 10 walking-related tasks for five minutes each (see Table 1). Individuals were evaluated using the Trunk Impairment Scale (TIS), Berg Balance Scale (BBS), Timed Up & Go (TUG) test, and the 10 m Walk Test (10 MWT). The results were analyzed using the Kolmogorov-Smirnov test and paired *t*-test.

Walking-Related Tasks			
• Step-ups	• Treadmill	• Speed walk	• Stairs
• Balance beam	• Stand up and walk	• Walk backwards	• Kicking a ball
• Obstacle course		• Walk and carry	

Table 1. Patients performed tasks to strengthen lower extremities and enhance walking balance, speed, and distance.

RESULTS & DISCUSSION

There were significant differences in three of the four tests between groups. After four weeks, the experimental group and control group scores for the TIS were 18.50 ± 2.37 and 16.40 ± 4.67 , respectively. The BBS scores were 50.10 ± 4.12 for the experimental group and 44.60 ± 10.17 for the control group. While both groups improved in dynamic balance, only the experimental group developed more coordination. Both groups showed equal improvement in the TUG test. The experimental group also showed better 10 MWT results of 20.22 ± 10.69 in contrast to 26.19 ± 11.09 for the control. Walking-related stroke rehabilitation further developed trunk control, coordination, and functional mobility.

CRITIQUE

Task-oriented training improved trunk control, balance, and gait overall. A strength of the study was the number of standardized tests performed to evaluate trunk control, gait, and balance in individuals. The study was limited by the lack of positions evaluated with the TIS. Further research geared towards evaluating different positions, such as standing or lying down and ADLs, would determine the effectiveness of task-training in overcoming weakness and balance challenges that stroke patients face every day. More information is needed to prove a correlation between trunk control and gait for mobility-related ADLs after task-oriented physical therapy sessions.

REFERENCE

Kim, H., Lee, S. M., Bae, H. B., Yu, J. H., & Kim, T. H. (2012). The effect of a task-oriented training on trunk control ability, balance and gait of stroke patients. *Journal of Physical Therapy Science*, 24(6), 519-522.

TRAINING FOR LACROSSE ENDURANCE CAPACITY

A critique of the work of Hirakawa and Tanisho (2009), "Training effects on endurance capacity in maximal..."
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PURPOSE

Lacrosse athletes compete at intensities that are extremely high at times and at other times are fairly low; it is a sport of maximal intermittent activity and endurance. The purpose of the reviewed study was to compare continuous training (CT) versus intermittent training (IT) and determine how each training method effects endurance capacity for athletes participating in maximal intermittent exercises (Hirakawa & Tanisho, 2009).

METHODS

Eighteen male college lacrosse athletes were separated into three groups (CT, IT, and non-training) following pre-training assessments. The pre-training assessments were also the post-training assessments used to compare the effects of training on endurance capacity for each of these groups. Following the assessments (see Table 1), CT and IT implemented an assigned training protocol for each group. The CT group performed incremental pedaling to exhaustion and the IT group performed ten sets of ten second maximal sprints on a cycle ergometer with twenty second recovery periods following each set. These protocols were followed three times a week for fifteen weeks and then athlete's performed the post-training assessments. Pre/post-training assessment differences were determined using repeated two-way analysis variance.

Pre/Post-training Assessments on Cycle Ergometer

Maximal Anaerobic Power (MANP)	Three, ten sec. maximal pedaling sessions
Aerobic Test (VO _{2max})	Maximal incremental cycling progression to exhaustion
Intermittent Exercise	Ten sets of ten sec. maximal sprints with a forty sec. recovery after each set

Table 1. Descriptions of the pre/post-training assessments performed on a cycle ergometer to determine significant endurance capacity improvements.

RESULTS & DISCUSSION

The CT group saw insignificant improvements in both MANP and VO_{2max} assessments, while there were significant improvements in endurance capacity as measured by the intermittent exercise test. The IT group, however, saw more significant improvements in the endurance capacity assessment, as well as in the MANP and VO_{2max} assessments. The evidence from the study suggests IT improves both anaerobic and aerobic fitness, and therefore produces an athlete whose endurance capacity in maximal intermittent exercise is more desirable for competition.

CRITIQUE

This study suggests that interval training is an effective method to increase endurance capacity in lacrosse. The combination of MANP, VO_{2max}, and intermittent exercise testing provides a broad foundation to reinforce the study's conclusion regarding IT. Although physical training outside the confines of testing was discouraged it was not restricted, possibly skewing test results. Future research should seek to test female athletes who participate in intermittent exercise competitions.

REFERENCE

Hirakawa, K., & Tanisho, K. (2009). Training effects on endurance capacity in maximal intermittent exercise: comparison between continuous and interval training. *Journal of Strength and Conditioning Research*, 23(8), 2405-2410.

DEVELOPMENT OF COGNITIVE ABILITY WITH AGE

A report of the work of C. Rovee-Collier and R. Barr (2010), "Infant learning and memory"
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PURPOSE

The purpose of the study was to provide information and evidence on early infant learning. Rovee-Collier and Barr demonstrated that different types of learning, memory, and retention skills were present at various ages (2010).

METHODS

Seven infants, 2-18 months old, participated in four learning experiments (see Table 1) of systematic research. Infants first participated in a habituation learning exercise with exposure to stimulus in intervals up to 75 seconds. Next, the subjects were exposed to classical and operant conditioning. Latent learning also was examined. The study techniques continued until each individual showed a specific form of learning. The purpose was to identify response patterns. Memory and learning was measured by the ability of task repetition with various refractory time periods. Cues such as reminders and reinstatements also were given in certain experiments.

Learning Techniques

Technique	Definition
Habituation	Provide individual with repeated exposure of stimulus to gain specific response
Classical Conditioning	Allows individual to anticipate what might happen given after an event
Operant Conditioning	Individuals respond voluntarily to gain a reward or do not respond when associated to punishments
Latent Learning	Learning in which new knowledge is not shown until it is needed in a particular situation

Table 1. Various learning techniques tested by researchers determine infant learning capability, information storage, and recollection (original table adapted from Rovee-Collier & Barr, 2010).

RESULTS & DISCUSSION

During habituation trials, infants ages 3-4 months were capable of retaining information for 5-15 seconds, while infants ages 9-12 months could retain the same information for 10 minutes. Both classical and operant conditioning showed that frequent and consistent showing of the stimulus allowed for better retention. Although latent learning was not directly observable, researchers were able to state information was stored and used for future recollection.

CRITIQUE

The study provided excellent information about infant learning. More direct research methods were needed. New methods could include neuroimaging to provide concrete learning theories. The results indicated that the learning process began during infancy and different stimuli could influence the quality of information retention.

REFERENCE

Rovee-Collier, C., & Barr, R. (2010). Infant learning and memory. *Handbook of Infant Development*, 2(8), 271-294.

ALTERED HEALTH AFTER HYPERTENSIVE PREGNANCY

A critique of the work of Männistö et al. (2012), "Elevated blood pressure in pregnancy and subsequent chronic..."

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PURPOSE

During pregnancy, hypertensive disorders can develop; this can affect the future health of the mother and child. The purpose of the reviewed study was to evaluate women for the risk of cardiovascular, cerebrovascular, kidney disease and diabetes after a hypertensive pregnancy (Männistö, Mendola, Vääräsmäki, Järvelin, Hartikainen, Pouta, & Suvanto, 2012).

METHODS

Ten thousand three hundred fourteen females with singleton pregnancies were evaluated for high blood pressure. At visits blood pressure was measured; women were grouped into the following, normotensive, new-onset hypertension, and chronic hypertension. Women were evaluated one year post-pregnancy for hypertensive disorders; adjustments were made for body mass index, smoking, parity, diabetes mellitus before or after pregnancy. The results were analyzed by student *t* tests, chronic kidney disease and diabetes mellitus. The highest hazard ratio between hypertensive women and normotensive women was myocardial infarction death, 3.00. The lowest was ischemic heart disease, 1.26 (see Table 1). Stress on a woman's body throughout pregnancy increased cardiovascular problems that might have already existed, which resulted in increased hypertension.

Gestational Hazard Ratios	
Hypertensive Disorder	Hazard Ratio
Heart Failure	1.78
Ischemic Stroke	1.59
Kidney Disease	1.91
Diabetes Mellitus	1.52

Table 1. Early intervention was beneficial in a hypertensive pregnancy.

CRITIQUE

Hypertension within pregnancy caused elevated risk of cardiovascular disease post-pregnancy. The study had a large number of participants resulting in higher accuracy. The study was limited in the classification of each hypertensive disorder due to change in diagnosing standards. Future research could test hypertensive pregnancies for cardiovascular disease throughout pregnancy.

REFERENCE

Männistö, T., Mendola, P., Vääräsmäki, M., Järvelin, M., Hartikainen, A., Pouta, A., & Suvanto, E. (2012). Elevated blood pressure in pregnancy and subsequent chronic disease risk. *American Heart Association Journals*, 2013(127), 681-690.

ULTRA-MARATHON EFFECT ON MUSCLE ACTION

A review of Guillaume et al. (2011), "Neuromuscular consequences of an extreme mountain ultra-marathon".
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PURPOSE

Ultra-marathon running causes high muscular fatigue. The purpose of the reviewed study was to compare the difference in maximal voluntary contraction (MVC) pre and post running (Guillaume et al., 2011).

METHODS

Twenty-two male ultra-marathon runners participated in the study. Pre testing was performed two to ten days before the race. Post testing was done within 20 minutes after finishing. All participants' right hips were tested in the frame of a Cybex II with the knee and hip flexed 90°. Maximal voluntary contraction was assessed using electromyography (EMG) placed on their vastus lateralis (VL) to measure knee extension (KE), and soleus (SOL) to measure plantar flexion (PF). Eleven runners did recovery testing 2, 5, 9, and 16 days after race day. A paired t-test was used to compare between pre and post testing for all participants. A one way analysis of variance with repeated measures was used to compare the post testing of the recovery group.

RESULTS & DISCUSSION

Results indicated there were significant decreases in the neuromuscular activation of KE and PF after prolonged and extreme running durations with large changes in elevation (see Table 1). Maximum voluntary activation (MVA) decreased for KE by 19% and for PF by 6%. The MVC had a significant decrease after the race for both VL and SOL. The VL and SOL decreased 35% and 39%, respectively. In the recovery group, the largest amount of recovery for MVC happened between post-race and day two. After that, MVC recovered progressively.

Changes in Voluntary Muscle Control					
	Post	D+2	D+5	D+9	D+16
KE MVC	-35	-10	-9	-5	-2
PF MVC	-39	-14	-8	-6	-3
KE MVA	-19	-2	0	-1	0
PF MVA	-6	-2	-1	-1	0

Table 1. The percent of differences in MVC and MVA compared to the pre-race value is shown. The symbol D+ refers to the testing days following the race day for the recovery group.

CRITIQUE

The KE and PF showed drastic decreases in MVC immediately after the race compared to the pre-race values. For the participants in the recovery group, the MVC were near baseline values after nine days. Testing the MVC of the runners immediately after the race was a strength of the study, ensuring that neuromuscular fatigue was at its greatest. A limitation of the study was that the only muscles tested were the VL and SOL. Future research should consider testing other KE and PF muscles.

REFERENCE

Guillaume, Y. M., Tomazin, K., Verges, S., Vincent, C., Bonnefoy, R., Boisson, R., ... Martin, V. (2011). Neuromuscular consequences of an extreme mountain ultra-marathon. *Public Library of Science One*, 6(2).

COMPARISON OF ASYMMETRY IN FEMALE RUNNERS

A critique of the work of Zifchock et. al. (2006), "Kinetic asymmetry in female runners with and without..."

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PURPOSE

Gait asymmetry may be linked to the tendency for runners to sustain chronic overuse injuries. The purpose of the reviewed study was to compare gait asymmetry in female runners who had never sustained a running-related injury (CON) to those who have sustained unilateral, tibial stress fractures (TSF; Zifchock, Davis, & Hamill, 2006).

METHODS

All subjects were female, rear foot strikers who were similar in age, weight, height and mileage. The participants were placed into two groups: 25 runners who had never been injured (CON) and 24 subjects with a history of documented TSFs. A ten-point difference in the symmetry index (SI) between the CON and TSF groups was used to evaluate the symmetry of each runner with respect to kinetic parameters (see Table 1). Subjects were asked to run along a 25 m runway at 3.7 m/s and wore a uniaxial accelerometer on the medial, inferior aspect of their tibia. Five trials were collected for both limbs and averaged. A two-tailed independent *t*-test was used to compare the kinetics between the limbs of the TSF subjects, included ground reaction force (GRF).

Kinetic Parameters			
• Peak Lateral GRFGRF	• Peak Braking GRF	• Peak Vertical GRF	• Peak Instantaneous Loading Rate
• Peak Medial GRF	• Vertical Impact GRF	• Average Vertical Loading Rate	• Peak Vertical Shock

Table 1. Eight kinetic parameters analyzed in this study were derived during stance phase.

RESULTS & DISCUSSION

Results suggested that kinetic symmetry in healthy runners ranged between 3.1% and 49.8%. Symmetry did not appear to be different between previously injured and never injured runners. The limb involved with the injury in the TSF group had elevated loading compared to the uninvolved limb. However, peak braking shock and vertical impact ground reaction force were significantly higher for the involved limb.

CRITIQUE

Symmetry between injured and uninjured runners did not appear to be different, but results on loading and impact could have helped explain the increased risk for sustaining repeated bone injuries. The variables were isolated well through a high degree of control and strengthened the study, but combining the data for both limbs limited the ability to determine the cause of TSF on a specific side. Future research should separate data between the left and right limb to pinpoint the differences that occur in asymmetry between limbs when a runner sustains an injury.

REFERENCE

Zifchock, R.A., Davis, I., & Hamill, J. (2006). Kinetic asymmetry in female runners with and without retrospective tibial stress fractures. *Journal of Biomechanics*, 39(15), 2792-7.

EFFECTS OF EXERCISE ON MULTIPLE SCLEROSIS

A critique of the work of Rampello et al. (2007), "Effect of aerobic training on walking capacity and maximal..."
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PURPOSE

Patients with multiple sclerosis (MS) often suffer periods of disability, which include poor exercise tolerance and fatigue. The purpose of the reviewed study was to compare the effects of an eight-week aerobic training (AT) program with a neurological rehabilitation (NR) program on exercise capacity in individuals with mild to severe MS (Rampello, Franceschini, Piepoli, Antenucci, Lenti, Olivieri, & Chetta, 2007).

METHODS

Nineteen subjects participated in an eight-week parallel crossover study, with an eight-week wait period between each program. The AT program consisted of three training sessions/week on a leg cycle ergometer. Each session consisted of a warm up, 30 minutes of 60% maximum work rate, cool down, and stretching. The NR program consisted of three sessions/week, each involving exercises aimed at improving respiratory, postural and motor synergies along with stretching. The results were analyzed using the chi-squared test, the analysis of variance, Kruskal-Wallis test, the Newman-Keuls multiple comparison test and the Friedman test.

RESULTS & DISCUSSION

Walking speed and distance improved significantly after completion of the AT program but not after the NR program (see Table 1), indicating increased limb endurance as result of the aerobic activity. Subjects displayed increased VO_2 levels and increased work rate only after the AT program, indicative of an improvement in fitness. The AT and NR programs did not differ in terms of perceived fatigue, possibly due to multidimensional origin.

Program	Exercise Capacity				
	Walking Speed (m/min)	Walking Distance (m)	Peak VO_2 (ml/min/kg)	Maximum Work Rate (W)	Perceived Fatigue
NR	P=0.14	P=0.17	P=0.88	P=0.01	P=0.64
AT	P=0.02	P=0.02	P=0.01	P=0.47	P=0.66

Table 1. The results of the AT program demonstrate improvement of specific tenants of exercise capacity in patients with multiple sclerosis as shown using p-values.

CRITIQUE

The study showed that an eight-week AT program might be more effective than an NR program in improving exercise tolerance and walking capacity in patients with mild to moderate MS. The results of the study may improve the quality of life for patients encouraged to use AT programs to manage this disease. The amount of participants that completed the study limited the validity of the research for a larger population, thus; future research should include a larger sample size.

REFERENCE

Rampello, A., Franceschini, M., Piepolo, M., Antenucci, R., Lenti, G., Olivieri, D. & Chetta, A. (2007). Effect of aerobic training on walking capacity and maximal exercise tolerance in patients with multiple sclerosis: A randomized crossover controlled study. *Journal of the American Physical Therapy Association*, 87(5), 545-55.

THYROID CANCER IN PEDIATRIC CANCER SURVIVORS

A critique of the work of Sigurdson et al. (2005), "Primary thyroid cancer after a first tumour in childhood..."
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PURPOSE

Survivors of childhood cancer who received radiotherapy to the upper body during treatment are at a high risk of developing thyroid cancer secondary to their initial diagnosis. The purpose of the reviewed study was to find a link between initial radiotherapy and thyroid cancer later in life (Sigurdson, Ronckers, Mertens, Stovall, Smith, Liu, Berkow et al., 2005).

METHODS

Participants included 14,054 childhood cancer survivors diagnosed before age 21. The patients were evaluated five years after the start of the study to see if a secondary thyroid cancer had developed, or if it was likely to develop. There were 69 cases with the cancer and 265 matched controls. Conditional regression analysis and calculated odds ratios were used to estimate the risk caused by radiation therapy. A simple linear model assessed the risk and increased radiation dose. Linear-exponential models were used to test for a reduction in risk at high doses.

RESULTS & DISCUSSION

Thyroid cancer risk increased linearly with low doses of radiation. The risk fell at doses of radiation absorption (in Gy) more than 30 Gy due to the cell-killing effect of radiation (see Table 1). Chemotherapy during initial diagnosis did not affect the survivor's risk. In addition, 42% of the cases had Hodgkin's lymphoma as a primary cancer while 19% of the controls didn't, which suggested that treatment for Hodgkin's made patients susceptible to a secondary thyroid cancer.

Radiation Dose vs. Thyroid Cancer Risk
0-9 Gy- 10 cases & 90 controls
10-30 Gy- 15 cases & 15 controls
>30 Gy- 2 cases & 4 controls

Table 1. The number of thyroid cancer cases increased with radiation absorption until Gy reached 30.

CRITIQUE

The cell-killing effect of radiation doses above 30 Gy made it less likely for survivors to get a secondary thyroid cancer. One benefit of the study was that it had a fairly large, diverse, and carefully selected sample group. A limitation was that eight participants had an intermediate cancer between their initial and secondary cancers, which was discounted. Future studies should not include such patients since other radiation may have attributed to their thyroid cancer risk.

REFERENCE

Sigurdson, A. J., Ronckers, C. M., Mertens, A. C., Stovall, M., Smith, S. A., Liu, Y., Berkow, R. L., Hammond, S., Neglia, J. P., Meadows, A. T., Sklar, C. A., Robison, L. L., & Inskip, P. D. (2005). Primary thyroid cancer after a first tumour in childhood (the childhood cancer survivor study): a nested case-control study. *Lancet Journal*, 365, 2014-2023.

EFFECTS OF EXERCISE ON TYPE 1 DIABETICS

A critique of the work of Yardley et al. (2012), "Effects of performing resistance exercise before versus after..."
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PURPOSE

Various forms of exercise affect the glycemic levels of Type 1 diabetics (T1D) in different ways. The purpose of the reviewed study was to compare the effect of exercise order on glycemic levels after both aerobic and resistance exercise (Yardley, Kenny, Perkins, Riddell, Malcolm, Boulay, Khandwala, et al., 2012).

METHODS

Twelve active adults with T1D (with an average plasma glucose concentration, or HbA_{1c}, of 7.1 ± 1.0%) performed 45 minutes of aerobic activity before 45 minutes of resistance training (AR) (see Table 1), or vice versa (RA). Plasma glucose levels were measured during and after exercise, and interstitial glucose was measured with continuous glucose monitors before, during, and after exercise. Two-way repeated-measures ANOVA and related-samples Wilcoxon signed rank tests were used to analyze the sets of data, respectively.

Resistance Training Exercises & Muscles Recruited	
<ul style="list-style-type: none">• Leg press (Quadriceps, Biceps femoris, Gluteus Maximus)• Seated row (Latissimus dorsi, Rhomboids, Trapezius)	<ul style="list-style-type: none">• Shoulder press (Deltoids)• Chest press (Pectoralis major)• Lat pull-down (Latissimus dorsi)• Leg curl (Biceps femoris)

Table 1. Seven different resistance-training exercises were performed for 45 minutes during the AR and RA treatments.

RESULTS & DISCUSSION

Substantial declines in plasma glucose concentration were seen during AR treatment but not during RA treatment. The higher glucose levels during RA were attributed to the increase of norepinephrine and epinephrine during anaerobic activity (which improve glycogenolysis) and the increased secretion of growth hormone (which decreases muscle glucose uptake). Additional carbohydrates to regulate blood glucose during exercise were required for 80% of AR participants and only 50% of RA participants. While the frequency of nocturnal hypoglycemia was similar between groups, the severity of hypoglycemia was worse after AR.

CRITIQUE

Performing RA rather than AR may reduce the risk of hypoglycemia and the need for extra glucose during activity in T1Ds. The study design encouraged real-life conditions rather than tightly controlled methods rarely seen in the lives of T1Ds. A limitation of the study was the sample population; the trends may differ for T1Ds who are not as active or have poorer glycemic control. Future research should include a broader participant base, such as those with lower fitness levels, and should explore factors such as the time of day when exercise is performed.

REFERENCE

Yardley, J., Kenny, G., Perkins, A., Riddell, M., Malcolm, J., Boulay, P., Khandwala, F., Sigal, R. (2012). Effects of performing resistance exercise before versus after aerobic exercise on glycemia in type 1 diabetes. *Diabetes Care*, 35(4), 669-675.

IMPLEMENTING PROGRAMS FOR KINDERGARTENERS

A report of the work of Deli, E., Bakle, I., & Zachopoulou, E. (2006)

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September 21, 2013

ISSUE

The purpose of this study was to observe and determine the effects of locomotor skills in kindergarten children. The children were placed into intervention programs that consisted of three different experimental groups.

OVERVIEW

Seventy-five children, 36 boys and 39 girls, ranging from five to six years of age participated in a 10-week program focused on seven locomotor skills. Leaping, skipping, running, galloping, hopping, horizontal jumping, and sliding were assessed. The children were placed into one of three different experimental groups. Group A followed a movement only program, Group B followed a music and movement program, and Group C was engaged in regular free-play activities. Groups A and B were assessed twice a week for 35 minutes. Group C had no organized time.

ANALYSIS

All seventy-five children were individually tested for performance record, post and prior to the intervention programs, using the Test of Gross Motor Development (Ulrich, 1985). The children were videotaped for pre and post testing for future analysis. Prior to the intervention programs, the means and standard deviations were depicted. The pattern of controlled grouping, with or without music, had mean scores closest to one another (see Table1). The controlled groups rose above the uncontrolled group in post- measures (Deli, Bakle, & Zachopoulou. 2006).

LOCOMOTOR SKILLS PRE AND POST RESULTS

Skills	Pre-Measure			Post- Measure		
	Group A	Group B	Group C	Group A	Group B	Group C
Running	1,91	1,92	2,48	2,72	2,68	2,12
Hopping	1,12	1,08	0,88	2,04	1,88	1,16
Leaping	0,60	0,29	0,56	0,96	1,20	0,64

Table 1. The first number determined performance record score. The second number was the mean of pre and post-measures. Changes in specific locomotor skills in the groups before and after the programs were assessed. Significant changes occurred in Groups A and B in the post-measures (Deli, Bakle, & Zachopoulou. 2006).

CONSIDERATIONS

The results of the study showed that Group A and Group B matured the fundamental movement patterns of complex and simple motor skills. It did not matter if the program did not have rhythmic accompaniment. The motor skills developed greatly with the controlled group. Group C did not meet the standard guidelines of motor development.

REFERENCES

Deli, E., Bakle, I., & Zachopoulou, E. (2006) Implementing intervention movement programs for kindergarten children. *Journal of Early Childhood Research* 4(1), 5-18.

EFFEFFECT OF INTERVAL TRAINING ON HEART HEALTH

A critique of the work of Currie et al. (2013), “Low-impact, high-intensity interval training in patients with...”

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PURPOSE

Cardiovascular exercise has been shown to improve the survival rates of patients with coronary artery disease (CAD). The purpose of the reviewed study was to quantify and compare the effect of high-intensity interval training (HIT) to endurance training (END) in patients with coronary artery disease (Currie, Dubberley, McKelvie, & MacDonald, 2013).

METHODS

Twenty male and two female patients with a documented history of CAD were chosen to participate in the 12-week study. Participants were randomly assigned into the HIT or END (n=11) group. Fitness measurements of each group were recorded before (F_i) and after (F_f) testing using a graded exercise test to exhaustion on a cycle ergometer to determine peak power output (PPO) and peak oxygen consumption (VO_{2peak}). High-intensity interval participants performed one-minute cycling intervals alternating between 89% and 10% of PPO and increased to 110% of PPO by week 12. Endurance participants performed continuous cycling at 58% of PPO for 30 minutes and increased to 50 minutes by week 12. Comparisons of VO_{2peak} were made between F_i and F_f . Data was analyzed using a factorial repeated-measure analysis of variance.

RESULTS & DISCUSSION

Both HIT and END groups showed an improvement in VO_{2peak} , a decrease in resting blood pressure, and a decrease in resting heart rate. Average VO_{2peak} increased by 3.6 and 4.7 $ml \cdot kg^{-1} \cdot min^{-1}$ in END and HIT respectively. Previous studies have shown a 12% increase in life expectancy for every 3.5 $ml \cdot kg^{-1} \cdot min^{-1}$ increase in VO_{2peak} and an increase in life expectancy for each 10bpm drop in resting heart rate.

Pre- and Post- Training Fitness Measurements

	Peak Power Output (W)		Relative VO_{2peak} ($ml \cdot kg^{-1} \cdot min^{-1}$)		Blood Pressure (mm Hg)		Heart Rate (bpm)	
	HIT	END	HIT	END	HIT	END	HIT	END
Pre	133 ± 51	108 ± 30	19.8 ± 3.7	18.7 ± 5.7	124/81	124/75	60	55
Post	159 ± 52	133 ± 42	24.5 ± 4.5	22.3 ± 6.1	121/79	118/68	57	52

Table 1. Mean ± standard deviations of pre- and post- protocol results for both HIT and END groups.

CRITIQUE

Patients with CAD benefited from both HIT and END protocols since both increased VO_{2peak} . A strength of this study was the use of inclusionary and exclusionary criteria to generate a sample population. Randomizing participants into HIT and END groups benefited the study by eliminating bias. The study was limited by its gender ratio and lack of control group. Future studies should require a more equal distribution of men and women in the sample population and consider testing a control group with no exercise protocol.

REFERENCE

Currie, K. D., Dubberley, J. B., McKelvie, R. S., & MacDonald, M. J. (2013). Low-volume, high-intensity interval training in patients with coronary artery disease. *Medicine and Science in Sports and Exercise*. Advance online publication. doi: 10.1249/MSS.0b013e31828bbbd4

NICOTINE LOCUM THERAPY DURING PREGNANCY

A critique of the work of Coleman et al. (2012), "A randomized trial of nicotine-replacement therapy..."

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PURPOSE

Cessation of smoking during pregnancy is important to fetal health. The purpose of the reviewed study is to assess the efficacy and safety of nicotine-replacement patches for extended abstinence from smoking during pregnancy (Coleman, Cooper, Thornton, Grainge, Watts, Britton & Lewis, 2012).

METHODS

One thousand and fifty women (16-50 years of age) with pregnancies in the range of 12-24 weeks gestation and who smoked five or more cigarettes a day during pregnancy were selected from seven hospitals in England. During the eight-week study, the women were randomly assigned treatment with active standard-dose nicotine patches or placebo patches. The data was collected through self-report surveys via telephone or face-to-face consultations with research midwives. Statistical significance was assessed through likelihood-ratio test.

RESULTS & DISCUSSION

Rates of prolonged abstinence at delivery (with validation) were 9.4% for the nicotine replacement group and 7.6% for the placebo group. Rates of adverse events were similar in both groups (see Table 1). The only abnormality was a significantly higher rate of delivery by cesarean section for the replacement group (20.7% vs. 15.3%). This study shows that supplementing behavioral support with nicotine replacement was no more effective than placebo in promoting sustained abstinence throughout gestation. This is accredited to a low adherence rate. The low adherence rate could be explained by increases in nicotine and cotinine clearance during pregnancy.

Outcome	Nicotine Replacement	Placebo
Maternal Adverse Events	440	338
Fetal Adverse Events	63	51
Neonatal Adverse Events	32	29
Total Adverse Events	535	450

Table 1. Participants may have had adverse events in more than one category. Fetal adverse events include, but are not limited to, decreased fetal movement. Maternal adverse events include skin reaction, headache, and other adverse events.

CRITIQUE

Supplemental behavioral support with nicotine replacement was no more effective than placebo in promoting sustained abstinence throughout pregnancy. This study was the largest of conducted research on nicotine replacement therapy during pregnancy, which deserves merit. A limitation of this study is the small sample size; which limits the external validity of this study. In order to further the research on this topic, a larger participant sample study with a higher dose of nicotine replacement would be required.

REFERENCE

Coleman, T., Cooper, S., Thornton, J., Grainge, M., Watts, K., Britton, J., & Lewis, S. (2012). A randomized trial of nicotine-replacement therapy patches in pregnancy. *The New England Journal of Medicine*, 366(9), 808-818.

REGAINING BALANCE AND GAIT SPEED POST-STROKE

A critique of Kang et al. (2011), "Effects of treadmill training with optic flow on balance and gait in individuals..."
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PURPOSE

Regaining balance and proper gait during stroke rehabilitation is critical in regaining independence. Treadmill therapy currently lacks visual stimulation used in normal proprioception for proper limb control and velocity during the gait cycle. The purpose of the reviewed study was to assess rehabilitation outcomes using optical flow during treadmill training in post-stroke patients (Kang, Kim, Chung, & Hwang, 2011).

METHODS

Thirty out of 32 post-hemiparetic stroke patients completed the study, and were divided equally among three rehabilitation groups: treadmill with optic flow (TOF), treadmill (T), and control group (C). Therapy was performed for 30 minutes, three times a week, for four weeks in each group. Data was collected using timed-up-and-go test (TUG), functional reach test (FRT), 10-m walk test (10MWT), and 6-minute walk test (6MWT) before and after therapy. A head mounted device, MSP-209, provided optical imaging. Treadmill speed was increased 0.1 km/h once patients walked stably for longer than 20 sec during TOF and T therapy sessions. Group C received only standard stretching and full range of motion exercises. Results were analyzed by one-way analysis of variance, significance was set to $p < 0.05$.

RESULTS & DISCUSSION

Significant improvements in TOF following therapy were noted in all tests (see Table 1). TOF mean scores were higher for all tests compared to groups T and C mean scores. Balance improvements (TUG, FRT) by TOF were attributed to an increase in sensory input from the optic flow device. Improvements in gait (10MWT, 6MWT) were attributed to repetitive motion of the treadmill, promoting functional reorganization of remaining brain tissue.

TOF Post-Therapy Test Score Improvements				
Test	TUG (sec)	FRT (cm)	6 MW (m)	10 WT (m/sec)
Increase	5.55±2.04	2.78±1.44	24.49±11.00	0.21±0.06

Table 1. The test scores are mean change ± standard deviation

CRITIQUE

The results validate the use of TOF therapy in post-stroke patients. These specific requirements during participant selection strengthened results: (1) six months post diagnosis; (2) >15min self-ambulatory; (3) no visual impairments or hemianopia; (4) Mini-Mental Exam score ≥ 21 ; (5) Brunnstrum stage > 4 . Multiple tests for balance and gait dynamics aided in reliable data also strengthening results. Lack of age specific requirements for participants weakened results. Future research should include a wider array of brain injuries such as traumatic brain injuries, and both acute and sub-acute stroke patients. Additional use of brain scanning could show specific neurological stimulation during therapy with optical flow, further strengthening results.

REFERENCE

Kang, H. K., Kim, Y., Chung, Y., & Hwang, S. (2012). Effects of treadmill training with optic flow on balance and gait in individuals following stroke. *Clinical Rehabilitation*, 26(3), 246-255. doi: 10.1177/0269215511419383

FIBROMYALGIA AND MYOFASCIAL RELEASE

A critique of the work of Castro-Sanchez et al. (2011), "Effects of myofascial release techniques on pain..."

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PURPOSE

Myofascial release is a technique used to cause release in the tissue between joints and muscles surrounding the head and neck area. The purpose of the reviewed study was to examine the effects of myofascial release on the quality of life of fibromyalgia patients (Castro-Sanchez, Mataran-Penarrocha, Arroy-Morales, Saacedra-Hernandez, Fernandez-Sola, & Moreno-Lorenzo, 2011).

METHODS

Eighty-six fibromyalgia patients, ages 40-65 years, were examined over a period of 20 weeks while undergoing ten different myofascial release modalities. Physiotherapists used myofascial therapy twice a week for one hour. A pressure algometer was used to evaluate and calculate a baseline mean for painful points. Pain level was assessed using the McGill Pain Questionnaire (MPQ). A stabilometer platform was used to assess postural stability. The Fibromyalgia Impact Questionnaire was used to evaluate physical function. Physical state was assessed using the Clinical Global Impression Severity Scale. A t-test was used to analyze the statistics.

RESULTS & DISCUSSION

At the end of the 20-week therapy, painful points decreased for the participants from the baseline mean of 32.4 (see Table 1). These improvements were noted at six months, but only the reported number of days the patients felt well showed improvement at the one-year checkup. Despite the decrease in pain, patients did not show any improvement in postural stability. The results demonstrate that the experimental therapy helped patients cope with pain, physical function, and decrease the clinical severity of fibromyalgia, but did not improve postural stability.

Mean Number of Painful Points	
Baseline	32.4
20 weeks	25.7
6 months	27.9
1 year	30.0

Table 1. The pain scores show the change in painful points during the study.

CRITIQUE

Myofascial therapy improved physical function, fatigue, number of days feeling good, tiredness on waking, and stiffness in people with fibromyalgia for up to six months. A strength of this study was the improvement in pain level of fibromyalgia patients. A limitation of this study was the absence of a higher level of difficulty in the postural stability test. In future studies, a longer course of therapy could be used to achieve patient outcomes that would last longer.

REFERENCE

Castro-Sanchez, A. M., Mataran-Penarrocha, G. A., Arroya-Morales, M., Saavedra-Hernandez, M., Fernandez-Sola, C., & Moreno-Lorenzo, C. (2011). Effects of myofascial release techniques on pain, physical function, and postural stability in patients with fibromyalgia: A randomized controlled trial. *Clinical Rehabilitation*, 25(9), 800-813.

HYDROTHERAPY FOR MULTIPLE SCLEROSIS

A critique of the work of Castro-Sánchez et al. (2012), “Hydrotherapy for the treatment of pain in people with...”
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PURPOSE

Hydrotherapy is commonly used to treat patients with neurological or musculoskeletal disabilities. The purpose of the reviewed study was to determine if hydrotherapy successfully improved symptoms and decreased pain in multiple sclerosis (MS) patients (Castro-Sánchez, Matarán-Peñarrocha, Lara-Palomo, Saavedra-Hernández, Arroyo-Morales & Moreno-Lorenzo, 2012).

METHODS

Thirty-six patients with MS between the ages of 18 and 75 received Ai-Chi hydrotherapy exercise treatment (experimental group), while 39 patients received relaxation exercise treatment (control group), twice a week for 20 weeks. All patients were evaluated before, immediately after, 4 weeks, and 10 weeks after treatment using variable measurement tools. Differences in variables were measured by analysis of variance (ANOVA) and the effectiveness of treatments was measured by a Student’s *t*-test.

RESULTS & DISCUSSION

Pain levels of the experimental group decreased by 50% after 20 weeks. Disability scores decreased for both groups after 20 weeks, as well as scores in both the physical and psychological Multiple Sclerosis Impact Scale-29 (MSIS-29; see Table 1). By week 30, the positive effects remained for the experimental group in pain, disability, and the psychological MSIS-29. Spasticity decreased in the experimental group due to the patients’ ability to perform active movements with a wider range of motion in the water. The decrease in fatigue and increase in physical and psychological health was due to the increase in exercise level.

Variable Outcomes				
Measurement Tool	Group	Baseline	Week 20	Week 30
Pain VAS	Experimental (Control)	7 (7)	3 (6)	5 (6)
Roland Morris Disability Questionnaire	Experimental (Control)	7 (9)	2 (5)	3 (8)
MSIS-29 Physical	Experimental (Control)	48 (46)	41 (45)	48 (46)
MSIS-29 Psychological	Experimental (Control)	34 (30)	21 (25)	24 (29)

Table 1. Several variables decreased and varied between experimental and control groups.

CRITIQUE

The 20-week Ai-Chi aquatic exercise reduced pain, disability, spasm, depression, and fatigue in patients with MS for 10 weeks after treatment. The study was proficient in looking at both physical and psychological symptoms because it used tools that measured both variables. A 30-week study was not sufficient to determine the full duration of reduced MS-related symptoms. Future research should extend the time period of research in order to see if the reduced MS-related symptoms continue.

REFERENCE

Castro-Sánchez, A.M., Matarán-Peñarrocha, G.A., Lara-Palomo, I., Saavedra-Hernández, M., Arroyo-Morales, M., & Moreno-Lorenzo, C. (2012). Hydrotherapy for the treatment of pain in people with multiple sclerosis: A randomized controlled trial. *Evidence-Based Complementary and Alternative Medicine*, 2012.

MOTOR IMAGERY AFTER FATIGUING ACTIVITY

A critique of the work of Rienzo et al. (2012), “Selective effect of physical fatigue on motor imagery accuracy.”
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PURPOSE

Motor imagery (MI), the mental simulation of an action, has been shown to have some neurophysiological equivalents to the physical practice of the same movement. The purpose of the reviewed study was to determine the effect of general fatigue due to a strenuous sport activity on MI accuracy (Rienzo, Collet, Hoyek, & Guillot, 2012).

METHODS

Nine male and three female regional level swimmers with a mean age of 15.5 years completed MI tests before and after a fatiguing swim session. The swimmers first swam a warm-up at 50% to 55% maximal aerobic speed (MAS) and then a 45 minute fatiguing swim at 70% to 100% MAS. Turn sequences were performed at 90% MAS during both sessions. The MI tests consisted of ten trials of both external visual imagery (EVI) and internal visual imagery (IVI) of the turn sequence. Motor imagery accuracy was determined by recording the time of turn completion during physical practice (PP) sessions and MI trials. Recorded variables were compared using analyses of variance (ANOVAs).

RESULTS & DISCUSSION

There was no significant difference in the mean MI pretest times and PP times. However, the MI posttest times were significantly shorter compared to the MI pretest and PP times (see Table 1). More specifically, the shorter posttest MI times were recorded during IVI, while EVI was not affected by strenuous activity. Fatigue may have affected the swimmers’ experience of the turn sequence during PP, which then impaired the swimmers’ internal representation of the turn sequence in the MI posttest. Therefore, fatigue was thought to have altered the central nervous system’s ability to completely process the sensorial effects of the turn sequence during MI.

Comparison of Turn Sequence Times		
Session	Mean Time (s)	PP – MI Mean Times (s)
Physical Practice	7.49	---
Motor Imagery Pretest	6.47	1.02
Motor Imagery Posttest	5.54	1.95

Table 1. The difference between PP and MI posttest times was almost two times greater than the difference between PP and MI pretest times.

CRITIQUE

Physical fatigue due to strenuous exercise likely affected MI accuracy. Analyzing a highly automated movement, the turn sequence, strengthened the study by providing strong temporal congruency between PP and MI sessions. However, the unbalanced gender distribution of participants may have skewed the data. Future research should include an equal gender distribution of participants and investigate a fatiguing sport other than swimming to determine if fatigue affects MI in other areas of athletics.

REFERENCE

Rienzo, F.D., Collet, C., Hoyek, N., & Guillot, A. (2012). Selective effect of physical fatigue of motor imagery accuracy. *PLOS ONE*, 7(10).

LITERATURE REVIEW ABSTRACTS



PSYCHOLOGICAL HEALTH AND OBESITY IN WOMEN

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ISSUE

The purpose of this study was to determine how body image and self-esteem contributed to the development and prevalence of obesity. Obesity was recently labeled a disease by the American Medical Association (AMA).

OVERVIEW

Body satisfaction, self-esteem, and self-efficacy were evaluated among multiple groups of obese females. One group included 40 females who qualified for treatment at a center for eating and weight disorders (Grilo, Wilfley, Brownell, & Rodin, 1994). High levels of body dissatisfaction were positively correlated with early-onset obesity. Another group of women were evaluated on self-efficacy and body satisfaction through a behavioral physical activity intervention (Annesi & Whitaker, 2009). Improvements in task self-efficacy were associated with higher levels of body satisfaction. Another group of participants were assigned a questionnaire, which included questions involved self-esteem and body shape satisfaction (Hill & Williams, 1998). The highest BMI (body mass index) group was found to have the lowest self-esteem, which was a major predictor of psychological health. Women who participated in weight-reduction surgery demonstrated a large decrease in severe body image disparagement (Stunkard & Wadden, 1992; see Figure 1).

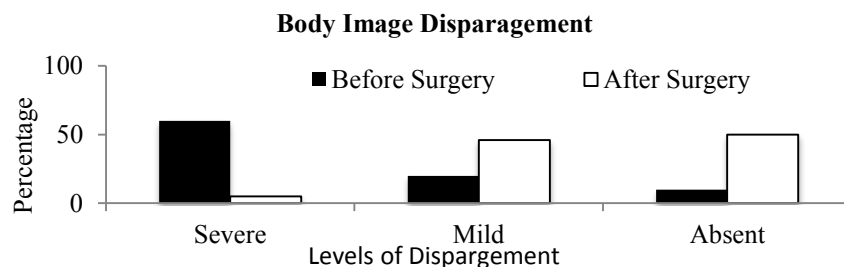


Figure 1. There was a change in body image disparagement after weight reduction surgery (original figure adapted from information in Stunkard & Wadden, 1992).

CONSIDERATIONS

Psychological factors that related to self-perception, such as body image and self-esteem, were positively related to obesity among women. Future studies could analyze the role of these factors among men since most of these studies focused primarily on women. Evaluating these factors among different age groups also may produce other results.

REFERENCES

- Hill, A. J., & Williams, J. (1998). Psychological health in a non-clinical sample of obese women. *International Journal of Obesity*, 22(3), 578-583.
- Stunkard, A. J., & Wadden, T. A. (1992). Psychological aspects of severe obesity. *The American Journal of Clinical Nutrition*, 55(2), 524-532.
- Annesi, J. J., & Whitaker, A. C. (2009). Psychological factors associated with weight loss in obese and severely obese women in a behavioral physical activity intervention. *Health Education and Behavior*, 37(10), 593-606.
- Grilo, C. M., Wilfley, D. E., Brownell, K. D., & Rodin, J. (1994). Teasing, body image, and self-esteem in a clinical sample of obese women. *Addictive Behaviors*, 19(4), 443-450.

INCREASED WATER CONSUMPTION AND WEIGHT LOSS

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ISSUE

Diet and exercise have been major concerns associated with maintaining a healthy lifestyle. Water, one of the most important nutrients, is essential to our diet and can play a significant role in weight loss. Water gives the feeling of being full, therefore, decreases meal energy intake (Dennis et al, 2010; Dubnov-Raz et al, 2011; Stookey et al, 2008; Tate et al, 2012; Van Walleghen et al, 2007).

OVERVIEW

Increasing water consumption in one's diet has a significant impact on losing weight and decreasing overall body fat percentage (Stookey et. all, 2010). Specifically when replacing caloric beverages with diet beverages or water, the results have shown to increase the chances of losing weight up to two times of their intended five percent weight loss (Tate et. all, 2012). When adding water thirty minutes before consuming a meal, hunger ratings were decreased and eventually led to weight loss. This weight loss was caused by a decrease in food consumption due to the feeling of fullness water gives to the body (Dennis et. all, 2010; Van Walleghen et. all; 2007). Dubnov-Raz (2011) examined how resting energy expenditure was elevated due to increased water consumption. This assisted overweight children in weight loss and maintenance. After considering multiple studies on various age groups, the results have shown to support the hypothesis that increased water consumption aids in weight loss.

CONSIDERATION

Although studies examine the intake of water before meal consumption and replacing caloric beverages with diet beverages or solely water; there hasn't been solid evidence of increasing overall water consumption throughout the day. When continuing to consume water throughout the day instead of right before meals it can have an effect on weight loss in other ways than stated in previous studies. Aside from increasing water digestion throughout the day; regular diet and exercise regimens should continue to remain the same. This way we evaluate the effects of increased water consumption only.

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EFFECT OF EXERCISE ON SLEEP QUALITY & LENGTH

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ISSUE

Incorporating physical activity of any kind (high impact or low impact) throughout the day can have positive effects on sleep quality and duration. Different approaches have been taken in regards to type of exercise and most show sleep improvements in people of all ages. Tai chi has been found to improve sleep for older individuals, running and biking have been found to effect sleep cycle length, and walking and other low impact activities have shown to generally improve not only sleep, but depression as well.

OVERVIEW

Tai chi, a low impact exercise performed slowly with deep breathing, showed improvements in sleep quality, latency, duration, and efficiency in people 60 and older. (Li, F., Fisher, K. J., Harmer, P., Irbe, D., Tearse, R. G., & Weimer, C. 2004). Another study using a fit group and a control unfit group showed shorter sleep cycle length and a higher rate of cycling in the fit group while asleep (Trinder, J., Stevenson, J., Paxton, S. J., & Montgomery, I., 1982). According to the Pittsburgh Sleep Quality Index (PQSI), low impact activities have revealed improvements in long-term measurements of sleep (Li et al. 2004; Singh, N. A., Clements, K. M., & Fiatarone, M. S., 1997). In healthy individuals age 60-74 years old, low impact exercise increased long-term and short-term measures of sleep quality as well as improved scales of depression and mental health (Singh et al., 1997). Low impact exercise (including Tai chi) also improved physical strength, which has predicted improvement in sleep quality (Li et al., 2004; Singh et al., 1997).

Exercise Effects on Sleep
<ul style="list-style-type: none">• More REM cycles per length of sleep• Increased sleep duration (approximately 42 minutes per night)• Reduced daytime sleepiness
Table 1. This table outlines examples of effects of exercise on sleep based on low impact activities over a 10-16 week time period.

CONSIDERATIONS

Multiple sleep characteristics were measured to assess exercise effects compared to control groups (Li et al., 2004; Singh et al., 1997). Research was done over multiple weeks to ensure normal sleeping patterns in regards to individuals' routines. These studies apply to all people with self-reported sleep problems, but especially to the elderly. The limitations of these articles is the fact that two of the three used in this literature review directly target *older* individuals, which leaves younger adults without direct evidence that exercise works for their sleep problems as well. Further research should be conducted in a clinical setting to study how exercise affects sleep in people with diagnosed sleeping disorders (e.g., insomnia; Li et al., 2004).

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HYPOXIC TRAINING: DO BENEFITS OUTWEIGH RISK?

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Training or living at high altitude has known physiological benefits for athletes who normally perform their sport at a lower altitude. The live high train low (LHTL) model shows increased red blood cell mass, increased oxygen uptake (VO_2) and increased race performance after a four week training program. However, there are risks associated with this type of training. High altitude headache (HAH), acute mountain sickness (AMS), high altitude cerebral edema (HACE), and a disruption in the balance of prooxidant/antioxidants are conditions known to be associated in an altitude regimen.

OVERVIEW

Live high train low has shown improvements in 3000m and 5000m race performance, along with increases in overall VO_2 . The 3000m race improved .4-1.4% per week for three weeks, 4000m race performance improved about 3%, and VO_2 improved about 7% (Chapmen & Levine, 2007). However with the LHTL model, athletes slept at altitude, which comes with risk. High altitude headache, disruption in prooxidant/antioxidant balance, and sleep disturbances were the most common altitude problems encountered with hypobaric and hypoxic conditions (Maa, 2010). If only a hypoxic condition was used, then the disruption in prooxidant/antioxidant became the main problem and altitude simulation was not as accurate (Pialoux et al., 2009). After 14 days of LHTL, reactive oxygen species (ROS) increased (Pialoux et al., 2009). The increase in ROS increased the oxidative stress on cells, which effected protein and amino acid synthesis. In addition, antioxidant levels decreased. This made the rise in ROS problematic (see Table 1).

	Pre	Post
Retinol	.53 $\mu\text{mol/L}$.53 $\mu\text{mol/L}$
Lycopene	.35 $\mu\text{mol/L}$.25 $\mu\text{mol/L}$
β -Carotene	.59 $\mu\text{mol/L}$.56 $\mu\text{mol/L}$

Table 1. Amount of antioxidant present in blood.

CONSIDERATIONS

Three to four weeks seemed to be the optimal time for the LHTL program to provide increases in performance (Chapmen & Levine 2007). The researchers may have been able to push up the simulated altitude to 4000-4500m, being that only hypoxic air existed, cerebral insults were minimized, but optimal benefits may not have been achieved (Maa, 2010). Lacking the hypobaric aspect made the altitude simulation less realistic. Future research should include a hypobaric and hypoxic chamber rather than hypoxic tent. Doing so would allow for more accurate simulation of altitude and possibly strengthen respiratory muscles by decreasing air pressure. Ultimately, the athlete and trainer will need to weigh the risks and benefits.

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APPROACHES TO IMPROVE SOCCER PERFORMANCE

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The focus on the type of exercise used to enhance soccer performance have been evaluated successfully in three different formats: plyometric training, anaerobic training, and aerobic training. The different formats of training for purposes related to specific soccer-related movements proved to provide essential strategies in enhancing performance and preventing injuries.

OVERVIEW

Each training method focused on enhancing the level of fatigue that inhibited the athlete's performance over the length of playing time (see Table 1; Cowley, Ford, Myer, Kernozek, & Hewett, 2006; Hoff, Wisloff, Engen, Kemi, & Helgerud, 2002; McCurdy, Walker, Langford, Kutz, Guerrero, & McMillan, 2010). Plyometric training (hopping, cutting, and lunging exercises) was used to minimize vertical ground reaction force (GRF) in order to maximize horizontal motion while sprinting and to reduce the risk of Anterior Cruciate Ligament (ACL) injury (Cowley et al., 2006; McCurdy et al., 2010). Anaerobic training through various resistance exercises that focus on muscles used during sprinting increased resistance to fatigue that could otherwise lead to hamstring muscle strains (Greig & Siegler, 2009). Aerobic training increased the player's VO₂ max through interval training at an intensity of 90-95% maximal heart rate and therefore maintains a higher average intensity without lactate buildup during match play (Hoff et. al., 2002).

Performance Improvements Based on Training Formats

- Plyometric- Minimized vertical GRF to maximize horizontal motion
 - Anaerobic- Increased resistance to hamstring muscle group fatigue
 - Aerobic- Increased VO₂ max to maintain a higher average intensity
-

Table 1. Each training method shown above provided an essential component towards enhancing soccer performance.

CONSIDERATIONS

It was concluded that more than endurance type training is required to maximize a soccer player's performance. Whether the research investigated short-term, high intensity anaerobic training or longer endurance training, all of the studies assessing these different training formats focused on the specific physiological demands that ultimately effected soccer performance. However, the findings in plyometric and anaerobic training were primarily for injury and rehabilitation purposes and therefore should be purposefully tested through a specific training program that involves the interaction of these three types of training methods.

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OBESITY AND ITS AFFECT ON PHYSIOLOGY

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The purpose of this synthesis was to determine the effects of obesity on physiology. The incidence of obesity rapidly increased in both children and adults (Rosenbaum & Leibel, 1998). Co-morbidities of obesity increased individual health risk due to physiological changes of adipose storage homeostasis (Rosenbaum & Leibel, 1998; Woods & Seeley, 2002).

OVERVIEW

Changes in energy intake and expenditure were influenced by specific genetic and environmental conditions. Genetic feedback systems adapted to balance energy intake with energy expenditure. Although genetics led to susceptibility of obesity, greater adipose storage influence resulted from environmental conditions (Rosenbaum & Leibel, 1988). Respiratory lung functioning alterations increased in obese individuals. Increased volume of adipose tissue limited expenditure capacity and altered pressure variants (Salome, King, & Berend, 2009). Both resting and exercise lung functioning were altered (see Figure 1; Sood, 2009).

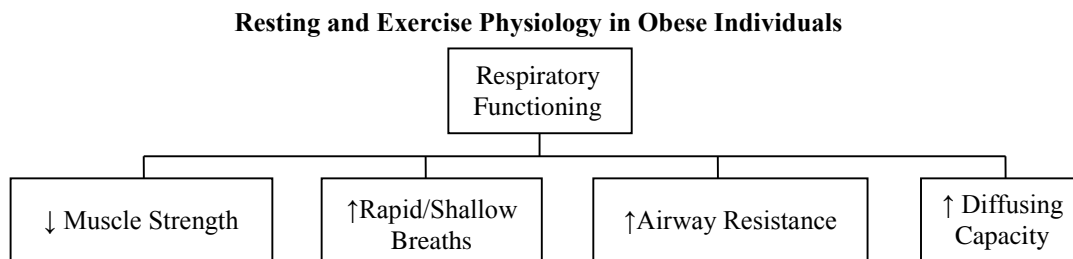


Figure 1. Research demonstrated physiological changes in respiratory functioning of obese individuals both at rest and during exercise (original information expressed in graphic form, located in Sood, 2009).

CONSIDERATIONS

Impaired respiratory functioning caused additional co-morbidities which included sleep apnea, asthma, and COPD (O'Donnell, Holguin, & Dixon, 2010). Research suggested reversal of obesity and co-morbidities by inducing weight loss to obtain a suggested body mass index level. Hormone therapies that included insulin and leptin control in addition to balance of energy intake and expenditure proved to be effective weight loss therapies (Woods & Seeley, 2002). Genetic variances due to ethical limitations and difficulty in environmental control limited research capacities (Rosenbaum & Leibel, 1998). Future studies should consider the specific physiological effects of obesity in children.

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PHYSICAL INACTIVITY AND REWARD PREFERENCE

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ISSUE

Physical inactivity or sedentary behaviors led to increased health risks (cardiovascular disease, obesity, and diabetes). A lifelong healthy lifestyle assumed to be the most favorable for health in an aging population (van Oostrom, Smit, Vos- Wendel, Visser, Verschuren, & Picavet, 2012).

OVERVIEW

In physical activity, it has decreased during this time and many had become accustomed to sedentary lifestyle which caused the increased health risks. There was a preference for immediate-rewards over delayed-rewards (Krishnan, 1984), with relation that got into physical activity, wanted to see results quickly rather than later. Internal and external factors determined whether people want to get into physical activity (see Figure 1).

Factors for Physical Activity

<i>Reasons - Physical Activity</i>	<i>Barriers - Physical Activity</i>
Enjoyment/Having fun	No time or Family commitments
Developing fitness	Too tired or Health problems/Age
Weight loss	Pollution Weather
Reduces health risks	Cost

Figure 1. People recognized the reward of quality of life when physically active rather reduced quality when sedentary (Salmon, Owen, Crawford, Bauman, & Sallis, 2003).

CONSIDERATIONS

Physical activity was measured over a period of time. For example, a longitudinal study was recorded over 10 years. This type of study was needed, since quality of life rewards from a physically active life style take time. Interestingly, participants who watched TV during the weekends reported higher rates of physical activity (Loureiro, Matos, & Diniz, 2012).

Future studies should focus on determining health strategies used to successfully increase physical activity. Also, a survey of active and non-active persons of all ages should be undertaken to determine what was rewarding about physical activity or sedentary activities. By completing this survey, greater insight would be accomplished.

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OBESITY AND INTRINSIC MOTIVATION

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ISSUE

Intrinsic motivation was derived from pleasure and satisfaction in completing a task. The purpose of this synthesis was to consider the effect of intrinsic motivation on weight loss in over weight subjects who worked to lose weight.

OVERVIEW

Autonomous exercise motivation predicted eating regulation over a twelve-month period (Mata, Silva, Vieira, Carraca, Andrade, Coutinho, Sardinha, & Teixeira, 2009). Maintenance of weight loss was predicted by intrinsic motivation to lose weight (Williams, Grow, Freedman, Ryan, & Deci, 1996; see Table 1). Extrinsically motivated subjects tended to lose passion for the activity (Deci, Betley, Kahle, Abrams, & Porac, 1981). Intrinsic motivation increased a subject's motivation to continue an activity (Zackerman, Porac, Lathin, Smith, & Deci, 1978). Subjects who were motivated at the intrinsic level were more likely to continue with an activity despite a hindrance (Blanchard, Mask, Vallerand, Sablonniere, & Provencher, 2007). Supporters tried harder when helping patrons who exhibited intrinsic motivation (Pelletier & Vallerand, 1996).

Effects of Intrinsic Motivation and Weight Loss	
Intrinsic Motivation	<ul style="list-style-type: none">- Subjects were more inclined to continue participation- Subjects maintained weight loss even after program ended- Supervisors were more motivated to help a client who was intrinsically motivated

Table 1. Intrinsic motivation aided weight loss in subjects.

CONSIDERATIONS

Self-determination was influenced by internal motivation to lose weight. Subjects lost more body fat when intrinsically motivated to exercise. When careful monitoring was performed on subjects, weight loss was maintained longer for people who were motivated by internal factors. Intrinsic motivation drove clients to continued weight loss. Internal motivation provided desire to continue despite a setback. An interesting additional support system included supervisors. Supervisors tended to give more support to clients who displayed motivated desire to change exercise and eating behavior. Future studies should provide clarification of intrinsic motivation levels to further explain impact.

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ALCOHOL AND EXTRINSIC MOTIVATION

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ISSUE

The purpose of this synthesis was to examine the effect of extrinsic motivation on attitude toward and use of alcohol (Jong, Wiers, Braak & Huijding, 2006). Extrinsic motivation assessments were related to self-reported use of alcohol (Bloomfield, Wicki, Gustaffson, Makela, & Room, 2010). The relation between importance of extrinsic values and alcohol use was studied.

OVERVIEW

During assessment negative outcomes from alcohol were documented. Motivation was affected negatively (Shamloo, & Cox, 2010). Negative reinforcement as a form of behavior modification was effective in combating alcohol consumption. Life goals also affected selection of risky behavior related to alcohol consumption. Autonomy and relatedness were considered life goals. If important to the individual, the selection of alcohol related risky behavior was lessened (Williams, Hedberg, Cox, & Deci, 2000). The higher the extrinsic motivation, the lower the risky behavior (see Table 1).

Self Determination Theory Scale			
Needs Met - 0	Need Met - 1	Needs Met - 2	Needs Met - 3
High risk	Medium risk	Low risk	Very Low risk
Table. 1 The prevention relationship focused on meeting multiple psychological needs, simultaneously.			

CONSIDERATIONS

The overall synthesis considered intrinsic motivators working together with extrinsic values to prevent risky alcohol consumption behavior. However, alcohol consumption was not the only source of risky behavior. Smoking and sexual behavior were also considered.

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TAI CHI AND BENEFITS FOR THE ELDERLY

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Wellness education, as well as balance, strength, and stretching exercises, are all methods that have shown to decrease falls in the elderly. Furthermore, Tai Chi studies indicate a greater ability in decreasing fall risks than other strategies. Benefits for Tai Chi interventions in addition to decreased falls, include improved balance and enhanced quality of life.

OVERVIEW

Individuals who practice Tai Chi noticed an improvement of balance and strength, which lead to a decreased risk of falling, especially in the elderly population (*Geriatrics*, 1996). In addition, self-reported measures of increased balance confidence were demonstrated in the elderly who underwent Tai Chi programs (Rand, Miller, Yiu, & Eng, 2011). A study has shown that Tai Chi, in combination with other programs, such as wellness education, enhanced quality of life (Huang, Yang, & Liu, 2010). However, in contrast to a study that examined individuals who solely received wellness education and individuals who only went through a Tai Chi program, the Tai Chi group showed greater enhanced quality of life (Greenspan, Wolf, Kelley, & O'Grady, 2007).

CONSIDERATIONS

All studies demonstrated that patient participation in Tai Chi improved patient health, more so than other programs (see Table 1). When Tai Chi was compared with other programs, individuals who only practiced Tai Chi had greater enhanced quality of life (Greenspan et al., 2007). One of the strengths of the studies was that Tai Chi was compared with a variety of other programs. However, the studies were not looked at longitudinally in order to determine if Tai Chi decreased falls in the long term. Future research should compare Tai Chi with different types of exercise that include balance and strength components longitudinally to determine if Tai Chi is the most effective method for decreasing risk of falls, improving balance confidence, and enhancing quality of life.

Other Programs Shown to Improve Patient Health

- Cognitive-behavioral intervention (Huang et al., 2010)
 - Wellness education (Greenspan et al., 2007)
 - Exercise training (Rand et al., 2011)
 - Multifactorial treatment (Rand et al., 2011)
-

Table 1. Compared to other exercise programs, Tai Chi demonstrated an increased improvement in patient health.

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FALLS IN THE ELDERLY AND ATTENTION RESOURCES

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ISSUE

Falls within the elderly population can be monitored and predicted by measuring attentional resources. The decrease of available attentional resources led to an increase in predicted falls.

OVERVIEW

Attentional resources were required for complicated tasks. Attentional resources produced the strongest association with predicting falls in the elderly population (Holtzer, Friedman, Lipton, Katz, Xue, & Verghese, 2007). Measures of attentional resources were significantly different between fallers and non-fallers. Limited attentional resources showed a positive correlation with predicted falls (Verghese, Buschke, Viola, Katz, Hall, Kuslansky, & Lipton, 2002; see Figure 1). Subjects who scored low during attention demanding tasks were up to four times more likely to fall (Holtzer, et al., 2007). Greater attentional resources were needed to regain a stable posture after balance was lost (Brown, Shumway-Cook, & Woollacott, 1999). Fallers performed poorly on measures of attention compared to non-fallers. Adults who suffered from Parkinson's disease showed greater attentional resources and were less likely to fall when compared to a control group of fallers (Hausdorff, Doniger, Springer, Yogev, Giladi, & Simon, 2006).

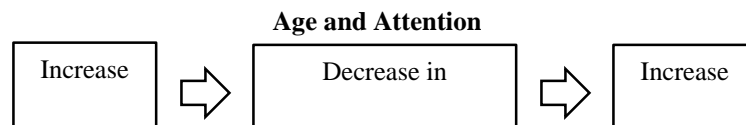


Figure 1. An increase in age led to an increased number of falls due to a decline in attentional resources (original figure adapted from

CONSIDERATIONS

Subjects were free of dementia and over 65 years old. The time needed to complete a task was measured. Fallers consistently required additional time compared to non-fallers. Forms of testing included balance disturbances and divided attention tasks. Further testing should be completed with a larger population to verify the relationship between falls and attentional demands. Testing attentional resources would allow care facilities to predict which people are at a high risk of falling. Rehabilitation programs could increase attentional resources, therefore decreasing the number of falls. Limitations include designing a practical testing method and creating a standard form of measuring attentional resources.

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FUNCTIONAL MOVEMENT SCREEN RELIABILITY

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The Functional Movement Screen (FMS) addresses the need for a screen that determines risk of injury in athletic populations, which has thus far been absent. The FMS is a relatively new protocol that diagnoses seven movement patterns considered to be the core of intricate sports movements. Determination of interrater and test-retest reliability of the FMS, especially within novice raters, needs to be assessed before the FMS can be applied to an athletic population.

OVERVIEW

Viewing of live and videotaped screenings was consistently scored, (Shultz, Anderson, Matheson, Marcello, & Besier, 2013) indicating good to excellent test-retest reliability between the screenings. Novice raters had substantial to excellent levels of agreement, suggesting experience influenced interrater reliability as compared to expert raters with over two years of experience with FMS (see Table 1; Minick, Kiesel, Burton, Taylor, Plisky, & Butler, 2010; Shultz et al., 2013; Teyhen, Shaffer, Lorensen, Halfpap, Donofry, Walker & Childs, 2012). Raters with differing professional backgrounds tended to have broader score ranges, indicating professional history affected scoring (Minick et al., 2010; Shultz et al., 2013; Teyhen et al., 2012).

Agreement Between Novice and Expert Raters			
Tested Movements	Agreement	Kappa	Level of Agreement
Deep Squat	100%	1.0	Excellent
Hurdle Step	92.3%	0.83	Excellent
In-Line Lunge	89.8%	0.79	Substantial
Active Straight Leg Raise	97.0%	0.94	Excellent
Shoulder Mobility	100%	1.0	Excellent
Trunk Stability Push-Up	97.5%	0.96	Excellent
Quadruped Rotary Stability	91.0%	0.84	Excellent

Table 1. The values assessed between novice and expert raters include Kappa statistic values, with a 1.0 indicating perfect agreement.

CONSIDERATIONS

Limited scoring criteria as well as limited range of scores could be grounds for interrater scoring errors, (Minick et al., 2010; Shultz et al., 2013; Teyhen et al., 2012) as raters are limited to the criteria given. Likely due to varying experience levels, Shultz et al. (2013) did not find significant levels of interrater reliability. The greatest variation in scoring came in quadruped rotary stability and in-line lunge movements, (Minick et al., 2010; Shultz et al., 2013) both of which have vague criteria given the complexity of the movement. Screening of individuals presenting a wider range of scores is necessary to further validate the FMS as a diagnostic tool.

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ANXIETY, OBESITY AND ITS COMPLICATIONS

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ISSUE

The purpose of this synthesis was to consider anxiety and its link to the complications of obesity. Obesity as an issue in the world continued to escalate. Studies demonstrated that anxiety and depression disorders were linked to obesity and its complications. When obesity was prevalent in young children, weight gain continued into adolescence and adulthood. This trend led to cardiovascular disease, chronic back pain, degenerative joint disease, and other chronic medical conditions (Onyike, Crum, Lee, Lyketsos, & Eaton, 2003).

OVERVIEW

Reasons for and problems associated with obesity were related to anxiety and depression disorders. These were linked negatively to exercise and the feelings felt while participating. The sensations made working out difficult, because experiencing anxiety caused individuals to avoid physical activity (Broman-Fulks, Berman, Rabian, & Webster, 2004; see Table 1).

Sensations Linking Anxiety and Exercise

Anxiety and Aerobic Work Out	
Increased Heart Rate	Increased Heart Rate
Fatigue - Nausea	Chest Pain - Soreness
Sweating	Redness of the Face
Pain in extremities	Muscle Cramps

Table 1. Bodily sensations were linked to high anxiety when performing exercise activities.

CONSIDERATIONS

Anxiety and depression were linked to weight gain and obesity. This link caused problems later in life. Information on early childhood experiences and the connection to level of depression, caused by anxiety also was considered (Anderson, Cohen, Naumova, & Must, 2006).

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CONFIDENCE IN FALLING WITH THE ELDERLY

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ISSUE

As people get older, balance and coordination begin to deteriorate. This led to an increased risk of falling. Not only did falling affect health, but it also compromised quality of life by weakening social and psychological factors (Walker & Howland, 1990). The fear of falling was found to be the leading fear among the elderly population (see Table 1). Multiple ways were developed to support the elderly to decrease the number of falls in later life.

Common Fears among the Elderly

Fears	Percent
Fear of Falling	25%
Fear of Robbery	16%
Fear of forgetting appointments	14%
Fear of financial difficulties	14%
Fear of losing cherished item	5%

Figure 1. There were five common fears in the elderly. Fear of falling was the most common .

OVERVIEW

Elderly people volunteered to complete multiple questionnaires specific to confidence and falling. The ABC scale questionnaire was used. The scale asked subjects to note level of confidence in execution of specific daily activities. The elderly who reported a fear of falling performed less well with daily activities than those that did not have a fear of falling (Hatch, Gill-Body, & Portney, 2003). Fear not only affected the performance of daily activities but also was a link to non-participation in certain activities. Non-participation led to a decline in social activity and lessened quality of life (Cumming, Salkeld, Thomas, & Szonyl, 2000).

CONSIDERATIONS

Fear produced a negative effect and contributed to a decreased satisfaction of life, increased weakness, and depressed attitude states (Vellas, Wayne, Romero, Baumgartner, & Garry, 1997). The repercussions of falling for the elderly led to being put into a hospice. But, there were programs that helped the elderly deal with the fear of falling and improved confidence. With educational programs about muscle strengthening and confidence, the number of falls in the elderly was predicted to decrease.

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EMOTION PROMOTES FALLS IN ELDERERS

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Falling was a leading injury in elderly individuals. As activity restriction increased in elders, emotional response promoted risk from falls. The purpose of the review was to consider deterioration in motor control after first fall, difference in women and men, and difficulty in decreasing stress (see Figure 1).

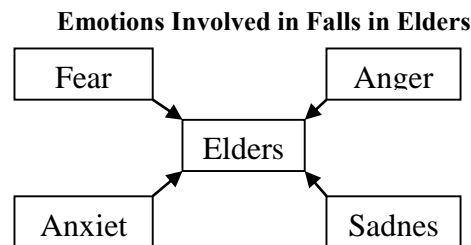


Figure 1. Four major emotional factors were associated with falling.

OVERVIEW

Although many settings triggered falls, emotion resulting from a fall was thought to be controllable. Hip or pelvic fractures resulted from falls, and caused increased anxiety and fear of later falls after recovery. About one-third of elderly people developed a fear of falling after a first fall (Vellas, Wayne, Romero, Baumgartner, & Garry, 1997). Individuals who were afraid of falling interfered with mechanisms for keeping balance and experienced increased gait disorders (Vellas et al., 1997; Moller, Hallqvist, Lafamme, Mattsson, Ponzer, Sadigh & Engstrom, 2009). Women seemed to suffer an emotional response from falls and experienced difficulty in managing resultant fear more than men did. Recurrent falls were caused by poor vision, cognitive impairment, and use of antipsychotic drugs (Iinattiniemi, Jokelainen, & Luukinen, 2009). Although some risk factors were more easily managed, emotional stress after an initial fall was difficult to minimize in the elderly. Fear of falling also was found to influence social and mental health status, including decreased quality of life, and functional decline (Zijlstra, Van Haastregt, Van Eijk, & Kempen, 2005).

CONSIDERATIONS

Emotional stress influenced on individual's mechanisms for maintaining balance and gait control. A limitation stated that elderly people were physically weaker and physiologically less responsive. Most research focused on independent living elders rather than other living environments. Emotional changes were difficult to clarify after different falls. Further studies should identify physiological functions of elders in stressful situations.

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PREVALENCE AND DANGERS OF TANNING BEDS

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Skin cancer is the most prevalent cancer among fair skinned individuals (Brouse, Hillyer, Basch, & Neugut, 2011; Narayanan, Saladi, & Fox, 2010) and has become a multibillion-dollar industry in the United States alone (Stapleton, Turrisi, Hillhouse, Robinson, & Abar, 2009). There is a link between IT and melanoma (M) risk and non-melanoma (NM) cancer (Cokkinides, Weinstock, O’Connel, & Thun, 2002; Brouse et al., 2011) as well as other health risks associated with IT (See Table 1). Percieved attractiveness, parent’s usage, and unawareness of risks are the three main reasons teens go IT (Brouse, et al. 2011; Cokkinides et al., 2002, Stapleton et al., 2009).

OTHER RISKS ASSOCIATED WITH IT	
• Skin or eye burns	• Immune system alterations
• Photo-aging	• Photo-drug reactions

Table 1. Many risks are associated with IT in addition to M and NM (Cokkinides et al., 2002).

OVERVIEW

Youth who utilize IT are less likely to use at least SPF 15 sunscreen while outside, and one session of IT for 15-30 minutes is equivalent to the same amount of Ultra Violet(UV) rays as a whole day in the sun (Cokkinides et al., 2002). Brouse et al. (2011) found that tanning salon operators were often lying about the dangers of UV exposure and none of the facilities sold any products containing SPF. Many tanning salons believe that IT helps prevent sunburns and skin damage and is safer than tanning outdoors (Narayanan et al., 2010).

CONSIDERATIONS

Since IT has a direct link to M and NM (Brouse et al., 2011; Cokkinides et al., 2002), research is looking into how to deter people from IT. The most effective interventions use education to show the appearance damaging effects of UV exposure (Stapleton et al., 2009). Cokkidines et al., (2002) was the first study to obtain data on a teenage population, which is the population at the highest risk. The majority of the studies (Cokkinides et al., 2002; Brouse et al., 2011; Stapleton et al., 2009) were all self-report studies, which could elicit skewed data as the participants could easily falsify answers. In conclusion, the most effective way to prevent M and NM is to refrain from IT and education in addition to regulation need to be installed in tanning salons. Future research should examine a teen population longitudinally until expiration.

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EFFECTS OF STEROIDS ON YOUTH SPORTS

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ISSUE

Athletes today were reported to use steroids to enhance athletic performance and appearance. As a result, children also felt pressure to use steroids for multiple reasons (see Figure 1; Calfee & Fadale, 2006). Studies demonstrated that 5% to 11% of high school males and 0.5% to 2.5% of high school females used/tried anabolic steroids. Most started at 14years (Greydanus & Patel, 2002).

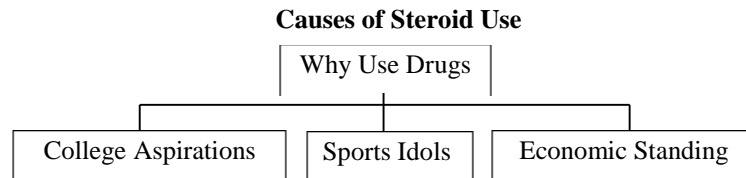


Figure 1. Young Athletes chose to use steroid for different reasons.

OVERVIEW

The effect of Anabolic-Androgenic Steroids (AAS) continued to be controversial in sports for adults. The use of steroids in teens was viewed as more controversial because AAS led to multiple complications. These included an increase in liver enzymes, peliosis hepatitis, cholestasis, hepatic failure, and hepatic neoplasms (Greydanus & Patel, 2002). In addition, AAS caused stunted growth while increasing the risk of injuring tendons. Evidence in the prevention of AAS use reported that using ‘scare tactics’ increased use because tactics led to stimulated curiosity. Thus, ‘scare tactics’ did not appear to be the solution. Experts suggested a social influence approach, which increased adolescences awareness of the pressures of AAS (Yesalis & Bahrke, 2000).

CONSIDERATIONS

Today’s athletes are pressured to perform at younger ages. In the quest for an edge in recruitment, college and professional teams are scouting athletes in the middle school years. The result is increased steroid and creatine use in youth sports. Because of less refined skills in reasoning, young athletes are not aware of the dangerous side effects that come with the drug.

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INFLUENCE OF SPRINT TRAINING ON PERFORMANCE

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Attaining a high sprint velocity over a short distance is essential for successful performance in field sports. Field sport athletes mainly perform at an average intensity close to anaerobic threshold. Short-sprint repetition and long-sprint repetition training (SSTP, LSTP) programs (Meckel, Gefen, Nemet & Eliakim, 2012), short recovery time (SRT) in LSTP (Hanon, Bernard, Rabate & Claire, 2012), and the associated increases in metabolic responses (Spencer, Bishop, Dawson, Goodman & 2005) improved performance in field-sport athletes.

OVERVIEW

Short-sprint training and LSTP were used in soccer teams and led to significant improvements in VO_{2max} , (see Table 1; Meckel et al., 2012). Short rest time in LSTP increased 300-meter performance and stimulated the rate of adenosine triphosphate (ATP) synthesis by increasing the capacity to reach lower post-training program pH values before inhibitions occur (Hanon et al., 2012). Long-sprint training and SSTP upregulated mitochondrial biogenesis, which could be the underlying mechanism responsible for aerobic adaptation (Meckel et al., 2012; Spencer et al., 2005). The sub-maximal nature of field-sport activities use anaerobic and aerobic energy sources; therefore a training program should incorporate both aerobic and anaerobic types of activities to enhance these abilities (Hanon et al., 2012; Meckel et al., 2012).

Different Training Programs on Aerobic and Anaerobic Performance				
	Short-Sprint Training (n=11)		Long-Sprint Training (n=13)	
	Pre	Post	Pre	Post
VO_{2max} (ml $kg^{-1}min^{-1}$)	44.6 (+,-) 5.3	47.5 (+,-) 3.7	44.9 (+,-) 5.2	49.5 (+,-) 5.4
250-m Run (s)	39.82 (+,-) 2.17	38.40 (+,-) 2.27	38.58 (+,-) 2.48	37.51 (+,-) 2.5
30-m Run (s)	4.86 (+,-) 0.19	4.74 (+,-) 0.20	4.82 (+,-) 0.23	4.74 (+,-) 0.22
4- x 10-m Run (s)	9.83 (+,-) 0.23	9.55 (+,-) 0.33	9.69 (+,-) 0.34	9.59 (+,-) 0.36
Long Jump (m)	2.13 (+,-) 0.13	2.16 (+,-) 0.17	2.10 (+,-) 0.18	2.15 (+,-) 0.16

Table 1. The effect of different training programs on selected aerobic and anaerobic performance indices.

CONSIDERATIONS

Increased acceleration, enhanced muscle stretch-shortening capacity, and improved power and strength adaptations in field-sport athletes are the result of SSTP and LSTP (Meckel et al., 2012). Therefore, a TP should be specific to the movement patterns of competition in order to be relevant to performance. A strength of the research was the analysis of a variety of speed training protocols. The studies were limited in that only soccer teams were tested. Future research should include other field sports such as football and lacrosse.

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ANXIETY AND FALLS IN THE ELDERLY

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Falling proved to be major problem with the elderly (Legters, 2002). One in four people over 69years fall each year. The number is higher for people over 74years (Yardley, 2004). Anxiety was linked to unsteadiness and falling with elderly people. Anxious thoughts induced arousal or fear, which became a risk factor for the person (see Figure 1).

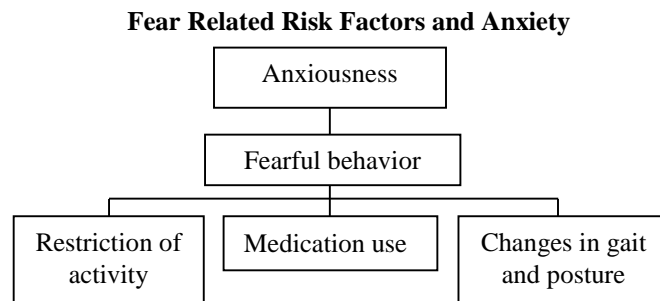


Figure 1. Anxiety can cause multiple negative affects in elderly people.

OVERVIEW

Research into the link between anxiety and balance disorders in elderly resulted in the development of a variety of psycho physiological mechanisms to describe the state. This included 1) aggravating or perpetuating balance system dysfunction, 2) postural instability, and 3) behavioral restriction (Yardley, 2004). People with anxiety prior to a fall experienced higher anxiety. Depression as a result was more likely (Bosma, Sanderman, Scaf-Klomp, Van Eijk, Ormel, & Kempen, 2004; Vetter & Ford, 1989). In a study of variables linked to falls in elderly, anxiety was reported as of highest value (Valentine, Simpson, Worsfold, & Fisher, 2011).

CONSIDERATIONS

Reducing elderly anxiety of falling helped improve overall well-being. Building confidence and awareness of the risk factors associated with fear of falling helped better prepare the elderly for the future. Since the elderly restricted activity and movement as a response to the potential for a fall, balance activities were suggested.

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INTRINSIC MOTIVATION FOR PHYSICAL INACTIVITY

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Subjects initially were extrinsically motivated to participate in physical activity. As a person persisted in physical activity, that motivation became intrinsic through stages (Frederick-Recascino & Schuster-Smith, 2003; see Figure 1). More than 50% of subjects that participated in physical activity dropped out within three months (Koivula, 1999). Autonomy, competence, and relatedness with others were personal factors that affected motivation and drop out. Individuals reported different reasons for adhering to forms of physical activity.

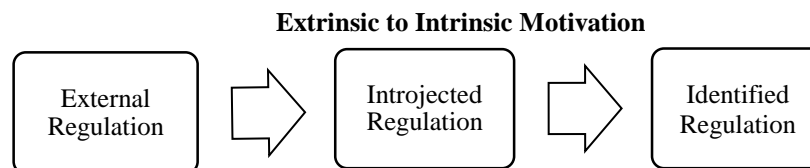


Figure 1. External regulation led to social approval. Introjected regulation motivated a person to gain social approval. Identified Regulation was the term used to indicate intrinsic motivation. As a group these regulation mechanisms formed a sense of total intrinsic motivation.

OVERVIEW

Men were more likely to participate in physical activity than women. Men would join for intrinsic reasons and women would participate in exercise for extrinsic reasons (Kilpatrick, Hebert, & Bartholomew, 2005). Koivula (1999) found that the subjects who related to a masculine or feminine stereotype exhibited the socially desirable behaviors for physical activity. Subjects that were intrinsically motivated to participate in physical activity reported a sense of enjoyment and were more committed. Intrinsic motivation led to a positive outlook on exercise (Huddleston, Fry, & Brow, 2012).

CONSIDERATIONS

Multiple studies illustrated strength by demonstrating similar results. Intrinsic motivation was positively related to adherence and enjoyment of physical activity. Men adopted physical activity as a part of being intrinsically motivated. Women appreciated extrinsic rewards demonstrated by weight or inches lost. Future studies should consider how subjects become intrinsically motivated to participate in physical activity. Since all studies were limited in length, a longitudinal study would help understand the transition from an extrinsic to an intrinsic motive.

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TYPES OF THERAPY FOR KNEE OSTEOARTHRITIS

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Patients with knee osteoarthritis (OA) have used aquatic treadmill running (ATM) (see Figure 1) and land treadmill running (see Figure 2) to rebuild and restore the knees of people suffering from knee OA (Wang, Lee, Liang, Tung, Wu, & Lin, 2011). While the patients used the different therapies, observers studied changes over time with pain, sport and recreational function, and knee range of motion.

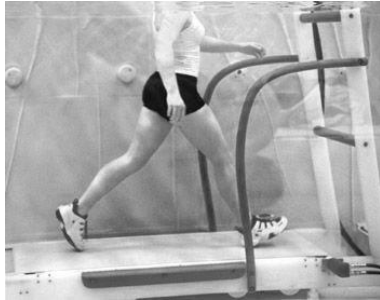


Figure 1. Patient uses ATM for knee OA therapy.

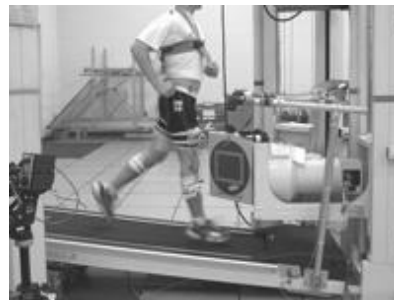


Figure 2. Patient uses land treadmill running for knee OA therapy.

OVERVIEW

Over time, patients with knee OA recorded a comparable change in the reduction of knee pain using both hydrotherapy and land-based therapy (Hinman, Heywood, & Day, 2007; Wang et al., 2011). Sport and recreation function was improved in both land and water based therapy with the increased use of knee muscles providing more stability during sport and recreation activities (Wang et al., 2011; & Silva et al., 2008). Evidence (Wang et al., 2011) indicated that range of motion (ROM) increased significantly using both methods of therapy.

CONSIDERATIONS

Increased concentrated use of the ligaments, tendons, and muscles around the knee were linked to increased ROM, decreased pain, and increased function of mobility (Wang et al., 2011; Hinman et al., 2007; Silva et al., 2008). As the knee became stronger and more flexible, patients with knee OA had a higher score on the Knee injury and Osteoarthritis Outcome Score (KOOS), (Wang et al., 2011), a test that represents knee function and pain. However, this test was completed by the patients themselves which could have resulted in inaccurate results. Further testing needed to be done on the overall improvement of knee function with OA by a physician or an EKG analysis to acquire comparable results.

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PHYSICAL INACTIVITY AND MOOD STATE

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The purpose of this synthesis was to address lack of exercise, depression, anxiety, and other mood states (Bryne & Bryne, 1993). Sedentary living doubled the risk of depression and anxiety (Fox, 1999). Physical inactivity positively affected depression and anxiety (Kanning & Schlicht, 2010; Peluso & Siveira, 2005; Bryne & Bryne, 1993).

OVERVIEW

Randomized controlled trials were used to study effects of exercise on depression. Compared effects of exercise and treatment for depression were assessed. Psychometric instruments were used (Lawlor, 2001). Before groups were examined subjects completed the Beck Depression Inventory that included mood state (Bryne & Bryne, 1993).

Exercise status produced important consequences related to mood state (Bryne & Bryne, 1993). Inactivity was associated with negative consequences. Physical activity increased the likelihood of positive mood state (Bryne & Bryne, 1993; Lawlor, 2001), reduced depression, and reduced anxiety (Kanning & Chikicht, 2010).

Effects of Exercise Treatments on Mood State

Subject	Control Group	Fitness Improved	Psychological Outcome
Adult, depressed women	No	Yes	Improved
Anxious male patient	No	No	Not Improved
Depressed outpatient	Yes	Yes	Improved
Male psychiatric patient	Yes	Yes	Improved
Male Juvenile Delinquent	No	Yes	Improved
Student Mood State	No	No	Small Improvement

Table 1. Exercise produced a positive change in a state of depression for most subjects (Bryne & Bryne, 1993).

CONSIDERATIONS

The mood state literature demonstrated insufficient clinical research. But, the strength of the literature suggested physical activity was successful as a prevention and treatment of psychiatric diseases and mood state (Peluso & Siveira, 2005; Kanning & Schlicht, 2010). Mental well-being was affected by activity level, which created negative or positive consequences. Inactivity levels led to negative mental well being with increased risk for depression and anxiety.

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THE EFFECTS OF ALCOHOL ON COMMUNICATION

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ISSUE

The purpose of this synthesis was to examine the effects of alcohol on communication. Alcohol impairs cognitive functioning and produced an influence on social behavior (Monahan & Samp, 2007). Alcohol consumption increased the rate and quality of social interaction (Caudill, Wilson & Abrams, 1987).

OVERVIEW

Individuals who consume alcohol generally demonstrated lower syntactic communicative performance than sober individuals (Collins, 1980; see Table 1). Adolescent alcoholics recorded a lower verbal and full-scale IQ than sober adolescents (Moss, Kirisci, Gordon, & Tarter, 1994). The effects of alcohol may facilitate communicative behavior to an extent (Monahan & Samp, 2007). Subjects who were given a low dose of alcohol initiated communication more frequently than subjects who were given a high dose or placebo condition (Caudill, Wilson, & Abrams, 1987). A higher rate of verbal persistence in goal pursuit resulted from drinking alcohol (Monahan & Samp, 2007). Goal-directed behaviors were easier to accomplish when an individual was intoxicated (Monahan & Samp, 2007).

Alcohol and Social Interaction

No Alcohol	Alcohol Consumed
<ul style="list-style-type: none">• Less social• Higher syntactic performance• Lower verbal persistence	<ul style="list-style-type: none">• More social• Lower syntactic performance• Higher verbal persistence

Table 1. Noticeable differences occurred between individuals who did not consume alcohol and those that did.

CONSIDERATIONS

If alcohol was believed to cause a more relaxed social state, then drinking was considered an option in similar situations by young adults (Monahan & Samp, 2007). An individual who consumed alcohol may be at a higher risk for date rape because the intoxicated person demonstrated a higher rate of verbal persistence rather than on topic definitive responses (Monahan & Samp, 2007). Alcohol consumption produced positive and negative side effects.

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IMPROVING BALANCE TRAINING IN OLDER ADULTS

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ISSUE

With advancing age, the physiological systems involved in balance maintenance begin to decline in function, thus increasing the prevalence of falling (Wolfson et al., 1996). Multiple interventions are available for improving balance in the older population (see Table 1). The FITT Principle (frequency, intensity, time, and type) needs to be considered when creating a program.

Balance Training Programs	
Functional	Resistance
Dynamic Balance	Endurance
Static Balance	Tai Chi
Tactile Sensitivity	Flexibility

Table 1. A separate approach or a combination of these methods is used to attain balance gains.

OVERVIEW

Assessing each individual's fitness level prior to the initiation of a program will ensure that notable progression occurs (Lord, Ward, Williams, & Strudwick, 2001; Means, Rodell, & O'Sullivan, 2005; Wolfson et al., 1996). The common technique of rating perceived exertion is used to maintain moderate intensity during the training (Means et al., 2005). While the frequency of an exercise is important, the type of training also plays a major role. Wolfson et al. (1996) found significant gains in balance after a short three month intervention involving strength and balance exercises that were performed three days a week. A 12 month program achieved comparable improvements after meeting two days a week for endurance and balance training (Lord et al., 2001).

CONSIDERATIONS

Specific types of balance training, involving static and dynamic exercises, resulted in significant balance gains (Lord et al., 2001, Means et al., 2005, Wolfson et al., 1996). The program administered by Means et al. (2005) conducted tests on a variety of floor textures allowing a spectrum of challenges for the participants; imitating the real world. Future research should include exercises that mimic activities of daily living, to investigate whether an implementation of these will attain greater balance gains compared to static or dynamic balance training. Providing the older population with a superior intervention for preventing falls is of great necessity in reducing fall-related fatalities.

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PHYSICAL INACTIVITY AND SPORT ORIENTATION

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ISSUE

The purpose of this synthesis was to determine a connection between physical inactivity and sport orientation. Active individuals have a stronger sport orientation, are sensation seeking, and have fewer sedentary behaviors. Athletes generally scored higher on a Sport Orientation Questionnaire than nonathletes (Gill, Kelley, Martin, & Caruso, 1991). This suggested that people who were physically inactive over a lifetime were less oriented towards sports (see Figure 1).

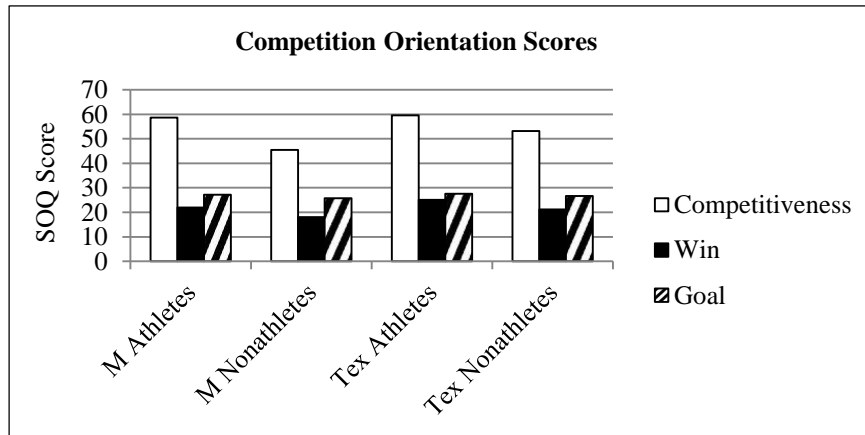


Figure 1. Athletes from Minnesota and from Texas differed in reference to sport orientation and its sub categories. Sub categories include 1) competitiveness, 2) win orientation, and 3) goal orientation (adapted from the work of Gill, Kelley, Martin, & Caruso, 1991, p. 274).

OVERVIEW

Physically inactive individuals were less likely to have a strong sport orientation than physically active people. Physically active individuals demonstrated a positive association between sensation seeking, previous physical activity level, and participating in community sports (Sallis, Prochaska, & Taylor, 2000). Also, athletes that were more accomplished had a higher performance orientation than weaker athletes (Martin and Gill, 1991).

CONSIDERATIONS

There was a relationship between physical activity and sport orientation. Alternatively, there was a doubtful or no relationship between physical inactivity and sport orientation. Further research is needed to focus on the connections of people who participate in sports and people who prefer sedentary behavior. Other research considerations were discussed by Van Der Horst, Paw, Twisk, and Van Mechelen.

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ORIGINAL RESEARCH ABSTRACTS



STUDENT CONFIDENCE IN FACULTY CANDIDATES

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PURPOSE

The purpose of this study was to determine differences in student confidence levels between faculty candidates regarding the ability to meet the demands of the position (Meizlish & Kaplan, 2008).

Null Hypothesis #1 (NH1): Students did not demonstrate preference in candidates.

Null Hypothesis #2 (NH2): There was no difference between males and females students on confidence in candidates.

METHODS

Participants. Male and female Kinesiology students participated in this study. A Student Confidence Assessment Questionnaire (CAQ) measured the confidence of students in the ability of candidates to successfully meet the demands of the position. **Instrumentation.** Confidence in candidates was determined using 12 questions and a four point Likert Scale (see Figure 1).

Four Point Likert Scale

I am confident in the candidate's ability to:	Strong Disagreement		Strong Agreement	
	1	2	3	4
1. Execute the skills necessary to be a successful Professor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Successfully develop a lab and assemble research funding.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 1. The Likert Scale assessed the confidence of students in the abilities of the candidates.

Procedures. The order of the candidate presentation was determined by convenience ($N_{can}=3$). Student participation ($N_{stnt}=42-53$; 3 candidates, 3 meetings $N_{mtg1}=53$, $N_{mtg2}=45$, $N_{mtg3}=42$) was determined by convenience. Scripted questions were formulated after a discussion with TAs and Physical Education and Kinesiology Professional Club members. These questions were formatted in written form and distributed to the students prior to candidate presentation. The students were instructed to ask the Scripted Questions and to follow with questions formulated with responses from each candidate. Presentations and a question and answer session took place in a physical activity room. After each presentation, a spontaneous group of students formed to discuss the merits of each candidate while reviewing candidate Vita's ($n_{stnt}=7$). **Statistics.** The results of the CAQ were compiled and posted on a wall prior to a Candidate Comparison Student Meeting (CCSM). The data collected was compiled in two groups, male and female. Descriptive statistics were used to demonstrate candidate preferences. As a result of the CCSM, a recommendation was provided to the Search Committee.

RESULTS

Means indicated that Candidate #1 (C#1; $\mu=3.706$) was followed by Candidate #3 (C#3; $\mu=3.625$) and Candidate #2 (C#2; $\mu=3.036$) in student preference. Hypothesis #1 was rejected. Students indicated a preference. Means demonstrated less student confidence in C#2 than in C#1 and C#3 (see Table 1).

CAQ Scores

Candidate	Average Score
Candidate 1	3.706
Candidate 2	3.036
Candidate 3	3.625

Table 1. The candidates all scored over a three, however Candidates 1 and 3 scored much better than Candidate 2.

A two tailed t-test, type 2 was performed for each candidate. For the male candidate, no student gender differences were found. For C#1, the average for male students was $\mu_{mstnt}=3.713$ and for females was $\mu_{fstnt}=3.699$. The P-value for C#1 was $p=0.893$. NH1 for C#1 was accepted. For female candidates, gender differences were found. The data showed that there was a significant difference between male and female student confidence for female candidates. Female students were more confident in female candidates than were male students. For C#2, the male average was $\mu_{mstnt}=2.846$ versus $\mu_{fstnt}=3.121$ for females. The P-value for C#2 was $p=0.055$. For C#3, males averaged $\mu_{mstnt}=3.439$ while females averaged $\mu_{fstnt}=3.794$. The P-value for C#3 was $p=0.028$.

DISCUSSION

Male students were less confident in and were less likely to select a female candidate. Overall, students were more acceptant of C#1 and C#3. The CCSM results sent to the Search Committee recommended C#1 and C#3, in that order, but did not recommend C#2. Candidate 1 (C#1) possessed expertise in Exercise Physiology and Biomechanics. Candidate 2 (C#2) and Candidate 3 (C#3) were both sport psychologists.

Therefore, selection to position suggests implications for the program. An offered appointment to C#1 would support a traditional view (Mathews, & Cox, 1976). An offered position to C#2 or C#3, may indicate a move away from the traditional science base, toward a base of social science (Cox, 2007; Ulrich, 1968; Weinberg, & Gould, 2011). If movement away from a traditional base were to occur, then students from Kinesiology at that University may not be able to compete for the same positions as students from other area universities that adhere to the more traditional underlying structure for the Kinesiology Profession (exercise physiology & biomechanics). To be seen as competitive, students graduating from a university with a kinesiology degree undergirded by social science rather than exercise Physiology or Biomechanics, must gain other advantages from the Kinesiology Program to compete

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COMPETITIVE ANXIETY IN ENDURANCE ATHLETES

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PURPOSE

Competitive state anxiety (CSA) was situation-specific and multidimensional in nature. The dimensions of CSA included cognitive components, somatic components, and self-confidence. Multiple studies posited the following two trends – a negative linear trend between cognitive anxiety (CA) and performance, and a curvilinear trend between somatic anxiety (SA) and performance. Literature also showed that high self-confidence related to low competitive anxiety and better performance in sport (Eys, Hardy, Carron, & Beauchamp, 2003; Burton, 1988; Wiggins & Brustad, 1996). The purpose of this study was to determine the connection between overall competitive state anxiety, cognitive anxiety, somatic anxiety, and self-confidence in relation to sport experience in endurance athletes.

Null Hypothesis #1: There was no difference between novice and varsity rowers in competitive state anxiety.

Null Hypothesis #2: There was no difference between novice and varsity rowers in cognitive anxiety.

Null Hypothesis #3: There was no difference between novice and varsity rowers in somatic anxiety.

Null Hypothesis #4: There was no difference between novice and varsity rowers in self-confidence.

METHODS

The population was selected from a Division I men's crew team. A total of 20 crew athletes (N=20) were chosen randomly from both the novice ($n_n=10$) and varsity ($n_v=10$) teams. Athletes with less than one year of rowing experience were classified as novice. Athletes with more than one year of rowing experience were classified as varsity. The subjects were 18 to 24 year old, college students ranging from freshman to senior class. A modified version of the competitive state anxiety inventory-2 (CSAI-2) was used to survey participants.

Changes were made to the CSAI-2 survey in order to make questions more specific to crew athletes. In addition to an overall CSA assessment, the CSAI-2 measured cognitive anxiety, somatic anxiety, and self-confidence. These factors were determined by responses to ten sport-specific questions posed in the survey. The study was introduced with the use of formal script in order to ensure consistent and accurate communication with athletes. The assessment packet included the modified CSAI-2, a logistics sheet to assess personal information, and an open-ended comments section. All participants understood that personal privacy was protected using University Use of Human Subjects procedure.

RESULTS

Novice participants recorded an overall competitive state anxiety score of 25.7. Varsity participants reported a score of 28.8. Mean values were calculated for sub-sections of the data set and a two-tailed t-test was implemented to compare groups.

Sub-section scores for cognitive anxiety, somatic anxiety and self-confidence did not vary based on experience (see Figure 1).

Overall CSA Results		
Group	Mean	Significance
Novice	25.7	0.09
Varsity	28.8	
Cognitive Anxiety Results		
Group	Mean	Significance
Novice	7.2	0.49
Varsity	7.9	
Somatic Anxiety Results		
Group	Mean	Significance
Novice	7.7	0.16
Varsity	9.1	
Self-Confidence Results		
Group	Mean	Significance
Novice	7.5	0.11
Varsity	6.2	

Figure 1. There were similar results for groups regardless of group affiliation.

All p-values for overall competitive state anxiety, cognitive anxiety, somatic anxiety, and self-confidence exceeded alpha. All null hypotheses were accepted. There was no difference between groups.

DISCUSSION

Future studies should consider individual zone of optimal functioning, competitive state anxiety levels, and performance of each subject to produce a clear understanding of anxiety in novice and varsity rowers (Salminen, Liukkonen, Hanin, & Hyvonen, 1995; Williams & Jenkins, 1986). By measuring discrepancies between individual zone of optimal functioning and measured competitive state anxiety levels, researchers would be able to predict more accurately detrimental levels of anxiety in athletes during performance. Future studies would benefit from larger sample sizes and observation of a variety of sports.

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COMPARING EXERCISE INTENSITIES: RUNNING VERSUS EXERGAMING

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PURPOSE

Decreasing physical activity in adults and adolescents is an increasing cause for concern. The Centers for Disease Control and Prevention (CDC) has recommended 60 minutes of aerobic physical activity per day, yet the CDC has shown that only 28.7% of high school students reported to have met that guideline. Additionally, over 31% of high school students spend three or more hours watching TV or playing video games (Eaton et al., 2012). With 16.9% obesity prevalence in youth between the ages of 2-19 years (Ogden, Carroll, Kit, and Flegal, 2012), alternative forms of exercise have surfaced in hopes to reverse this trend. Exergaming is a relatively new style of video gaming that incorporates exercise. This may be an effective way to promote physical activity in sedentary youth (Bailey and McInnis, 2011) who may be more interested in video games than traditional exercise. The CDC recommends that children aerobically exercise 60 minutes or more per day at moderate-vigorous intensity, and that adults aerobically exercise 150 minutes of moderate-vigorous intensity per week (Centers for Disease Control and Prevention, 2011). Intensity level is relevant in this recommendation because higher intensity exercise results in exponentially greater caloric expenditure compared to lower intensities. The purpose of this study was to evaluate voluntary exercise intensities of running compared to playing the Xbox Kinect. Our null hypothesis was that there would not be a statistically significant difference between exertion intensities of running and exergaming.

METHODS

Participants: A sample of 13 undergraduate students ($n_{\text{male}} = 7$, $n_{\text{female}} = 6$), ages ranging from 16-45, voluntarily participated. **Equipment:** Subjects wore SenseWear Armbands for physical exertion monitoring. Running was done on treadmills or a track. The video game, Kung Fu High Impact, was played on the Xbox 360 gaming console with Xbox Kinect. **Procedures:** Subjects participated in both running and exergaming trials held on separate days. Subjects were instructed on how to play the video game before the trial began. Game settings were Mayhem Designer, six rounds, and subjects were instructed to continue playing/running for the full time period. Subjects were instructed to “do a thirty minute workout,” without any description of how intense the workout should be. Both trials lasted for an average of 31 continuous minutes of data collection. Physical exertion was measured in METs (Metabolic Equivalent of Task). Intensities were grouped as: 0-3 METs = Sedentary, 3-6 METs = Moderate, 6-9 METs = Vigorous, >9 METs = Very Vigorous. **Statistics:** A paired two-tailed t-test was used to compare means with significance set at an alpha level of $p \leq 0.05$.

RESULTS

Results are shown in Table 1. Paired analysis of average METs (average calculated for the complete workout duration) showed significant differences between running and exergaming exercise intensities ($p < 0.01$) (null hypothesis rejected). Average METs comparison is shown in Figure 1, and time spent at different intensity levels is compared in Figure 2. Standard error is shown in both figures.

Table 1: Intensities of Running vs. Exergaming and Time Spent in Each Category

Trial	Average METs	Time at MET Level (min)			
		0-3 METs	3-6 METs	6-9 METs	>9 METs
Running	7.4 (± 1.5)	1.9 (± 1.5)	6.2 (± 7.0)	12.2 (± 6.7)	10.9 (± 9.3)
Xbox	6.1 (± 1.0)	1.5 (± 1.1)	11.5 (± 9.9)	18.0 (± 9.9)	0.3 (± 0.8)

Mean (\pm Standard Deviation) is calculated for full 31-minute workout and time distribution equates to 31 minutes.

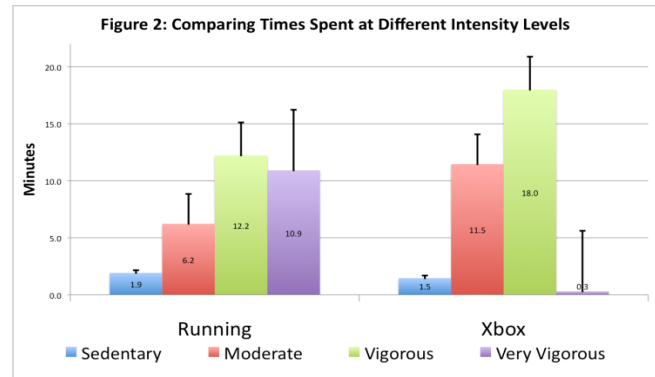
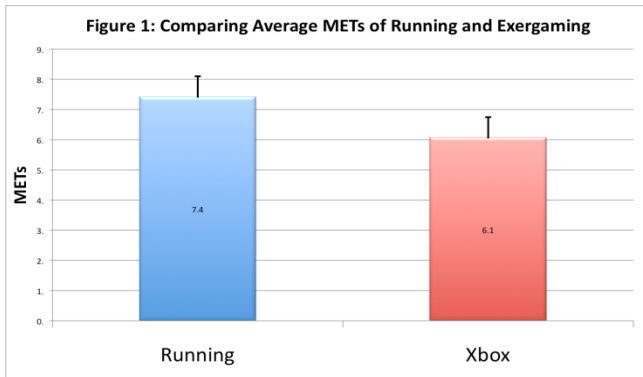


Figure 1 (left): This figure displays the average METs comparison between running and Xbox for the full trial time.

Figure 2 (right): This right figure displays a comparison of minutes spent in intensity zones according to the intensity level.

DISCUSSION

As originally expected, there was a significant difference of intensity in running compared to exergaming. However, the difference in average METs was less than expected. The data suggested that running is 21% higher in intensity than playing the Xbox. Figure 2 shows how time is distributed across intensity levels. Subjects spent nearly all of their time in moderate-vigorous zones while exergaming, but spent 74% of their time running in vigorous-very vigorous zones. Although running is physically more vigorous than the Xbox, perhaps the mental stimulation of an exergame could provide a means for longer workout durations than traditional exercise. In the case of this study, based on the means, it would have taken only an additional 7 minutes of exercising on the Xbox to achieve the same amount of energy expenditure as running, which suggests that exergaming may improve youth inactivity rates. With the success of the gaming industry, and the time that adolescents spend playing video games, exergaming has potential to be one solution to increase physical activity. However, this study is limited to a single game, which was chosen based on its high level of physical demand. There are many exergames that are much less intense. Also, the majority of our subjects were older than 18 years of age, which limits the study further. There remains a need for research assessing exergame enjoyment and exercise efficacy in youth specifically to provide greater support for or against exergaming as a viable form of stimulating exercise to combat inactivity rates.

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EFFECT OF EXPECTED EXERCISE DURATION ON PACING STRATEGIES DURING CIRCUIT WORKOUT

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PURPOSE

Expected exercise duration has been shown to have a large effect on pacing strategies and rates of perceived exertion (Miller, 2012; Eston et al., 2012). Many people may change their pacing strategy during a workout to fit various intensities and/or lengths. The purpose of this study was to observe the effect of knowledge of exercise duration on: 1) rate of perceived exertion (RPE), 2) heart rate, 3) completed cycles and 4) pacing strategies during a timed circuit-workout. The three research hypotheses of the study were: 1) heart rate would increase, 2) RPE would increase, and 3) completed cycles would increase during the known duration condition compared to unknown duration.

METHODS

Participants: A convenience sample of sixteen college-age students volunteered for participation ($n_{\text{male}} = 9$, $n_{\text{female}} = 7$). All participants were defined as recreationally active (e.g. exercise at least 3 times a week). **Equipment:** Heart rate was measured using a Polar T31 chest strap with watch. RPE was measured using Borg's 10-point scale (Figure 1). Completed cycles were collected by researchers as whole numbers for full cycles and a whole number plus 0.25, 0.5, or 0.75 depending on the exercise in which the cycle finished. **Procedures:** Prior to testing, all participants completed a familiarization session. During familiarization, participants received a basic explanation of number representation on the Borg 10-point RPE scale and performed each exercise of the circuit. Prior to testing sessions, a coin was flipped to determine order of workouts. The two sessions included one of known duration and one of unknown duration. Each participant completed as many cycles as possible of four exercises: 200m run, 10 walking lunges with 15 pound dumbbells, 20 roman twists with a 10 pound medicine, and 10 box jumps approximately two feet off the ground. After each workout, the participants answered one question about how hard the entire workout was on a scale of 1-10. Heart rate and RPE were collected every two minutes and completed/partial cycles were recorded as they were completed. **Statistics:** Dependent group t-tests were used to determine whether significant differences existed between knowledge of exercise duration on RPE, heart rate, and completed circuits. Statistical significance was set at an alpha level of $p \leq 0.05$.

1 - 10 Borg Rating of Perceived Exertion Scale	
0	Rest
1	Really Easy
2	Easy
3	Moderate
4	Sort of Hard
5	Hard
6	
7	Really Hard
8	
9	Really, Really, Hard
10	Maximal: Just like my hardest race

Figure 1. Borg's 10-point scale was used to measure rate of RPE.

RESULTS

All means and standard deviations for each dependent variable are presented in Table 1. There was no statistical difference ($p=0.07$) in heart rate between duration conditions. The results for RPE also illustrated no statistical difference ($p=0.89$) between duration conditions. Once again, there was no statistical difference ($p=0.42$) between completed cycles in either duration condition. Research hypotheses one, two and three were rejected.

Table 1. Mean \pm SD for heart rate, RPE, and completed cycles were calculated for each exercise condition.			
	Heart Rate (bpm)	RPE	Cycles Completed
Known	180.4 \pm 7.0	5.9 \pm 1.3	3.5 \pm 0.5
Unknown	177.6 \pm 7.5	5.8 \pm 1.2	3.4 \pm 0.5

DISCUSSION

Despite the lack of a difference in heart rate between workouts, one study showed heart rate to be significantly lower at 171.8 ± 8.5 bpm in the unknown exercise duration trial compared to 176.9 ± 6.6 bpm in the known exercise duration trial (Eston et al., 2012). The present study illustrated increases in heart rate from the beginning of the circuit to the end of the circuit but no significant increases between trials. Researchers found it quick and easy to familiarize participants with Borg's 10-point scale in the allotted time for the current study. Multiple exercise included in the circuit were hard to control, including rotation during Russian twists, jump height during box jumps, and depth of each lung during lunges. A major reason for no difference in cycles completed was most likely because the circuit only lasted a total of eight minutes. In order to observe large changes in this variable a longer duration of workout would need to be used (Albertus et al., 2005). Ten of the sixteen participants were active Whitworth University varsity athletes and were considered to differ from non-athletes in the degree of motivation to exercise as well as competitive nature. This may have modified results slightly, especially in the area of circuits completed during the second session as they aimed to complete more than the first session. Another consideration was made concerning individual statistics; dependent group t-test evaluated the group as a whole, while some differences may have been found between each person between conditions. Some strengths of this study were relatively easy equipment and a basic workout. Limitations of this study were a small sample size of mainly athletes and limited time. Further investigations should examine a larger sample size, different apparatuses such as a treadmill or stationary bike, similar variables with the addition blood lactate and/or pH, and a more diverse population.

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EFFECTS OF SEVEN-DAY CREATINE LOADING PHASE ON ACUTE HYPOXIC PERFORMANCE

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PURPOSE

Ogura, Katamoto Uchimar, Takahashi and Naito (2006) observed a significant decrease in aerobic energy release and a significant increase in anaerobic energy release during high-moderate hypoxia ($O_2=12.7\%$). The decrease in atmospheric pressure at a higher altitude is lower than the partial pressure of inspired oxygen, it becomes more difficult to intake O_2 . Creatine (Cr) is an important fuel source for the immediate system and is used for high intensity, anaerobic activity increasing intramuscular Cr allows for greater stores of Cr in the muscle, so that the duration of the immediate system can be sustained for longer (Williams & Branch, 1998). The purpose of this study was to determine whether Cr had a positive effect on peak power (PP), mean power (MP), fatigue index (FI%), heart rate (HR), and oxygen uptake (VO_2), on a Wingate anaerobic test (WT) in a hypoxic environment. The research hypotheses were that the application of Cr would: 1) increase PP, 2) increase MP, 3) decrease FI%, 4) increase VO_2 , and 5) decrease in HR.

METHODS

Participants: A convenience sample of 14 college aged students volunteered for participation ($n_{male}=10$, $n_{female}=4$). All participants were defined as competitive collegiate athletes (e.g. NCAA division III, or intramural). Peak power, MP, and FI% were measured using a Monark 894e cycle ergometer. Heart rate was measured using a Polar Wearlink1 HR monitor. Oxygen uptake was measured using Parvo TrueOne 2400 Metabolic Measurement cart, through the use of a T-Shaped configured Hans Rudolph Two-Way Non-Re-breathing valve, Model 2700B. **Procedures:** Prior to testing, all participants completed a familiarization session. During familiarization, no data was collected. Participants were harnessed to the Metabolic measuring system and performed one WT test to feel what it was like to perform the task. One to two days afterward participants began the experimental procedure. Participants were assigned to one of two control conditions (hypoxic[HYP] or normoxic[norm]) randomly. During the 30-sec WT trial PP, MP, FI% HR and VO_2 were recorded. One to two days later the participant performed the opposite condition. The third trial was always Hypoxia with creatine supplementation for seven days (HYP/C). All variables were measured the same as the prior trials. **Equipment:** (see Figure1.) **Statistics:** A repeated measures Analysis of Variance (ANOVA) was used to investigate significant differences between HYP, NORM, and HYP/C for each dependent variable. Statistical significance was set at an alpha level of $p \leq 0.05$.

Equipment



Figure 1A: A weather balloon was used for Hypoxic air storage.



Figure 1B: During Hypoxic trial two way valves are opened and participant breaths

Descriptive statistics for all experiment conditions are summarized in Table 1. A statistical difference for VO_2 ($p = 0.046$) was found. A pairwise comparison showed a significant difference between NORM vs. HYP and NORM vs. HYP/C ($p = .014$, $p = .032$, respectively). A pairwise

comparison showed no statistical difference between HYP vs. HYP/C ($p=.707$). A repeated measures ANOVA showed no statistical difference for HR ($p=.385$). A repeated measures ANOVA indicated a statistical difference for PP ($p=.036$). A pairwise comparison showed a significant difference between HYP vs. HYP/C ($p=.009$). A pairwise comparison showed no significant difference between NORM vs. HYP and NORM vs. HYP/C ($p=.119$, $p=.096$ respectively). A repeated measures ANOVA indicated a statistical difference for MP ($p=.005$). A pairwise comparison showed a statistical significance between NORM vs. HYP and HYP vs. HYP/C ($p=.004$, $p=.013$ respectively). A pairwise comparison showed no statistical significance between NORM and HYP/C ($p=.421$). A repeated measures ANOVA showed no statistical difference for FI% ($p=.555$). The research hypothesis for MP, PP, and VO_2 were true since Cr seemed to improve these measures. The research hypothesis for HR and FI% were false since there was no significant difference found.

Table 1. VO_2 , HR, PP, MP, and FI means and standard deviations for the Wingate test are shown for each condition.

Condition	VO_2 (L/min)*	HR (bpm)	PP (W/Kg)*	MP (W/Kg)*	FI (%)
NORM	2.20 ± .59	150.80 ± 14.93	10.60 ± 2.02	8.14 ± 1.06	48.32 ± 7.77
HYP	2.70 ± .66	157.81 ± 8.25	10.25 ± 1.73	7.84 ± 1.06	50.92 ± 9.45
HYP/C	2.77 ± 1.08	155.29 ± 11.84	11.12 ± 2.14	8.28 ± 1.13	49.95 ± 7.75

* indicates significant difference between conditions

DISCUSSION

Mean power, PP, and VO_2 showed a significant difference under hypoxic performance. Hypoxia without Cr decreased PP and MP compared to NORM. These findings supported the conclusions found in previous studies. Ogura, Katamoto Uchimaru, Takahashi & Naito (2006) found a significant decrease in PP, and MP during a HYP WT. The combined results of the present study and Ogura, Katamoto Uchimaru, Takahashi and Naito (2006) concluded that PP and MP were decreased during HYP conditions. The present study found that after a seven day Cr loading phase HYP performance improved significantly. Peak power and MP improved to the same performance levels as normoxia and in some cases, better than normoxia. Therefore, researchers can suggest that with Cr loading hypoxic performance can be improved to a level equal to or greater than normoxic performance without creatine. In the current study the participants showed a significant increase in PP and MP. This corresponds to how Cr loading is known to affect anaerobic performance. PP as well as MP increased significantly, the current study showed that Cr did in fact help the individuals in the study maintain MP for longer, as well as increase total PP within the 30 second WT.

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THE CURRENT ECONOMIC IMPACT ON YOUTH SPORTS

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PURPOSE

It has been observed that the turmoil of a national economic crisis has deterred households from participating in community sports. In the 1930's during the Great Depression, sports flourished amid a global recession. Special state and federal task forces were created with the intent purpose of stimulating recreational sports and facilities (Davidson, 1988). Today, the recession has changed many family's priorities in regards to spending habits. Moreover, with governmental policies and budget cuts, many schools and cities are dropping programs to cover other costs. According to many studies, in adult populations, low socioeconomics is positively correlated to sports participation regardless of education, income, or occupational status (White & McTeer, 2012; Telema, Laakso, Nupponen, Rimpela & Pere, 2009). However, little research investigates the economical relationship during childhood and youth and the effect it has on their ability to participate in sports. White and McTeer (2012) found younger populations are greatly affected by socioeconomic status and their ability to maintain involvement in organized sport activity. One study investigated participation factors affecting youth ages twelve through eighteen, and costs were found to be an influential aspect of their involvement (Humbert, Chad, Spink, Muhajarine, Anderson, Bruner, Girolami, Odnokon & Gryba, 2006). The effects of socioeconomic status on health is well documented. It is suggested that early childhood socioeconomic starts children on a course of increasingly negative health outcomes (Chen, Boyce & Mathews, 2002). It is inferred that as economical status declines, participation rates will also decrease which might be one factor leading to increased childhood health risks. The purpose of this study is to assess changes at the family level in regards to youth sport participation rates influenced by recessions, and to propose an association with increased childhood health risks. To be able to promote physical activity among children, adolescents and adults and to improve and promote youth sport programs, it is important to know influential factors.

METHODS

Participants: A randomized sample of 300-400 participants. All participants were defined as parents of children ages 5-18. **Equipment:** Two identical surveys utilized: a hard copy, and a digital form using Qualtrics, a survey software program. **Procedures:** parents were randomly selected at sporting events, public buildings and facilities. The digital survey link was emailed twice in a two week interval by three city recreation directors to their patrons. A cross-sectional study will look at a recreational soccer program's participation percentages over a five year period between the years of 2007 and 2012 to determine the difference of participants within the specific sporting event. **Statistics:** A Pearson Product correlation will be used to determine if there is a relationship between participation and income level ($\alpha=0.05$). Additionally, a chi-square test will be used to investigate the significance of the observed data.

RESULTS

It is anticipated the results will indicate a strong relationship between youth sports participation due to economic stressors. It is believed the current recession has disrupted many families' spending habits which has caused a decline in the amount of sport programs a family chooses to enroll.

DISCUSSION

The health of the American population is declining due to a lack of physical activity, leading to a higher risk of chronic diseases. Encouraging children and adolescents to involve themselves in organized physical activity will not only decrease their own health risks, it will also encourage a lifelong healthy lifestyle. The importance of youth sports can aid in the discovery of a healthy lifestyle that is widespread, not only affecting the participant, but their family, and in turn their community.

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THE EFFECTS OF ULTRA MARATHONS ON FOOT VOLUMETRICS AND NUTRITION.

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PURPOSE

The purpose of this study was to investigate the differences in pre and post foot volumetrics for Ultra Marathon (UM - exceeding 26.2 miles) runners.

Based upon another, non published study (due to small population) of pure marathon runners (26.2 miles) and the anticipated trauma of 50 miles on a mountain trail, our hypothesis was that there would be an increase in the volume of the foot during an UM.

METHODS

Participants, consisted of 21 male or female UM runners aged 18+ with no history of surgery to their lower extremities (LE). Prior to a 50-mile and 14,000 vertical foot mountain trail marathon. Prior to the race, the participants left foot length, width, and arch length were assessed using a Brannock shoe size-measuring instrument. Left foot volumetrics were also assessed using a Lucite, foot volumeter set with volumeter container (water displacement) and obturator, which was used to standardize the water levels prior to each measurement. The same foot data was assessed immediately after (with in 10 minutes) of completion of the participants' UM. See figure 1 for a photo of the foot measurements being taken after a participant's race.



Figure 1. Photo of the foot measurements being taken after a participants race.

RESULTS

Refer to Table 1 for a representation of a sample of the foot data collected from the UM participants’.

Pre Foot Volume	Post Foot Volume	% Difference Lost
480 ml	340 ml	29%
340 ml	160 ml	53%
720 ml	540 ml	25%
620 ml	360 ml	42%
560 ml	500 ml	21%
440 ml	340 ml	23%

Average % Loss
32%

Table 1. A sample of the foot data collected from the UM participants’.

While there was very little change in foot and arch length and width, there was as little as 21% and as much as 53 % decrease in volume of the measured foot from pre to post event measurements.

DISCUSSION

Upon measuring our participants, we discovered that the change in the foot measurement was different than we had hypothesized. The foot did have a change but the change actually decreased in volume. This study indicates that our hypothesis of anticipated increased foot volume was incorrect, but rather the null of decreased foot volume was correct. As the foot shrinks the runners foot has a greater chance of slipping and sliding in their shoe causing blisters which will cause injury to the runner, thus preventing the runner from running at their full potential. With this information one might consider that it may be beneficial for runners to consider the dynamics of the foot and thus take appropriate action to accommodate the changes in the feet during an UM. For example, one might possibly change the size and or type of shoe throughout an ultra marathon in order to facilitate best outcomes with the feet.

CARBOHYDRATE MOUTH RINSE EFFECTS WHILE RUNNING

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PURPOSE

Researchers have investigated the role of ingesting carbohydrate (CHO) during endurance exercise to postpone fatigue and enhance performance (Temesi, Johnson, Raymond, Burdon, & O'Connor, 2011). However, researchers who examined swishing a CHO mouth rinse that can increase a trained individual's endurance and could act as a useful alternative to the ingestion of CHO (Chambers, Bridge, & Jones, 2009; Pottier, Bouckaert, Gilis, Roels, & Derave, 2010). The purpose of this study was to compare the effects of a CHO mouth rinse to a placebo on: 1) respiratory exchange ratio (RER), 2) rate of perceived exertion (RPE), 3) heart rate (HR), and 4) blood glucose levels during endurance running sessions. The research hypotheses were that the CHO solution would increase blood glucose levels and increase RER, but the null hypothesis was that neither the CHO solution nor placebo would affect HR or RPE while running.

METHODS

Participants: A convenience sample of seven participants aged 22-45 volunteered for the study ($n_{\text{male}} = 6$, $n_{\text{female}} = 1$) and were defined as recreationally trained runners (e.g. 45 minutes of exercise, three to five days a week). **Equipment:** Oxygen consumption and RER were measured using a Paryomedics Trueone 2400 metabolic cart. Blood glucose levels were measured using a Bayer Contour glucometer. Rate of perceived exertion was collected using the Borg standard 15-point RPE scale (see Figure 1). Heart rate was measured using a Polar T31 monitor around the chest. All running took place on a Woodway Desmo HP treadmill. **Procedures:** Prior to testing, all participants were required to fill out a health screening form and an informed consent. The participants then underwent a familiarization trial on the treadmill where $VO_{2\text{max}}$ along with corresponding speeds for 70% $VO_{2\text{max}}$ were calculated. During the testing sessions the participants received either a CHO or placebo solution. The CHO rinse used was a 6.4% maltodextrin solution and the placebo was plain water. The study was double blind so neither the participants nor the researchers who collected data knew which solution was being used. The participants ran at 70% of their $VO_{2\text{max}}$ and rinsed 25 mL of solution for five seconds every five minutes, took RPE every ten minutes, and blood glucose every 15 minutes. Heart rate and VO_2 were continuously measured throughout the testing session. Participants ran for at least 45 minutes, but were capped at 95 minutes unless fatigue was in progress. The participants completed a total of two testing sessions with either a placebo or CHO mouth rinse. **Statistics:** A Wilcoxon Signed Rank test was used to investigate significant differences between the CHO mouth rinse and the placebo for each dependent variable. Statistical significance was set at an alpha level of $p \leq 0.05$.

RATE OF THE PERCEIVED EXERTION SCALE

6	No exertion	9	Very light	12		15	Hard (heavy)	18	
7	Extremely light	10		13	Somewhat hard	16		19	Extremely hard
8		11	Light	14		17	Very hard	20	Maximal exertion

Figure 1. Standard 15 Point Borg Rate of Perceived Exertion Scale

RESULTS

Mean data for each variable are summarized in Table 1. A Wilcoxon Signed Rank Test indicated that there was no statistical significance in RER ($P < 0.24$), RPE ($P < 0.61$), HR ($P < 0.87$), or blood glucose ($P < 0.39$). The research hypotheses were rejected, but the null hypothesis was accepted.

Mean Physiological Factors During Running with each Solution				
	RER	RPE	HR (bpm)	Blood Glucose (mg/dL)
CHO	0.89 ± 0.029	14.32 ± 2.24	158.46 ± 16.99	94.91 ± 12.40
Placebo	0.87 ± 0.017	14.94 ± 1.63	156.80 ± 8.78	90.24 ± 10.89

Table 1. Carbohydrate and placebo means and standard deviations are shown for each dependent variable.

DISCUSSION

For this present study, the CHO mouth rinse had no beneficial effects for any measured dependent variable of RER, RPE, HR and blood glucose. Similar to a study by Rollo, Cole, Miller, and Williams (2010), the participants did not show a noticeable decrease in RER while using a CHO mouth rinse or a placebo. Respiratory Exchange Ratio did not increase, which suggested that an intensity of 70% of VO_{2max} was not high enough to elicit CHO as a major fuel source during about one hour of exercise. Participants did not perform a time to exhaustion test (TTE), which yielded no significant change RPE for either solution. Therefore, full fatigue may not have been reached, which could have affected RPE levels and limited the study. There was no difference between HR during CHO solution use or placebo use, which was concurrent with previous literature (Whitham & McKinney, 2007). Oxygen requirements may not have been affected by the CHO mouth rinse so HR did not change. There was no difference in blood glucose levels, although previous research has indicated that CHO mouth rinses increase blood glucose levels (Flynn et al., 1987). The CHO solution used by Flynn et al. (1987) had a higher CHO concentration than the one used in the present study. Some limitations of the present study include the use of a small sample size and convenience method to gain participants, unforeseen changes to exercise routine by the participants, and a miscommunication between researchers that led to two participants running at different speeds for the two running trials. Future research should focus on testing a greater number of participants longitudinally (six months – one year) to yield results with higher statistical power. The present study yielded information that could be a foundation for further research in the area of CHO mouth rinse use during endurance activities and indicated that the type of population may affect the outcome of physiological factors when a 6.4% maltodextrin solution is utilized.

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EFFECTS OF WATCHING TV ON EXERCISE PERFORMANCE

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PURPOSE

Young adults commonly utilize distractive methods to maintain a workout session and to increase personal enjoyment. The most popular methods for mental distraction include: listening to music, reading a book, or watching television (Annesi, 2001; Lind, 2008; Russell et al., 2003; Schie, Stewart, Becker, & Rogers, 2008). The purpose of this research study was to examine the differences in heart rate (HR), caloric expenditure (CE), and rate of perceived exertion (RPE) between cycling performed with and without mental distraction (TV watching). The research hypotheses were that: 1) RPE and HR would be lower while participants watched TV and 2) CE would remain the same between exercise conditions.

METHOD

Participants: A convenience sample of 18 recreationally active, college-aged students volunteered for participation ($n_{\text{male}} = 4$, $n_{\text{female}} = 14$). Participants were considered moderately physically active (e.g. performed 20 - 30 minutes of moderate physical activity at least three times per week).

Equipment: Participants cycled on a Monark 328e cycle ergometer (Monark, Stockholm, Sweden). Heart rate was measured using a Polar heart rate monitor worn around the chest. A TrueOne 2400 mobile metabolic cart (ParvoMedics, Sandy, UT) was used to measure HR and CE.

The ACSM Borg scale was used to measure RPE. **Procedures:** Prior to testing, all participants completed a familiarization session. During the testing sessions, participants completed two randomized, 20-minute cycling sessions at a set, self-selected moderate intensity level, with at least 24 hours of rest between sessions to promote recovery. Participants chose a 20-minute Netflix TV show and watched the selected show during the distracted cycling session. Every five minutes RPE, CE, and HR were recorded (see Figure 1.).

Cycling Sessions

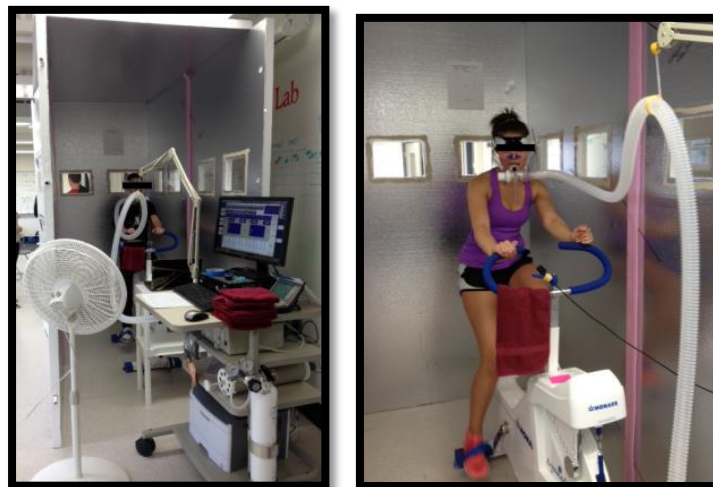


Figure 1. During distracted and non-distracted sessions, HR, CE, and RPE were measured every five minutes.

RESULTS

The descriptive statistics for HR, RPE, and CE are summarized in Table 1. There was a significant difference in HR ($p = 0.02$) and RPE ($p = 0.01$) between the conditions. The research hypothesis was accepted for both HR and RPE. No statistical difference was found between the two cycling sessions in regards to CE ($p = 0.18$), thus, the research hypothesis was accepted.

Mean and Standard Deviation HR, RPE, and CE Responses			
	HR (bpm)*	RPE*	CE (kcal)
Distracted (TV)	144.1 ± 14.1	12.4 ± 1.2	138.7 ± 49.5
Non-distracted	151.1 ± 14.9	13.5 ± 1.8	144.6 ± 57.6

Table 1. Listed above are the HR, RPE, and CE means and standard deviations for each cycling session. * indicates significant difference between distracted and non-distracted conditions.

DISCUSSION

There were no significant differences for CE in both cycling sessions. However, the distracted session resulted in 1) lower HR and 2) lower RPE compared to the non-distracted session. The research study was novel because it was the first to investigate CE for both exercise conditions. These results were attributed to the participants' state of mental distraction. Due to the distraction, participants could have decreased revolutions per minute (RPM), which resulted in lower HR. Consequently, participants perceived the cycling exercise to be less difficult. However, the results of the present study do not concur with the results seen in previous research because different methods of mental distraction were utilized (Lind, 2008; Kraft, Russell, Bowman, Selsor, & Foster, 2011; Schie et al., 2008). The results of this study were consistent with the results found by Kraft et al. (2011), in which HR was significantly higher ($p \leq 0.05$) for mean HR, peak HR, and time above target HR for interactive bicycle ergometry ($144 \pm 22 \text{ b}\cdot\text{min}^{-1}$, $161 \pm 23 \text{ b}\cdot\text{min}^{-1}$, and 22.5 ± 11.1 minutes, respectively) than for traditional bicycle ergometry ($126 \pm 20 \text{ b}\cdot\text{min}^{-1}$, $144 \pm 24 \text{ b}\cdot\text{min}^{-1}$, and 14.2 ± 12.6 minutes, respectively). Therefore, the protocols cannot be directly compared. Relevant future research could include an investigation on the effects of different genres of TV on RPE and HR. Noted limitations include convenience sampling, research design and space (time availability and constructed exercise box), and reliability of measuring instruments. Based on the results and the noted limitations, the present study has considerable value to serve as a foundation for future research. This research could examine different TV genres on RPE and HR, effects of $\text{VO}_{2\text{max}}$ on RPE, and a larger sample size.

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EFFECTS OF SLEEP DEPRIVATION ON ANAEROBIC PERFORMANCE AND RATE OF PERCEIVED EXERTION

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PURPOSE

When asleep, the body is efficient at the production of glycogen stores that can be later used as fuel (Davenne, 2000). Overall, researchers have shown sleep-deprived states do not increase anaerobic performance, but there is not a consensus on whether a negative effect may result (Vardar et al., 2007). Thus, the purpose of this research study was to determine whether a difference exists between well-rested and sleep-deprived states on rate of perceived exertion (RPE) and anaerobic performance during a 30 sec maximal Wingate test (WT). The research hypothesis was that the effect of sleep deprivation would decrease relative mean power (MP). The null hypotheses were that no significant differences would be observed between conditions for RPE, relative peak power (PP), or fatigue index (FI).

METHODS

Participants: A convenience sample of 17 college-age students volunteered for participation ($n_{\text{male}} = 12$, $n_{\text{female}} = 5$). All participants were defined as moderately active (e.g. 20-60 min of aerobic exercise, 3-5 times a week). **Equipment:** The participants rode a Monark Ergometric 894E bicycle (see Figure 1). Peak power, MP, and FI were calculated using a computer system that interfaced with the Monark ergometer. The RPE test was administered to participants using the 10-point Borg scale. **Procedures:** Prior to testing, all participants completed a familiarization trial to experience the WT and RPE test. During the familiarization, participants' weight was taken and 7.5% of measured body mass was recorded to be used as resistance in the WT. During the WT, participants performed a 1-2 min warm up, at moderate intensity. After the warm up, the participants were asked to reach maximum pedaling speed. At this point, the 7.5% body weight resistance was applied and the time started. The participants continued to pedal as quickly as possible for 30 sec. Immediately after each WT, the RPE test was administered to participants to evaluate the perceived exercise intensity. The sleep-deprived trial required the participants to receive one night of acute sleep deprivation (4 hrs in one night) after two well-rested nights of sleep (7-9 hrs). If the sleep protocol was met, participants then completed a WT and RPE test. The well-rested trial involved the completion of a WT and RPE test after having finished the recommended amount of sleep for two consecutive nights. Trials were performed in random order. **Statistics:** A dependent groups *t*-test was used to determine whether or not significant difference existed between the well-rested and sleep-deprived trials on PP, MP, FI, and RPE during the WT. To determine statistical significance, alpha level (α) was set at $p \leq 0.05$.

Wingate Bicycle



Figure 1. This is the Monark Ergometric 894E Bicycle used during this study.

RESULTS

Following dependent groups *t*-tests, researchers found there was no statistical significance in PP between the well-rested and sleep-deprived WT trials ($p = 0.33$), despite a slightly higher mean PP value in the well-rested trial (see Table 1). Thus, the null hypothesis was accepted. Mean power between the two situations was significantly different ($p = 0.05$). The research hypothesis for MP was accepted. Fatigue index resulted in no significant difference ($p = 0.45$). Fatigue index in the sleep-deprived trial spanned a large range from 7.45%-61.61%, which contributed to large standard deviations. The null hypothesis was accepted. Well-rested versus sleep-deprived RPE also was significantly different ($p = 0.02$). The null hypothesis was rejected.

Results for Anaerobic Power and RPE				
	PP (W/kg)	MP (W/kg)*	FI (%)	RPE*
Well-rested	10.04 ± 1.36	7.71 ± 0.81	49.20 ± 6.79	7.65 ± 1.00
Sleep-Deprived	9.75 ± 1.35	7.42 ± 0.88	46.85 ± 13.11	8.24 ± 1.20

Table 1. Means and standard deviations for each dependent variable are shown. The asterisks indicate that a significant difference was found.

DISCUSSION

Researchers discovered a significant decrease in MP from a well-rested state to a sleep-deprived state. This decrease suggested that acute sleep deprivation of 4 hrs in a single night had the ability to affect anaerobic performance on MP. Participants recorded higher RPE levels during the sleep-deprived trial despite the fact that MP in this condition was lower. Thus, the RPE was greater even when the participants were doing less work. More than anything else, these results may have been attributed to sleep loss. It is likely that the amount of sleep during the sleep-deprived state (4 hrs) was inadequate to allow the metabolic system to recover fully from the previous day (Davienne, 2009). This may have affected the ability to use glucose stores during a 30 sec maximal WT, as well as increased the feeling of physiological stress participants experienced. No statistical significance was found in PP and FI values between conditions, which is consistent with literature findings. This is largely due to there being sufficient glycogen stores at the beginning of the exercise to maintain a high PP in both scenarios (Soussi et al., 2008; Vardar et al., 2007). This study was novel because it was the first to focus on the effects of acute sleep deprivation on WT performance based on PP, MP, FI, and RPE values. To increase statistical power, future studies should aim for a larger sample size. Further investigations should strictly monitor sleep patterns as well as diet. Some participants fasted beforehand while others ate immediately prior to the trials. This may have affected performance during the WT. Additionally, Soussi et al. (2008) found that time of day significantly ($p > 0.001$) affects WT performance, so future research should require that WTs be performed at the same time of day. Lastly, future studies could test how long-term sleep deprivation affects the same four dependent variables.

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ASSESSMENT OF GAIT WITH ZERO DROP SHOES WHILE WALKING

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PURPOSE/RATIONALE

The purpose of this study is to examine and identify the relationship between barefoot walking and walking with zero drop shoes. Many believe that zero drop shoes mimic barefoot walking because the soles of these shoes are not sloped from the toe to the heel. Analysis of these two different methods will allow for further insight into whether barefoot walking is simulated in zero drop shoes. It is acknowledged that some research has been done in this area. Some have explored foot strike patterns in barefoot and shod runners (Lieberman, 2010), and the centre of pressure during barefoot walking (De Cock, 2008). Most of the research in this area has been done with regard to running, so we intend to analyze effects of zero drop shoes while walking. There has also been some general research that has analyzed gait with and without shoes (Oeffinger, 1999).

PROCESS

The shoes that are being used in the research include Altra (zero drop shoes), Samson & Delilah (zero drop shoes), traditional running shoes (Mizuno), and barefoot. The process of collecting data requires volunteer research subjects to use all walking methods and shoes mentioned previously. The data is collected when the walk on the Gaitrite System. The Gaitrite System contains a pad (about 20 feet in length) that measures center of pressure, toe-in, toe-out, plantar pressures and angle of impact. This data is then stored in a computer and analyzed by comparing similarities and differences between the different methods of walking.

Research subjects include volunteers as well as recruited students. The emphasis is to use subjects between the ages of 18 and 30 years of age, that have overall good health. Data is currently being collected and analyzed. This process has been going on for three months and will continue to until the research is presented. The goal is to have 50 male and 50 female subjects, so that we can acquire an adequate amount of test subjects and data.

OUTCOME/EVALUATION

If it is found that zero drop shoes do mimic barefoot walking then it will be beneficial over traditional running shoes (see Figure 1), for the health of the user. Barefoot walking is healthier than using traditional shoes because there is less impact on the ankle, knee, and hip joints. Zero drop shoes therefore would be healthier on joints while walking. So, there are much broader impacts of this research than simply gait assessment.

Similarities Between Zero Drop Shoes and Barefoot Walking

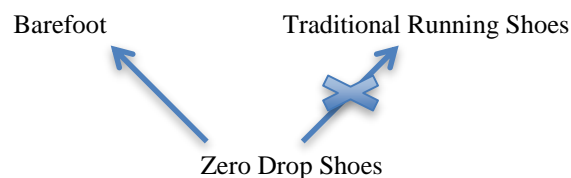


Figure 1. Zero drop shoes correlate more with barefoot than traditional running shoes.

INSIGHTS

Currently, data is being collected for analysis. Thus far ten participants have taken part in the research, with the goal of 50 male and 50 female research subjects by the end of the project. The statistics package that is being used is SPSS and the tests will be an ANOVA. Once all of the data is collected it can then be organized for analysis and conclusions can be drawn therefrom.

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ENERGY EXPENDITURE COMPARISON BETWEEN TREADMILL TRAINING AND EXERGAMING

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PURPOSE

According to one study, 10 to 16-year old children spent an average of 10 hours of daily sedentary behaviors and an average of only 12-13 minutes of daily vigorous activity (Strauss, Rodzilsky, Burack, & Colin, 2001). The decreasing levels of physical activity and the increasing prevalence of obesity-related health issues have created an incentive for additional workout options, such as exergaming, in an attempt to increase levels of exercise. Exergaming is video game play that involves physical exertion that can be compared to exercise. It has been noted in an additional study, that energy expenditure more than doubles when sedentary screen time is converted to active screen time, providing a possibility for obesity prevention and treatment (Lanningham-Foster et al., 2006). The purpose of this study was to compare the levels of energy expenditure (EE) between active videogame play and traditional treadmill training. The null hypothesis of the study was that no significant differences would be observed between the two exercise variables.

METHODS

Participants: A sample of thirteen undergraduate students, ages 16-45 years old, participated in the study ($n_{\text{male}} = 7$, $n_{\text{female}} = 6$). **Equipment:** Total EE was measured by SenseWear armbands. The videogame played was Kung Fu High Impact on the Kinect XBOX 360 gaming system. Jogging was done on a treadmill or indoor track. **Procedures:** Prior to testing, all participants observed a demonstration of how the video game worked and were given a short period of time to familiarize themselves with the game. After familiarization, the participants put on the armbands and played for thirty consecutive minutes. In a separate testing session, each participant trained for 30 consecutive minutes on the treadmill or indoor track. The order of the sessions varied, but were never done on the same day. No instruction or advice was given about the level of intensity for the gaming or treadmill session. Participants were given the ability to choose the intensity of the workout and the difficulty level of the game, so the sessions would be more reflective to settings outside of the experiment. **Statistics:** Paired two-sample t-tests were used to compare significant differences between the three dependent variables. Statistical significance was set at an alpha level of $p \leq 0.05$.

RESULTS

Mean data compared total EE between groups and are summarized in Table 1. The means of total EE are displayed graphically in Figure 1. There was a statistically significant difference for total EE ($p = .01$). The null hypothesis was rejected.

Table 1: The Comparison of Gaming and Treadmill Mean Energy Expenditure.

Variable	GAMING	TREADMILL
Total EE (Joules)	907.6 ± 215.3	1109.7 ± 277.7

Figure 1: Total EE comparison.

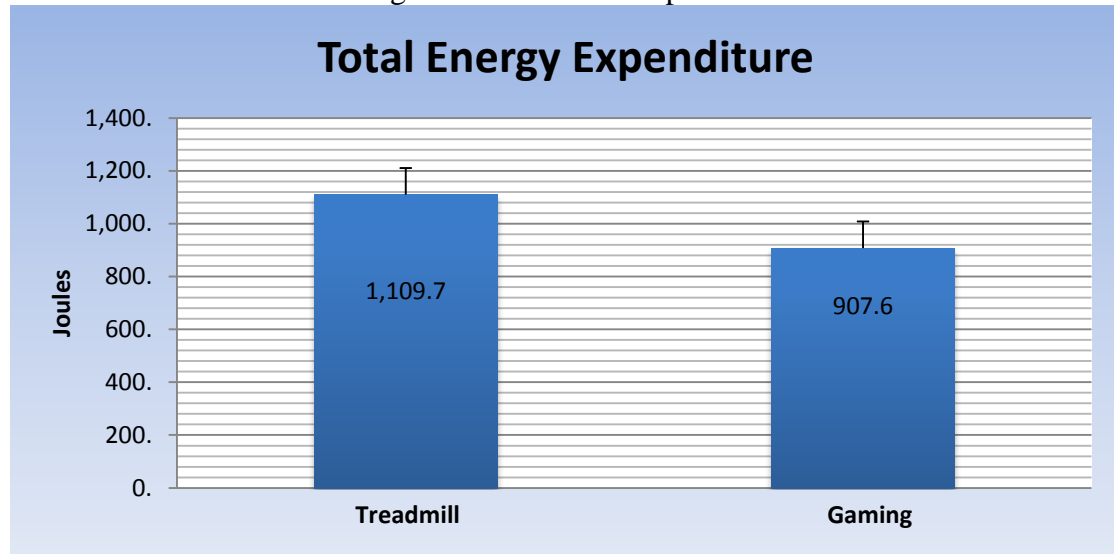


Figure 1: The Graphical comparison of Gaming and Treadmill Mean Energy Expenditure.

DISCUSSION

There was a higher amount of energy expenditure in treadmill training compared to exergaming, but they are more comparable than initially expected. In this study, a 30 minute session of active gaming required 81.8 % of energy expenditure of a 30 minute treadmill session. Traditional treadmill training may be more effective, but exergaming may provide a viable alternative to help the population become more active. Because exergaming, at least the game observed in this study, operates at a lower intensity, there would need to be an additional amount of time spent engaged in active gaming. Extending the duration of exergaming to match the amount of energy expended during a 30 minute treadmill session could provide similarly positive health effects compared to a shorter bout of the more traditional cardio training. Studies have shown that enjoyment of a physical activity is a key determinant influencing the allocation of time to that pursuit (Dishman et al., 2005). So, if exergaming is shown to be more enjoyable to individuals than traditional exercise, then it has the potential to increase levels of physical activity. More research is needed in the future to answer questions about the younger generation's willingness to participate in enough active gaming to provide paralleled benefits of traditional exercise. It is important to note that only one gaming system and one specific game were used in this study. This is just one game, so it is possible that the data is not completely representative of the effectiveness of exergaming as a form of exercise in general. More research is needed to determine the total EE for multiple gaming systems and games to provide a more comprehensive prospective.

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ANTHROPOMETRIC FACTORS AND KNEE INJURIES IN NOVICE FEMALE GYMNASTS

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PURPOSE

Anthropometric dimensions may influence biomechanical effectiveness of an athlete during sport performance (Norton and Olds, 2002). The purpose of this study was to assess the influence of anthropometric factors on the occurrence of knee injuries among novice competitive female gymnasts. Martin, McNeal, Sands, Colvin, and Walker (2005) analyzed a group of novice competitive female gymnasts and their frequency of injury during a one-year competitive season. Results of their study indicated novice gymnasts reported significantly fewer injuries than intermediate and advanced level gymnasts. Higher rates of chronic injury within the knee were reported among novice levels whereas higher rates of acute ankle/foot injuries were reported at the intermediate and advanced levels. This study sought to determine whether a relationship existed between the occurrence of knee injury and anthropometric measurements. Based on previous literature, it was hypothesized that one or more anthropometric factors such as body weight or limb lengths would be related to reported knee injury.

METHODS

Initial data were collected by Martin and colleagues (2005) using a questionnaire collecting demographic information, training history, and number/nature of injuries occurring over one year. Anthropometric data were collected by ISAK certified investigators. Data for this study were retrieved from responses reported by novice competitive female gymnasts (N=38; USA Gymnasts Levels= 5-6) from questionnaires in addition to anthropometric measurements recorded. Anthropometric factors included: height, sitting height, body fat percentage, six breadth measurements, two girth measurements, two length measurements, waist-to-hip ratio, and waist-to-height ratio. Gymnasts were categorized into two groups based upon injuries reported: knee injury (KI) and no knee injury (NKI). Using Statistical Packages for Social Sciences version 20.0 (SPSS, Chicago, IL), means and standard deviations were calculated for anthropometric measurements. An independent t-test was then performed to determine whether a significant difference existed in anthropometric measurements between groups. A Discriminant Analysis was performed to determine which anthropometric measurement was the most significant predictor variable of injury.

RESULTS

Descriptive statistics reported the means and standard deviations for each anthropometric measurement and group (see Table 1). An independent t-test revealed waist-to-hip ratio (WHR) measurements were significantly smaller among novice competitive gymnasts that reported a knee injury (WHR= $.58 \pm .25$) than the gymnasts who reported no knee injury (WHR= $.69 \pm .04$) ($P=0.02$). A Discriminant analysis also revealed WHR as being the most significant predictor variable between groups.

Anthropometric Measurement Means and Standard Deviations (\pm)

Measurement	Mean		Standard Deviation (\pm)	
	KI	NKI	KI	NKI
Height (cm)	90.5	78.2	63.4	62.3
Sitting Height (mm)	111.8	114	40.2	31
Biacromial Breadth (mm)	31.7	31.4	2.1	2.8
Bicristal Breadth (mm)	22.2	21.9	2.2	1.2
Elbow Breadth (mm)	5.9	5.8	.4	.5
Knee Breadth (in)	8.2	8.1	.3	.5
Ankle Breadth (in)	6.3	6.2	.3	.4
Corbi Girth (cm)	22.7	22.5	2.4	2.4
Calf Girth (cm)	30.5	28.9	3.2	5.5
Thigh Length (cm)	42.7	43.1	2.9	5.7
Shank Length (cm)	31.1	29.8	3.1	5.7
Waist-Hip Ratio	.58	.69	.25	.04
Waist-Height Ratio	.51	.51	.01	.01
Body Fat (%)	14.9	15.5	9.4	9.4

Table 1. Comparison of means and standard distributions (\pm) for anthropometric measurements between two groups of novice female gymnasts.

DISCUSSION

Waist-to-hip ratio is a measurement of the relative dispersion of body fat within the trunk. A higher WHR is associated with a greater percentage of body fat (%BF). Greater body fat percentages in gymnasts can be unfavorable because this increases the body's mass, which decreases potential for force production. Previous research has correlated increased rates of lower extremity injury with greater body size and body fat among gymnasts (Caine et al., 1996; Lindner et al., 1990). In this study the WHR ratio and body fat percentages of gymnasts reporting a knee injury was smaller (WHR= $.58 \pm .25$; %BF= $14.9\% \pm 9.4\%$) than those who reported no knee injury (WHR= $.69 \pm .04$; %BF= $15.5\% \pm 11.3\%$). This suggests that WHR and knee injury may be correlated with anatomical structure of the hip, specifically bicristal breadth, not relative %BF. This was supported in the bicristal breadth measurements that were larger among gymnasts who reported a knee injury (22.2 ± 2.2 mm) than those who reported no knee injury (21.9 ± 1.2 mm). Greater pelvic or hip width contributes to a greater angle at which the femur meets the tibia, also known as quadriceps angle (Q angle). This angle is naturally larger in women than in men, and research suggests a larger Q angle places increased valgus stress upon the knee predisposing female athletes to injury (Dufek et al., 1991; Hutchinson & Ireland, 1995). Further research should consider a larger sample size of novice gymnasts to determine whether WHR is consistently a significant predictor of injury and identify whether there are additional anthropometric factors that contribute to the occurrence of knee injury.

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CASE STUDY ON THE EFFECTIVENESS OF USING A LUMBAR BRACE DURING RUNNING

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PURPOSE

Back pain and injury occur when the spine is compressed to the point where intervertebral fluid is expelled from the disc—reducing lubrication during movement. This can cause a permanent deformation of the vertebral discs, which can lead to the spine’s inability to withstand compressive forces. Lumbar braces (LB) are designed to prevent back pain and injury by maintaining alignment of the spine and increasing the body’s overall trunk stiffness, thereby reducing spinal compression (Ivancic, Cholewicki, Radebold, 2002; Morris, 1974; Stokes, Gardner-Morse, Henry, 2011). While studies have reported a therapeutic effect when wearing a LB during occupational and recreational activities (Morris, 1974; Van Deursen, Van Deursen, Snijders, Wilke, 2005), the effectiveness of using a LB during recreational running has not been previously studied. This case study hypothesized that the use of a Bio Skin® Back Skin™ LB would have an effect on compressive forces placed on the lumbar spine during running and aimed to quantify this effect.

METHODS

Subject: A 42 year old female with a history of lumbar injury (stenosis, spondylolisthesis, dorsal root compression, herniated discs, and bulging discs) who runs on a regular basis. **Equipment:** Subject ran on a Trackmaster TMX425C treadmill. Stature was measured using a Seca 213 stadiometer and a Harpenden sliding anthropometer. Heart rate was monitored using a Polar RS800CX monitor. Pain was recorded based on a Mosby Pain Scale. **Procedures:** Subject was required to maintain circadian rhythm by waking up at the same time on testing days and test was administered at the same time on each day. Test was performed under two conditions: running with the LB on and running with the LB off. **Measurement protocol:** Measurement points included an initial measurement and measurements following a pre-run rest, the first run interval, the second run interval, and a post-run rest. Rest periods entailed 20-min spinal unloading sessions with the subject in the Fowler position. Each measurement period assessed spinal shrinkage of the subject by measuring stature three times in standing, seated, and supine positions using a stadiometer and an anthropometer as shown in Figure 1. Measurement periods required subject to align head in the Frankfort plane and take five breaths before recording stature using a blind procedure. **Run protocol:** Each run was a total of 30-min broken up into two 15-min intervals. Subject’s heart rate was maintained at approximately 75% of maximum heart rate, pain was monitored every 5-min, and treadmill settings were maintained at a speed of 4.8 with no incline. **Statistics:** Mean values were calculated then recorded in mm and comparisons were made between each experimental condition.



Figure 1. Measurement protocol consisting of standing, seated, and supine positions.

RESULTS

Subject exhibited greater spinal shrinkage when running without the LB compared to running with the LB. The greatest spinal shrinkage occurred during the first 15-min run interval compared to the second 15-min run interval. Table 1 compares mean stature measurements taken at each measurement point throughout the experiment under both conditions. Subject reported less pain when wearing the LB as shown in Table 2.

Mean Stature Measurements (mm)

MP	Standing		Seated		Supine	
	BR	NBR	BR	NBR	BR	NBR
M1	1562	1565.5	868.8	859.3	1587.3	1610.5
M2	1568	1570.5	868.3	861.5	1603.5	1599
M3	1560.5	1557	864.6	846.5	1599.6	1603.3
M4	1561	1558.5	857.1	850	1602.3	1602
M5	1569	1567.5	863.8	859.6	1603.3	1604.3

Table 1. Condition of running with brace (BR) and without brace (NBR). Measurement periods (MP) conducted at initial (M1), pre-run rest (M2), first run interval (M3), second run interval (M4), and post-run rest (M5).

Pain Measurements

Minute	RI-1		RI-2	
	BR	NBR	BR	NBR
5	4	4.5	4	5.5
10	4+	5	4	5.5
15	4+	5	4	6

Table 2. Recordings of pain taken every five minutes during each run interval (RI) and under each condition (BR vs. NBR).

DISCUSSION

The differences in spinal shrinkage observed in each condition support the hypothesis that the use of a LB reduces the effects of compressive forces during running. This was attributed to both the design of the LB, which restricted range of motion by a maintained alignment of the vertebral column, and the LB tension, which increased trunk stiffness and reduced spinal compression (Ivancic et al., 2002; Morris, 1974; Stokes et al., 2011). Results indicate support for previous research with the greatest spinal shrinkage occurring during the first 15-min run but results did not show consistent shrinkage in the second 15-min run, contrary to previous research (Garbutt, Boocock, Reilly, Troup, 1989; Leatt, Reilly, Troup, 1986). Deviations in spinal curvature during some measurement protocol have been attributed to this difference. Several limitations of this study were that running mechanics, running technique, and brace tension were not controlled. There also was a lack of control in measurement protocol, which allowed for error when measuring stature in the supine position. An additional limitation was that the results of a single-subject case study cannot be generalized to a larger population. Future research should adjust for the aforementioned limitations.

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CONFIDENCE WHEN COLLABORATING: KINESIOLOGY AND DESIGN STUDENTS

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PURPOSE

The purpose of this study was to determine differences in student confidence about a collaborative design process. Collaboration was defined as the development of the model of joint planning, joint implementation, and joint evaluation between individuals or organizations (Hord, 1986). Social skills involved in successful collaboration are cooperation and compromise, flexibility in roles, trust and respect for others, constructive criticism, and group problem solving (Bosworth 1994).

Null Hypothesis: There was no difference between Kinesiology and Design students in confidence during a collaborative process.

METHODS

Subjects. The subjects for this study were female beginner kinesiology and design students ranging from ages 18-23 years who attended a Division I – Research I university. There were fourteen Kinesiology students ($n_k=14$). There were twenty three Design students ($n_d = 23$).

Instrumentation. An eight point Likert scale on a Collaborative Confidence Inventory (CCI) was completed by the subjects prior to attending design workshops with other students. **Procedure.**

Collaborators met for an hour and a half once a week for 3 weeks to design a playscape or natural environment play area. **Statistics.** The CCI data was compiled on an excel data sheet. Instrument item scores were added for each subject to create a summary score. From these scores a group mean and standard deviation were calculated. A two-tail, type 3, t-test was utilized to compare groups $p < 0.05$.

RESULTS

Kinesiology students recorded a mean score of 68.21 out of 104 possible points. A standard deviation of 13.89 was recorded for Kinesiology. Design students recorded a mean score of 70.48 and a standard deviation of 11.78 using inventory data (see Table 1).

Kinesiology & Design Collaborative Confidence

	N	M	SD	P- Value
Kinesiology	14	68.21	13.39	.6064
Design	23	70.48	11.78	

Table 1. A type 3, t-test was used to assess differences.

The null hypothesis stated no difference between Kinesiology and Design students in confidence during a collaborative process. The null hypothesis was accepted. No differences were found.

DISCUSSION

Kinesiology students generally possessed a background of experience with collaboration through athletics and the team aspect of playing sports. Athletes worked together with teammates towards a central goal to achieve success through sport.

During a collaborative process students worked to design a playscape and to ensure safety of players, previous experience probably was the guide for kinesiology collaborators. Knowledge of the play process and collaboration as a part of play provided additional confidence in collaboration.

Design students collaborate and participate on design teams. Collaboration was one essential pillar of teamwork, which supported and sustained cohesive and productive teams (Cook & Macaulay, 2013, p. 54). Designers worked together with other designers towards a central goal.

Both kinesiology and design students felt confident in ability to collaborate as a group to achieve the goal to complete the playscape. Each group acquired key skills through other activities and carried that experience into the workshop to be successful collaborators.

Collaboration was one essential pillar of the kind of teamwork, which supported and sustained cohesive and productive teams (Cook & Macaulay 2013). The continued use of the collaboration process in design and the three keys to success as part of collaboration (see Figure 1), led to success and to increased confidence for kinesiology and design student when working together on a playscape design.

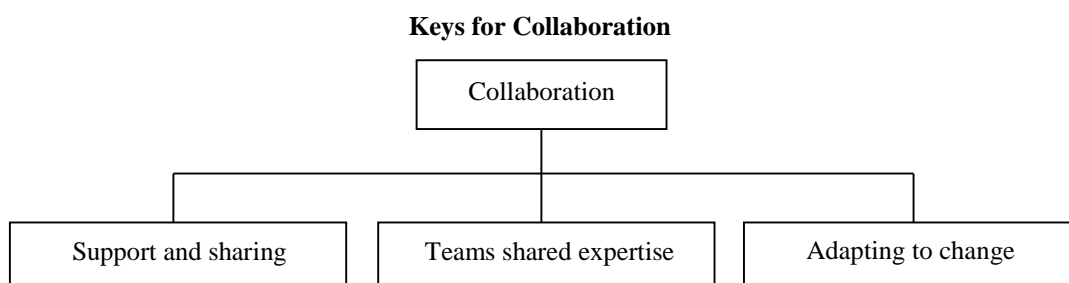


Figure 1. Three keys for collaboration improved the chance of success.

In the future, subject numbers could be increased to better meet assumptions for the statistics used. The addition of male subjects would provide more generalized findings. Male involvement would add both gender perspectives during collaboration to expand understanding of the design/collaboration process.

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A CORRELATION BETWEEN LEARNING STYLES AND FIELDS OF STUDY AT UTAH VALLEY UNIVERSITY

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PURPOSE: In a project assigned in a Utah Valley University (UVU) Exercise Testing and Prescription class, the researchers were required to assess what percentage of their learning style was visual, auditory and/or kinesthetic (VAK). Analysis of the class revealed that a significant majority of the Exercise Science majors were kinesthetic learners. Refer to figure 1 for a photo of Exercise Science students undergoing a kinesthetic learning experience. The researchers were curious whether this was an accident or the nature of students in Exercise Science. The researchers were also curious what learning styles other fields of study had and if, like Exercise Science, other fields of study were dominated by one learning style or another. The purpose of this study was several fold. First, to identify the percentage of different learning styles of majors in various fields of study at UVU. Second, to determine what, if any, learning style dominated each field of study by percentages and third, to compare our UVU participants' learning styles with previously determined national averages (Baldwin et.al.) Our hypothesis is that each field of study, by its very nature, would be lead by $\geq 50\%$ of the percentage points by one learning style over the others.

Kinesthetic Learners



Figure 1. Photo of Exercise Science students performing kinesthetic learning

METHODS: Having completed a literature review along with UVU IRB and department chairs' approval, participants were issued an informative consent form along with a written survey. The survey tool was a standardized questionnaire (Cuttell et. al.) that was designed to assess and characterize by percentage, what type of learner the participants were, those options being visual, auditory and/or kinesthetic. Participants consisted of a sample of 148 senior UVU students, from various fields of study (males=70, females=78). The majors assessed included Exercise Science, Elementary Education, Computer Science, Philosophy, and Visual Arts. The researchers selected these as the different fields were anticipated to require different types of learning. Having administered the survey tool, the learning style percentages were linked to the respective fields of study and analyzed.

RESULTS: Exercise Science majors tested to have 76% kinesthetic, 5% auditory and 14% visual with 2% demonstrating an equal split in percentage between two different learning styles. Computer Science majors demonstrated 73% kinesthetic, 4% auditory, 19% visual and 1% split evenly between two. Elementary Education majors exhibited 55% kinesthetic, 2% auditory, 41% visual and 1% split. Philosophy & Humanities majors tested at 70% kinesthetic, 11% auditory,

11% visual and 2% split. Art and Visual Communication exhibited 36% kinesthetic, 9% auditory, 55% visual and 0% split. Refer to Table 1 for a representation of learning styles of each major as represented in percentages.

Learning Style Percentages

<u>MAJOR</u>	<u>KINESTHETIC</u>	<u>AUDITORY</u>	<u>VISUAL</u>	<u>COMBINATION</u>
EXERCISE SCIENCE	76%	5%	14%	2%
COMPUTER SCIENCE	73%	4%	19%	1%
ELEMENTARY ED.	55%	2%	41%	1%
PHILOSOPHY/ HUMANITIES	70%	11%	11%	2%
ART & VISUAL COMM.	36%	9%	55%	0%

Table 1. Learning styles of each major as represented in percentages

The one hundred forty eight Utah Valley University participants tested, as a whole, have 66% kinesthetic, 5% auditory, 25% visual with 4% split. The national average is 25% kinesthetic, 15% auditory, and 60% visual. Refer to Table 2 for a representation of learning styles of the total UVU participants and the national surveyed averages.

UVU and National Averages

<u>POPULATION</u>	<u>KINESTHETIC</u>	<u>AUDITORY</u>	<u>VISUAL</u>	<u>COMBINATION</u>
PARTICIPANTS AT UVU	66%	5%	25%	4%
NATIONAL SURVEY	25%	15%	60%	N/A

Table 2. Representation of learning styles of the total UVU participants and the national surveyed averages

DISCUSSION: A review of the data indicates that the hypothesis was correct, in as much as every field of study did have one learning style that was $\geq 50\%$ of the respective populations' learning styles. Based upon the type of data collected, the researchers were not able to identify a statistical analysis tool that could measure if by their very nature, there was a direct correlation between fields of study and learning style respectively. The VAK percentages of the UVU participants were not consistent with national averages. More research needs to be done with a more specific data set that can be correlated with statistic analysis.

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HEART RATE AND TIME TRIAL DIFFERENCES BETWEEN RUNNING SHOES

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PURPOSE

The cushioning system and weight of the ON performance running shoe may indicate a faster running shoe because of the reduced impact, shorter ground contact time, and good running form for a swift takeoff (Regenold, 2012). If a participant can run the time trial (TT) with a lower overall heart rate (HR), ON running shoes will have still made an impact on performance. Therefore, the purpose of this study was to determine the differences in HR and performance via TT through the use of ON performance running shoes versus preferential running shoes. It was hypothesized that ON running shoes would show improve running time due to “cloud” technology. It also was hypothesized that HR will stay the same with decreased TT.

METHODS

Participants: Convenience sampling was used to recruit ten participants ($n_{\text{male}} = 5$, $n_{\text{female}} = 5$), between the ages of 18-33 years old. All participants were defined as physically active (90-300-min. of running per week). **Equipment:** HR was measured using Polar T31 Chest Strap HR monitors and trials were conducted on Woodway Desmo HP (Woodway, Waukesha, Wisconsin) treadmills. During testing participants wore their own preferential running shoe and the ON shoe in their respective size. **Procedures:** There were four sessions, each session lasting 30-min, plus a 10-min informational session to recruit and contact participants. Prior to testing, all participants completed two familiarization sessions to get accustomed to the 2-mi required trial. The other two sessions were completed in both the participant’s preferential running shoe and the ON running shoe. In order to randomize the experimental and control treatments, the pair of shoes each participant wore during the first testing session was determined with a coin flip (Heads=ON, Tails=preferential). For each session, the participants came in the same running attire. For all sessions, the participants brought a pair of preferential running shoes. The participants had to be familiar with running in them. For the experimental session, the participants were provided with ON running shoes (ON, Zurich, Switzerland). In the first session participants’ running shoes were weighed, as well as the ON shoes in their respective sizes. The participants were asked to only consume water *ad libitum* during their testing trials. Participants received a 5-min warm-up on the treadmill at a comfortable pace for the participant. The 2-mi TT immediately began following the warm-up. The participants were not able to see the time, distance elapsed, or speed, but they were able to adjust the speed as desired. The elapsed time of the 2-mile run was recorded in minutes and seconds, and then converted to minutes in decimal format. HR was recorded in beats per minute (bpm) from before and after the time-trial as well as every quarter-mile interval during the run. Average HR was taken by measuring from the 1.0 to 2.0-mi. **Statistics:** The independent variable for this study was shoe type (ON or preferential running shoe of participant). The dependent variables were the difference between TT times and HR before, during, and after each trial. In order to compare the mean scores from each dependent variable from the ON group and the preferential shoe group, an independent groups t-test was used. Alpha (α) was set at $p \leq 0.05$ to determine statistical significance.

RESULTS

The descriptive statistics for HR and TT are presented in Table 1. There was no statistical difference (SD) ($p=0.31$) between the ON performance shoes and the participants' preferential running shoes for HR. Therefore, the research hypothesis was false. For the TT tests, there was also no SD ($p=0.17$).

Average Heart Rate and Timed Trial During ON and Preferred Running Conditions		
	Variable	
Condition	Heart Rate (bpm)	Timed Trials (mins)
ON Performance Shoes	175.3±9.8	14.7±1.8
Preferential Running Shoes	172.0±12.7	15.3±2.3

Table 1. Heart rate and timed trial means and standard deviations for the running tests are shown for each shoe.

DISCUSSION

After conducting the trials, there were no apparent changes in HR or timed trials between the ON performance shoes and preferential running shoes. Most importantly, these results could explain that the CloudTec technology does not reduce impact force enough to significantly lower heart rate or increase run time. Also, the combination of a “barefoot” takeoff and a cushioned landing may not affect HR or improve run time. The results for HR were not consistent with reviewed HR literature. Hanson et al. (2011) found running shoes required 1.3% more oxygen (O_2) than barefoot, and running shoes with fitted orthotics required 2.4% more O_2 than barefoot running ($p<0.05$). With a greater O_2 requirement, HR will increase. The ON shoes weighed more on average (628.8 g) than the average preferential shoe (564.9 g) yet there was no SD in HR. The weight of the ON shoes compared to preferential shoes showed a SD ($p=0.03$). Frederick et al. (1983) also found that adding weight to the running shoe increased total work performed by the runner as they are lifted up and propelled forward with each stride. The researchers also found a 1.2% increase in VO_2 each time 100 g increments were added to the running shoe. Considering that VO_2 and heart rate increase proportionally, heart rate should have increased while wearing ON shoes, as the ON shoes were 63.9 g heavier than the average preferential running shoe of the present study (Jakicic et al., 1995). However, the results of the present study were not consistent with the reviewed literature. Timed trials were also inconsistent with reviewed literature. According to Hanson et al (2011), the lighter shoes (the preferential shoes) should have yielded a faster TT compared to the ON shoes. However, the ON shoes were constructed to allow the participants to run as though they were barefoot (Regenold, 2012). Although the ON shoes weighed more, their “barefoot-like” technology may help explain why some of the participants had faster TT with the ON running shoes. Despite this, there was not a SD found in the TT ($p=0.17$). This may have been attributed to the small sample size of the present study.

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CULTURALLY INFLUENCED WEIGHT MANAGEMENT IN BRAZILIAN AND AMERICAN GIRLS AGE 12 -14.

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PURPOSE

As obesity has become endemic in the United States (Yanovski & Yanovski, 2011), there is a greater concern for childhood and teenage obesity (Han, Lawlor & Kimm, 2010). The purpose of this study was to record cultural eating and physical activity habits and the possible relation to weight management in Brazilian and American girls age 12 - 14. Results from both groups were compared in order to determine how culture influences weight management. The null hypotheses of the study were that despite different cultural settings, no significant differences would be observed between the Brazil and U.S. group regarding BMI and percent body fat.

METHODS

Participants: A convenience sample of eighty-nine teenage girls age 12 - 14 volunteered for participation ($n_{\text{Brazil}} = 49$, $n_{\text{U.S.}} = 40$). All participants were middle school students from different schools throughout Brazil (see Figure 1) and the U.S. **Equipment:** Percent body fat was measured through a 3-site skinfold test using a caliper. A portable scale was used to determine weight for BMI calculations. A five page questionnaire about nutrition and physical activity habits were completed by each participant following body measurements. **Procedures:** A 3-site skinfold test was administered on each participant to determine percent body fat. Participants were then weighed for future BMI calculation (heights were obtained through recorded measurements recently taken in P.E. class). Finally, participants were asked to complete a five page questionnaire about nutrition and physical activity habits as well as general questions concerning their views on these subjects. Questionnaires were divided into three major sections: eating habits, physical activity habits, and general information. In the eating habits section participants were asked to identify food types consumed for each meal type, as well as how many times per week certain foods or beverages are consumed (fried foods, soda, etc); The physical activity section identified varied physical activities that are performed during different time periods; and the general information section dealt with how girls age 12 - 14 view themselves and understand health in different cultural settings. **Statistics:** A two-sample multivariate test was used to investigate significant differences between the two groups, and correlation was used to determine relationships between variables. Statistical significance was set at an alpha level of $p \leq 0.05$.

Participant Brazilian Schools



Figure 1. Colegio Estadual Sete de Setembro (A) and Escola Municipal Osvaldo Aranha (B) were among participant schools for this study.

RESULTS

Independent t-tests were used to make comparisons between girls from Brazil and the United States for several variables. Mean data for BMI and Percent Body Fat are summarized in Table 1. There were statistically significant differences for BMI ($p = 0.005$), percent body fat ($p = 0.000$), Fried Foods per Week ($p = 0.049$), Eat Out per Week ($p = 0.011$), and Screen Time per Weekend day (0.018). There were no significant differences for Soda per Week ($p = 0.149$), Fruit per Week ($p = 0.247$), Vegetables per Week ($p = 0.885$), and Screen Time per Weekday ($p = 0.647$).

Mean BMI and Percent Body Fat Calculation

	Group	N	Mean
BMI	Brazil	49	19.198
	U.S.	40	21.435
% Body Fat	Brazil	49	24.6429
	U.S.	40	33.4865

Table 1. Mean for BMI and percent body fat were calculated for each group.

DISCUSSION

The CDC BMI-for-age chart was used to interpret BMI scores for participants in both groups. The CDC uses a BMI-for-age chart that is identical to the UNESCO International BMI-for-age chart. Therefore, the fact that the two samples were from different countries did not compromise BMI score interpretations. The Brazil sample had 18% more participants categorized in the normal weight range when compared with the U.S. sample (78% vs 60%). The U.S. sample had 13% more overweight girls (23% vs 10%), 6% more obese girls (10% vs 4%), and the same percentage of underweight girls (8%). A high 88% of Brazilian participants considered themselves to be healthy individuals, and 65% were satisfied with their current weight. On the other hand, 62% of American participants thought of themselves as healthy individuals, and only 42% percent were satisfied with their current weight. As body satisfaction has been associated with eating patterns and BMI change (Sonnevile, Calzo, Horton, Haines, Austin & Field, 2012), current weight dissatisfaction among American girls might be one of the causes contributing to higher engagement in unhealthy eating habits. Alternatively, the results obtained suggest that culture dictates most eating and physical activity habits, as well as one's view on health and body image. Further investigations should examine girls age 12 - 14 from other cultural groups to determine the exact extent to which cultural behaviors predict healthy weight management in this population.

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CONFIDENCE IN BASKETBALL

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PURPOSE

The purpose of this study was to determine the confidence level of experienced and inexperienced basketball players during competition. The relationship between intensity and confidence levels was not connected (Kais & Raudsepp, 2005). Schilling and Hayashi (2001) observed the basketball players' personal incentives, perceived options, and sense of self-confidence and concluded that other social factors' affected confidence levels.

Null Hypothesis: There was no difference in confidence level between experienced and inexperienced basketball players.

METHODS

Experienced and inexperienced basketball players were considered when confidence levels were measured. **Subjects.** The population for this study included basketball players in a recreational league in a small town. Twenty players (N=20) from various men's basketball teams were evaluated. Ten players (n_e=10) constituted the experienced group. This group (experienced) played more than three years of basketball. Ten players (n_i=10) included the inexperienced group. This group (inexperienced) played less than three years of basketball. **Instrumentation.** The revised basketball questionnaire, was influenced by Weinberg and Gould (2011; see Figure 1). A score of one was not confident, while a score of four was very confident. **Procedures.** The basketball players were informed of the importance of answering the questions honestly and accurately. The details were re-iterated to the players on both teams before practice. The first meeting with the basketball teams was on the basketball court in the small town. Each athlete was informed of the study that was being conducted. The process was thoroughly explained to the basketball players. The script was followed to present the study to the subjects clearly. The athletes were asked to write down e-mails for the researcher to keep in touch with the players in the event that follow-up was needed. Upon completion, each e-mail cover sheet was placed in a secure personal folder to protect the identity of the basketball players. The secure location included a list referring to the players and a number used to keep the athlete's name confidential. The list allowed the researcher to re-locate subjects in the case of incomplete data. Each packet contained a number associated with a player's name on the cover sheet. **Statistics.** The collected information was transferred to a data compilation sheet using the subject number. The means for each group were recorded on the sheet. A t-score was calculated using Microsoft Excel 2007. The alpha level was set at 0.05.

Sample Questions

The following questions are for you to read and answer carefully. Each question will be rated on a 1-4 Likert scale: 1 is under-confident and 4 is over-confident. There is no right or wrong and answer, so answer each question honestly and thoughtfully.

1. Your ability to execute the skills in basketball. _____
2. Your ability to make critical decisions during a basketball game. _____

Figure 1. Sample questions included a four point Likert scale (instrument adapted from Weinberg & Gould (2011, p. 334).

RESULTS

The first group (experienced) scored a mean confidence level of 31.10. The second group (inexperienced) scored a mean confidence level of 30.40 (see Table 1). The hypothesis was accepted.

Confidence in Basketball				
Subject	N	Mean	S.D.	P-Score
Experienced	n=10	31.10	0.87	0.57
Inexperienced	n=10	30.40	0.89	

Table 1. Experienced and inexperienced player mean confidence level was compared using a two-tailed independent t-test.

DISCUSSION

The null hypothesis stated no significant difference in confidence levels between experienced and inexperienced basketball players. Athlete answers displayed no difference in confidence levels. Answers on the questionnaire demonstrated positive and negative effects in performance. The strength of the study was evident when other social factors affected basketball players' confidence levels (Schilling & Hayashi, 2001) since this finding reflected those in the literature.

The logistic sheet suggested other factors were present and relevant when that most experienced and inexperienced basketball players used techniques to boost self-confidence. Basketball players used imagery exercises to develop confidence. Imagery strategies helped athletes achieve a sense of confidence and become successful (Callow & Hardy, 2001). "I can do it" and "it is just a game" were some examples athletes use to boost confidence.

One limitation for the study included the use of a small range of sport activities. A broader range of competition levels in basketball should be assessed: for example 1) playing in a competitive league, 2) playing in a non-competitive league, or 3) playing in a co-ed league. Athletes would perform better if the confidence level matched the importance of the event. Too much confidence led to detrimental effects. Harmful effects were displayed when athletes were too confident or under confident (McGraw, Mellers, & Ritov, 2004). Another future study could assess players' confidence level in more than one sport. The different sports would produce different results.

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PRE/POST SELF-EFFICACY AND AWARENESS: DESIGN

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PURPOSE

Self-efficacy was defined as a self-evaluation of competence to successfully execute tasks to reach desired outcomes (Zajacova, Lynch, & Espenshade, 2005). In an academic setting, self-efficacy was linked to persistence, tenacity, and achievement in educational settings (Chemers, Hu, & Garcia, 2001). The purpose of this study was to determine differences in pre and post assessments of self-efficacy and awareness when designing a playscape for children.

Null Hypothesis: There was no difference between pre and post design self-efficacy and awareness for design students when working with a consultant Kinesiologist.

METHODS

Subjects. The population for this study was 18 – 23 year old beginning design students ($n_d=24$) from a Division I – Research I university. Kinesiology students ($n_k=14$) acted as consultants to the design student groups. All participating students were beginning professional preparation.

Instrumentation. A 10-item adapted *Self-efficacy and Awareness Inventory* was completed using a 5 point Likert scale prior to and after attending design workshops with other students. All inventory questions were specific to design of a playscape.

Procedure. Design students collaborated with Kinesiology consultants during the workshops. Self-efficacy measures were completed prior to three 1.5 hour design workshops held once a week over a three week period. Subjects also completed the inventory after all workshops finished. Inventory data was compiled on an excel data sheet. **Statistics.** Subject inventory summary scores were compiled to calculate group mean (M) and standard deviation (SD). A two tailed, type three, student t-test was used to compare self-efficacy pre to post. Significance level was $\alpha=0.05$.

RESULTS

Design students recorded a mean score (M) of 26.46 out of 30 possible points on pre-design assessment. A standard deviation (SD) of 2.52 also was recorded. Post design scores were $M=24.90$ and $SD=1.59$ (see Table 1).

Design Pre Post Self-efficacy & Awareness

	n	M	SD	P-Value
Pre- Design	20	26.46	2.67	0.0612
Post-Design	20	24.90	1.59	

Table 1. The standard deviations for Pre and Post were considered different, so a Type 3, t-test was used.

The hypothesis stated no difference between pre and post design self-efficacy and awareness for design students when working with a consultant Kinesiologist. The null hypothesis was accepted.

DISCUSSION

Lack of difference between pre and post design student self-efficacy and awareness may be partially due to feelings of competence in play and design.

Pre design students felt competent in ability to design a structure to support the weight of children. But, pre design students also felt less competent with ability to design a playscape due to less experience in play and motion (evidence the post assessment, see Table 1). The presence of a Kinesiologist collaborator apparently over powered feelings of initial inadequacy in pre design students.

But, comments heard during collaboration with the consultant and during design work in the workshop, confirmed lack of knowledge in play and sport appropriate to a playscape design. Stress probably occurred from lack of experience and knowledge. However, this stress was partially alleviated by the presence of a consultant, which affected no difference in pre-post self-efficacy. Increased stress levels due to lack of experience and knowledge led to poor adjustment to group work, incidents of psychological stress, and even withdrawing from the group. If designers experienced stress, even when bolstered by consultant Kinesiologists, possible lower self-efficacy and awareness scores would occur (Coffman & Gilligan, 2002; see Figure 1).

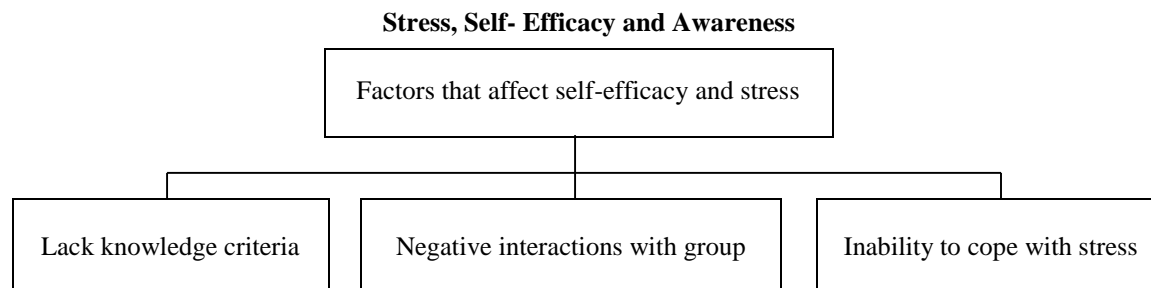


Figure 1. External factors affected self- efficacy and awareness in design students when collaborating with a kinesiology consultant.

The accuracy of efficacy beliefs (i.e. scores) depended on knowledge of criteria on which performance was judged (Moritz, Feltz, Fahrback, & Mack, 2000). Female design students reported lower self-efficacy since professional experience was not related to play settings and natural playscapes.

Gender differences should be assessed in the future. A larger pool of subjects would allow a diversity of groups. A design goal that included mobility or motor activity would yield an environment that meets the need for group physical activity. Since humans reported a strong need for control with respect to environments and situations (Ulrich, 1991), increased self-efficacy would result.

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INTERDISCIPLINARY KNOWLEDGE AND AWARENESS IN PLAYSCAPE DESIGN

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PURPOSE

The purpose of this study was to determine the interdisciplinary knowledge and awareness of Kinesiology (Kin) and Interior Design students (Design). Interdisciplinary knowledge and awareness, allows professionals to read adventurously, and develop an understanding that allows one to work critically with others in different disciplines (Oughton & Bracken, 2009). Interdisciplinary knowledge and awareness was most effective when applied to a shared object between young professions (Wesselink, 2009).

Null Hypothesis: There was no difference between Design and Kin students in interdisciplinary knowledge and awareness.

METHODS

Subjects. The subjects for this study were all female students studying either Design or Kin at a Division I – Research I university. Twenty five Design ($n_{\text{design}}=25$) and fourteen Kin ($n_{\text{kin}}=14$) students were selected ($N=39$). Subjects were randomly assigned in groups of Design and Kin students. Groups consisted of three Design students with one Kin student. One group included two Kin and three Design students. **Instrumentation.** Participants completed an Interdisciplinary Knowledge and Awareness Survey using a 5-point Likert scale. Assessment occurred prior to attendance at the workshops with the other young professionals. Subjects were questioned on confidence in both disciplines. **Procedures.** The design process consisted of three 1½ hour workshops held each Tuesday over three weeks. Young professional students collaborated on a design project for a playscape natural environment for children’s play. The Interdisciplinary Knowledge and Awareness Survey data was compiled on an excel spread sheet. A mean was calculated using individual subject item summaries. **Statistics.** Collected information was compiled on a data sheet. Upon completion, a mean score (M), standard deviation (SD), and p-value were determined. A two tailed, type three, t-test was used to compare the data.

RESULTS

The hypothesis stated no difference between Design and Kin students in interdisciplinary knowledge and awareness. The hypothesis was rejected.

Design students averaged a higher level of confidence than Kin students. Design students were more inconsistent on surveys. P-value demonstrated significant difference (see Table 1).

Kinesiology and Interior Design

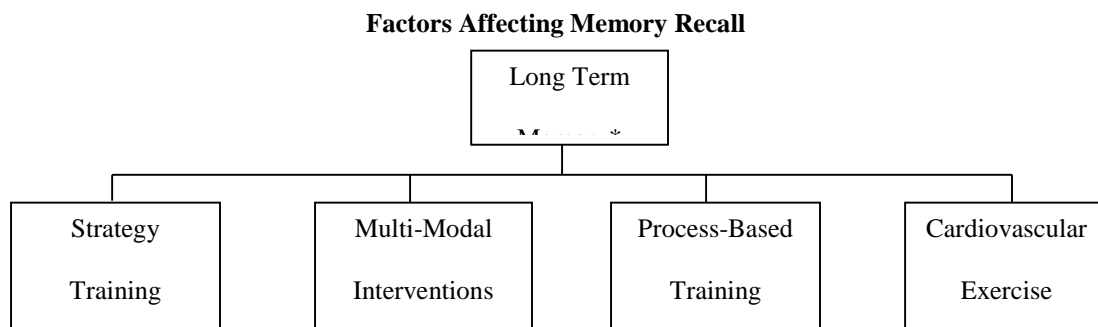
	n	M	SD	P-value
Kin	14	24.71	1.53	0.0004
Design	25	27.58	2.91	

Table 1. Design students recorded higher levels of confidence in Interdisciplinary Knowledge and Awareness.

DISCUSSION

Kin students recorded a lower average confidence in interdisciplinary knowledge than Design students. Design students reported more inconsistent scores. These results were explained considering Design students past experience in high school sports or normal developmental play experienced as a child. Animal and human subjects readily develop strong preferences for objects that were familiar through repeated exposures, so past experience mattered (Ion & Stromeyer, 1980).

At the same time, it was unlikely that Kin students possessed exposure to the discipline of design. In Kin students, lack of exposure likely produced lower confidence levels in interdisciplinary knowledge. Factors that were related to interdisciplinary knowledge, were also associated with long term memory recall (see Figure 1). These factors included strategy training, multi-modal interventions, process-based training, and cardiovascular exercise (Lustig, Shah, Seidler, & Reuter-Lorenz, 2009). Most factors were present in typical gross motor activities with play and sports.



*Note: A reflection of the work of Lustig, Shah, Seidler, and Reuter-Lorenz (2009).

Figure 1. Four factors affected long term memory recall and improved interdisciplinary knowledge and awareness through participation in play activities as a child, and through sport as an adolescent.

The study design might be improved using male and female subjects. Assessment of individuals already in the professional field would increase the sophistication and knowledge base of participants. Increased numbers of meetings, which require interdisciplinary knowledge application, may provide greater understanding. Control groups, consisting of one group of Kin students and one group of Design students, would provide an understanding of interdisciplinary knowledge gained from increased exposure to the materials and ideas across disciplines.

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INTERIOR DESIGN WITH KINESIOLOGY CONSULTANT: INTERDISCIPLINARY EFFORT

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PURPOSE

The purpose of this study was to determine the interdisciplinary knowledge and awareness of Interior Design (ID) students. Interdisciplinary knowledge and awareness research crosses two or more disciplines, and fosters the integration of ideas (Pillalimarri, & Circa 2013). The use of interdisciplinary knowledge and awareness helped students consider and use a more systematic approach in the development of children’s playscapes.

Null Hypothesis: There was no difference between pre and post Interior Design Students interdisciplinary knowledge and awareness.

METHODS

Subjects: Subjects used were all female college students between the ages of 18 and 23 years studying Interior Design at a Division I – Research I university. Twenty women were used in this study ($n_{id}=20$). Subjects were randomly assigned in teams of four, with the addition of two Kinesiology (Kin) consultant students ($n_k=14$, no data was collected for Kin consultant students).

Instrumentation: Participants completed a 5 point Likert scale on an Interdisciplinary Knowledge and Awareness Survey. Surveys were completed by interior design students prior to attendance at workshops with other student groups. Surveys questioned students on confidence working in Kin and ID. **Procedures:** The design process consisted of three 1.5 hour workshops held each Tuesday over three weeks. Students collaborated on a design project for a playscape natural environment for children’s play. The interdisciplinary knowledge and awareness data was compiled on an excel spread sheet. A mean was calculated using individual subject item summaries. **Statistics:** Collected information was compiled on a data sheet. Mean scores (M), standard deviations (SD), and a p-value were determined. A two tailed, type one, t-test was used to compare the pre and post data for ID students.

RESULTS

The null hypothesis stated no difference between pre and post Interior Design Student interdisciplinary knowledge and awareness. The hypothesis was rejected.

The post experiment group, reported a higher mean score than the pre experimental group. The p-value for this study was 0.0019 demonstrating difference (see Table 1).

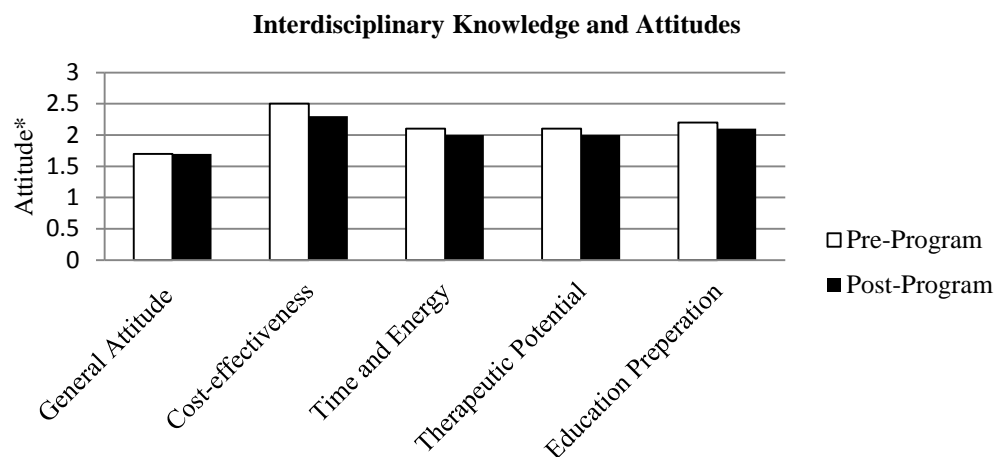
Pre vs. Post Experiment Data

	n	M	SD	P-Value
pre	20	27.35	2.98	0.0019
post	20	29.95	1.73	

Table 1. Subjects reported a higher level of confidence in Interdisciplinary Knowledge and Awareness after the experiment was completed.

DISCUSSION

The integration of interdisciplinary knowledge and awareness allowed ID students to design a better playscape for children using knowledgeable input from Kinesiology consultants. Information from Kinesiology was more easily understood because of experience received from Kinesiologists. Interdisciplinary helped breach communication gaps in the modern academy of professionals. Communication helped mobilize enormous intellectual resources in the cause of greater social rationality and justice (Nissani, 1997). Interdisciplinary knowledge produced a perceived positive impact on cost-effectiveness, time and energy, therapeutic potential, and education preparation (Fitzgerald, Williams, Halter, Remington, Foulk, Persky, & Shay, 2006; see Figure 1).



* Note: Scores range from 1 (Strongly Agree) to 5 (Strongly Disagree)

Figure 1. Learners reported greater confidence and interdisciplinary knowledge after an interdisciplinary workshop (Fitzgerald, Williams, Halter, Remington, Foulk, Persky, & Shay, 2006).

The p-value of (0.0019) indicated ID students' confidence in designing playscapes to knowledge and practical experience offered by Kinesiologists. As an individual came to "know" a stimulus better, the affective reaction to the stimulus was likely to become increasingly positive (Ion & Stromeyer, 1980).

The addition of a control group would help establish understandings of the effect of consultants on the design outcome. Other areas for study include how to stimulate interest in interdisciplinary knowledge and the dynamics of interdisciplinary collaboration.

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ANXIETY IN CO-ED RECREATIONAL BASKETBALL

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PURPOSE

Athletes from multiple sports experience anxiety during competition (Taylor, 1987). Anxiety decreased performance for both genders in basketball players (Kais & Raudsepp, 2005; Russell, Robb, & Cox, 1998; Singh, Singh, & Yadav, 2011). The purpose of this study was to compare anxiety levels of male and female intramural basketball players.

Null Hypothesis: There was no difference in competitive anxiety between male and female basketball players.

METHODS

Subjects. The participants included male and female recreational basketball players. Twenty (N=20) subjects were divided into two groups of male ($n_m=10$) and females ($n_f=10$). Athletes were required to report at least one year of basketball experience and be over the age of eighteen years. **Instrumentation.** A revised questionnaire, adapted from Weinberg and Gould's (2011) Competitive State Anxiety Inventory-2, was used as the questionnaire in this study. The ten questions from the adapted instrument were sport specific to basketball. Each question focused on pre-game anxiety in basketball competition. Participants ranked each question from the instrument on a four point Likert scale. Information was gathered at the intramural co-ed championship game using a packet of materials: 1) cover page, 2) use of human subjects (WSU-IRB No. 5847), 3) adapted instrumentation, and 4) logistics sheet. **Procedure.** Data was obtained thirty minutes prior to game time to measure competitive state anxiety. In order to ensure uniform description and consistent explanation, a script was used to introduce the study. Packets were distributed to each participant. Once completed and collected from participants, the cover page was removed from the packet and filed in a secure location to ensure confidentiality (personal file cabinet). Gathered information was compiled on a data sheet. **Statistics.** After completion of the data table, a mean score and standard deviation (S.D.) were calculated for each group. A two-tailed t-test was used to compare anxiety levels in male and female basketball players. Alpha level was .05 ($p<0.05$)

RESULTS

The null hypothesis stated no difference in competitive anxiety between male and female basketball players. Group one (males) recorded a mean score of 2.29 ± 0.44 . Group two (females) recorded a mean score of 1.98 ± 0.53 ; see Table 1. The null hypothesis was accepted.

Anxiety in Basketball

Group	N	Mean	S.D.	Significance
Male	10	2.29	0.44	0.172
Female	10	1.98	0.53	

Table 1. Male's demonstrated a greater mean anxiety level than females.

DISCUSSION

Studies reported a difference in anxiety levels between male and female basketball players. Female players recorded a higher competitive state anxiety level than males (Russell, Robb, & Cox, 1998; Singh, Singh, & Yadav, 2011). The results of this current study disagreed with the literature reports. Probably, this occurrence was a result of the sample size and the use of rough instrumentation (pilot instrument was used without established reliability or validity established for sport specific Competitive State Anxiety Inventory for basketball).

Multiple researchers found that competitive athletes throughout all sports experienced state anxiety since competition presented a stressor. Stressors usually occurred as a result of 1) perceptions of lack of control, 2) divided attention, and 3) internal self talk that was negative (see Figure 1). State anxiety was common for both genders during competition but likely, more common for females.

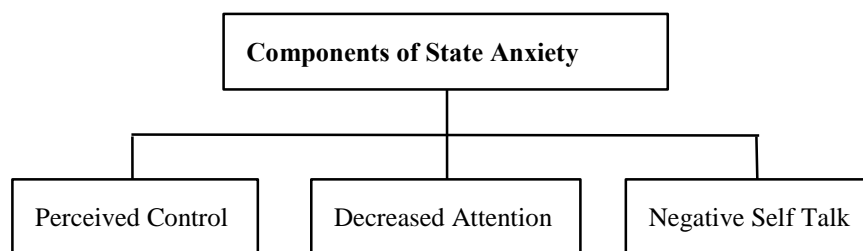


Figure 1. Among the many factors associated with state anxiety, perceived control, decreased attention, and negative self talk were the most prevalent.

Factors leading to increased anxiety levels among female athletes included lack of confidence and gender equality in co-ed basketball. Removal of these factors led to a more controlled and positive environment for future research (Russell, et al., 1998).

In future studies, increased reliability and validity for instrumentation would likely improve outcome. Increased sample size would better meet the underlying assumption of normal random sample and homogeneity of variance for the t-score statistic. Randomization of the participants would lead to decreased bias in further research.

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THE EFFECTS OF SELF-SELECTED MUSIC ON EXERCISE PERFORMANCE DURING A WINGATE CYCLE TEST

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PURPOSE

Music may serve as an ergogenic aid to athletes during exercise performance, diverting their mind from thinking about their level of fatigue and therefore increasing their power output (Terry et al., 2012; Edworthy & Waring, 2013). Music during anaerobic exercise has been far less studied compared to aerobic exercise (Jarraya et al., 2012). The Wingate (WIN) test is an excellent tool in measuring anaerobic performance (Brooks & Brooks, 2010). The purposes of this study were to compare: 1) mean power (MP) and peak power (PP) output, 2) rate of perceived exertion (RPE), 3) fatigue index (FI), and 4) heart rate (HR) with and without music during a WIN test. The null hypothesis for this study were that 1) MP, PP, and HR would increase, 2) RPE would be lower during the music trial, and 3) FI would decrease when listening to music.

METHODS

Participants: A convenience sample of twenty-one college-aged, recreationally active students volunteered for participation ($n_{\text{male}} = 12$, $n_{\text{female}} = 9$). Recreationally active was defined as engaging in 150 minutes or more of some form of moderate intensity exercise per week on a regular basis. **Equipment:** Mean power, PP, and FI were measured using a computer that was hooked up to a Monark Ergonomic 894E Peak Bike. Rate of perceived exertion was based on a scale of 6-20 (Borg scale). Heart rate was measured using a Polar telemetry monitor worn around the chest. Music was played using an iPod Nano and Bose® QuietComfort 2Acoustic Noise Cancelling headphones. **Procedures:** Prior to testing, all participants completed a consent form, health screening form, and a familiarization session. During familiarization, height (cm) and weight (kg) were measured. After familiarization, participants completed two more trials: one with music and other with no music. Participants began with a 5-min warm-up at a self-selected intensity. During this time, the resistance added was calculated at 7.5% of the participant's body weight (kg). After they were warmed up, the headphones attached to the iPod Nano were administered. When the participant was ready, they pedaled up as fast as he/she could until a cycle speed of 140 RPM was reached. At this point, the weight automatically dropped and the resistance was applied. The 30-s period was followed by a self-selected cool down. All variables were measured after the test, except for HR, which was measured right after the 5-min warm-up and immediately after the test. **Statistics:** T-tests were used to compare mean differences between MP, PP, RPE, FI, and HR in both music and no music conditions. Statistical significance was set at an alpha level of $p \leq 0.05$.



Figure 3. In the above left picture the participant is on the Wingate cycle ergometer with headphones on ready to start her test. Researchers are starting the music and collecting data in the right.

RESULTS

Mean data for both conditions are summarized in Table 1. For MP and PP, there were statistically significant differences ($p = 0.04$ and $p = 0.05$, respectively) between music and no music conditions. This means that the null hypothesis for these variables was accepted. There was no statistical difference for RPE ($p = 0.23$), as well as for FI ($p = 0.78$) between both conditions. Hence, the null hypotheses were rejected.

Means For MP, PP, RPE, HR, and FI During Music and No Music Conditions		
Variable	Music Condition	No Music Condition
MP ($W \cdot kg^{-1}$)	7.4 ± 1.3	7.2 ± 1.3
PP ($W \cdot kg^{-1}$)	10.0 ± 2.2	9.7 ± 2.1
RPE	15.9 ± 2.2	16.2 ± 2.5
FI (%)	51.8 ± 9.6	51.0 ± 8.8
HR (bpm)	$111.2 \pm 13.8/$	$108.5 \pm 16.4/$
(Pre/Post)	169.9 ± 12.4	167.8 ± 11.6

Table 1. Mean \pm SD for all variables are shown.

DISCUSSION

A minor difference in the MP and PP output were observed between music and no music test conditions. Peak power increased by an average of $0.30 W \cdot kg^{-1}$ and MP output increased by an average of $0.20 W \cdot kg^{-1}$. Both results were calculated to be significant, suggesting that the addition of musical stimuli can increase PP and MP (Brohmer & Becker, 2006). There was no statistical significance in fatigue index changes between the two trials. However, the lack of statistical significance from the FI data was important, because it suggested that MP and PP increased with no observed change in FI, and further supported the possible performance benefits of music on power output. There was no statistical significance in RPE and HR differences between conditions. However, this data was important because it indicated that the addition of musical stimuli resulted in increased power output without an increase in perceived exertion. Similarly there was no observed change in HR between trial conditions or order.

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