

2012 R. D. PEAVY PAPERS

Western Society of Kinesiology and Wellness
57th Annual Conference, Reno, NV
October 10-12, 2012

Publisher

Western Society for Kinesiology and Wellness

Editor

J. A. Ulbnght

TABLE OF CONTENTS

RESEARCH CRITIQUE ABSTRACTS

How Depth Jumps Effect Maximal Strength (<i>L Beisley - EWU</i>)	5
Community-Based Rehabilitation in Africa (<i>R Boettcher - Whitworth</i>)	6
Rehabilitation Effects on Multiple Sclerosis (<i>R Boettcher - Whitworth</i>)	7
Emotional Benefits of Running for Women (<i>B Borla - Whitworth</i>)	8
Quality of Health among Latina Immigrants (<i>B Borla - Whitworth</i>)	9
Assessing the Safety of Going Higher (<i>A Calabro - Whitworth</i>)	10
Maximum Output from Whole-Body Vibration (<i>S Carlson - Whitworth</i>)	11
Neuromuscular Activation Rehabilitation (<i>S Carlson - Whitworth</i>)	12
Strength Training in Overweight Children (<i>D Childers - EWU</i>)	13
Common Injuries of Track & Field Athletes (<i>MENman - Whitworth</i>)	14
Leg Strength and Total Knee Arthroplasty (<i>E Fonken - Whitworth</i>)	15
Parkinson Disease: Exercise and Self-Efficacy (<i>EFonken - Whitworth</i>)	16
Alternative Medicine Benefits in HTV Patients (<i>B Fowler- Whitworth</i>)	17
Contamination of Phones Used in Hospitals (<i>B Fowler - Whitworth</i>)	18
Increasing Oxygenation of Ischemic Tissue (<i>P Inouye - Whitworth</i>)	19
Running Economy Based on Footwear (<i>MJarvis - EWU</i>)	20
Early Orthoses for Down Syndrome Infants (<i>J Kelly - Whitworth</i>)	21
Biomechanics of Push and Pull Movements (<i>D Koerner - EWU</i>)	22
Effects of Music Therapy in Dementia Patients (<i>J Loo - Whitworth</i>)	23
Therapeutic Yoga as Schizophrenia Treatment (<i>J Loo - Whitworth</i>)	24
Exercise Now May Prevent Osteoporosis Later (<i>A Medlin - EWU</i>)	25
MRI Findings in Lumbar Disks of Dancers (<i>JNewberg - Whitworth</i>)	26
Yoga Benefits, Barriers, and Cues (<i>D Olson - Whitworth</i>)	27
Elbow Flexion Effects in Pitching Levels (<i>B Piek - EWU</i>)	28
Humeral Fractures & Radial Nerve Damage (<i>C Rahn - Whitworth</i>)	29
Sleep Effects on Memory (<i>A Reardon - Whitworth</i>)	30
Vibration Decreases Bone and Muscle Loss (<i>A Vyakhk - EWU</i>)	31
Drugs and Mental Health in the Military (<i>E Watt - Whitworth</i>)	32
Children Crossing Roads: Dangerous? (<i>C Woytovech - WSU</i>)	33

LITERATURE REVIEW ABSTRACTS

Physical Inactivity and Team Climate (<i>J Balaban - WSU</i>)	35
---	----

Inspiratory Muscle Training on Athletes (<i>K Brandt - Whitworth</i>)	36
Effects of Music on Exercise Performance (<i>TEsqueda - Whitworth</i>)	37
Obesity and Aggression (<i>A Gengnagel - WSU</i>)	38
Obesity and Extrinsic Motivation (<i>S Hinkle - WSU</i>)	39
Elite Distance Runners' Energy Usage (<i>IFonken - Whitworth</i>)	40
Anxiety about Falls in the Elderly (<i>NImhoff- WSU</i>)	41
Impact of Population on Food Production (<i>B Keeton - WSU</i>)	42
Physical Inactivity and Sport Orientation (<i>S Lewis - WSU</i>)	43
The Media and Obesity (<i>C McDaniels - WSU</i>)	44
Obesity and Listening Skills (<i>Ft Oberst - WSU</i>)	45
Causes of Aggression in Sport (<i>J Radmall - UVU</i>)	46
Internal Fixation of Humeral Fractures (<i>C Rahn - Whitworth</i>)	47
Effects of Exercise on Idiopathic Scoliosis (<i>M Seely - Whitworth</i>)	48
Elderly Falls and Confidence (<i>B Shumate - WSU</i>)	49
Imagery and the Treatment of Obesity (<i>JBoettcher-Wells - WSU</i>)	50
Infants Crawling Vs. Walking on Slopes (<i>C Woytovech - WSU</i>)	51

ORIGINAL RESEARCH ABSTRACTS

Effects of Dynamic and PNF on Vertical Jump (<i>A Ayres, A Kluge, & A Glass - Whitworth</i>)	53
Effect of Wingate Training on a Two-Mile Performance Run (<i>KBrandt, E Travis, & E Watt- Whitworth</i>)	55
Value of Nutrition, Sport, and Physical Activity in Thailand (<i>A S Chae, D D Irby, J G Balaban NR Imhoff, B L Shumate, JM Boettcher-Wells, B N Dein, A A Gengnagel, SJHinkle, K J Larson, SA Lewis, MMMcCanna, C A McDaniels, J E Nelson, H R Oberst, LD Bruya, FParkay, J A Sievers, G S Wood - Washington State University; Rosmini College, New Zealand</i>)	57
Communication in Rugby Players (<i>K Ciciora - WSU</i>)	59
Correlation of Utah Charter Schools' Physical Education Class Time and Childhood Obesity (<i>NDavis, C Hansen, C Worthen, & B.H. Boyer- UVU</i>)	61
Glucose Ingestion during Exercise on Resisting Cognitive Interference (<i>T Esqueda, J Real, &M Seely- Whitworth</i>)	63
A Kinematic Comparison of Barefoot and Vibram Fivefingers® Running (<i>IFonken, THill, & CNorthcott- Whitworth</i>)	65
An Assessment of the Amount of Physical Education Class Time in Utah Schools (<i>C Hansen & B Boyer - UVU</i>)	67
Wingate Anaerobic Test of Male vs. Females (<i>G Hoffman, NDavenport - WSU</i>)	69
Reward Preferences in Youth Wrestling (<i>G Hoffman - WSU</i>)	71
Validation of Three Body Composition Devices (<i>K Johnson -Akron</i>)	73
Team Climate among Football Officials (<i>MKunold- WSU</i>)	75
Confidence in Resistance Training (<i>TLee - WSU</i>)	77
Anxiety in Women Soccer Players (<i>KMcCaffrey - WSU</i>)	79
Comparison of Rehydration Effects of Coconut Water vs. G2 on Rehydration (<i>TNorton, C Curtis, & RRockefeller- Whitworth</i>)	81
Confidence Levels in Track and Field Athletes (<i>HParent - WSU</i>)	83
Tabata vs. Circuit Training Heart Rates (<i>B Shumate - WSU</i>)	85
Tester Experience when Measuring Body Fat Using Skinfolds in College-Aged Adults (<i>A Vyakhk-EWU</i>)	87
Self-Monitoring and Athletes (<i>J Wiggs - WSU</i>)	89
An Assessment of Foods and the Effects of Revenue from Vending Machines in High Schools (<i>C Worthen, C Hansen, N Davis, & B Boyer - UVU</i>)	91

RESEARCH CRITIQUE

ABSTRACTS

McGuigan, M. R., Tatasciore, M., Newton, R. U., & Pettigrew, S. (2008). Eight weeks of resistance training can significantly alter body composition in **HOW DEPTH JUMPS EFFECT MAXIMAL STRENGTH**

A critique of the work of Bullock and Comfort (2011), "An investigation into the acute effects of depth jumps. . ." L. T. Beisley - lancebeisley@yahoo.com - Eastern Washington University

PURPOSE

Post activation potentiation (PAP) has been found to increase muscle force and power in subsequent activities. The PAP effect of high-load, low-velocity (HLLV) activities on low-load, high-velocity (LLHV) activities has been researched more extensively than the effects of LLHV on HLLV. The purpose of this study was to test the effects of depth jumps (DJ) on maximum strength performance and to see if the number of DJ's alters the PAP effect (Bullock & Comfort, 2011).

METHODS

Fourteen trained male collegiate athletes (aged 22 ± 4 yrs) participated in a block randomized and counterbalanced study. Two, four, or six DJ's were performed followed by a four minute rest period and a one repetition maximum (1RM) back squat. The warm-up and techniques of both the DJ's and back squats were standardized. Repeated measures analysis of variance was used to determine significant differences between groups compared to the control (no DJ's).

RESULTS & DISCUSSION

The significant increases in maximal strength found between the interventions and the control are presented in Table 1. There were no significant differences in strength found between the numbers of DJ's performed. It can be concluded that performing DJ's before a strength activity increases strength performance. This information will prove particularly useful for athletes performing a maximum load back squat.

Effects of DJ's on 1RM Squat

DJ's	1RM Squat (kg)	<i>P</i>
0	132.43 \pm 34.56	<0.05
2	140.71 \pm 35.68	0.004
4	140.50 \pm 33.77	0.001
6	141.43 \pm 34.39	0.001

Table 1. Mean \pm standard deviation 1RM back squat after interventions are presented above.

CRITIQUE

Much research suggests that PAP increases the muscle's ability to contract forcefully. Research into the PAP effects of LLITV activities is relatively new. Bullock and Comfort (2011) were the first to examine different volumes of DJ's. The researchers limited adaptation during the study by randomizing the order that each group performed the DJ's. Deviation in body weight introduced changes in the load during the LLITV phase of the protocol. This may have altered the PAP effects for each individual tested. Future studies might want to investigate the time period between LLHV exercise and the subsequent HLLV exercise.

REFERENCE

Bullock, N., & Comfort, P. (2011). An investigation into the acute effects of depth jumps on maximal strength

COMMUNITY-BASED REHABILITATION IN AFRICA

A critique of the work of Penny et al. (2007), "Community-based rehabilitation and orthopedic surgery for..." R. E. Boettcher - rboettcher14@my.whitworth.edu - Whitworth University

PURPOSE

Work is being done in Uganda to make treatment and rehabilitation more accessible to children with motor disabilities. The purpose of the reviewed study was to describe a cohesive reconstructive orthopedic surgery and community-based rehabilitation (CBR) project which provided services to these children (Penny, Zulianello, Dreise, & Steenbeek, 2007).

METHODS

The CBR project concentrated on locomotor impairments of children. Expatriate consultants of the project included an orthopedic surgeon, two physiotherapists, and a nurse administrator. Through networking of organizations and collaboration of 13 CBR projects, eight expatriate coworkers and over 300 national co-workers were employed. The central orthopedic surgical unit and rehabilitation center was a necessity for the CBR projects. The center served to link the projects together and promote coordination despite the different orientations of the projects.

RESULTS & DISCUSSION

Of the disabled children, approximately half had neglected locomotor disabilities because the rural African environments the children lived in lacked resources and development. Over one-third of the children benefited from surgical intervention due to the continuum of care provided by the CBR programs. Reconstructive surgeries were provided to children with common locomotor disabilities (see Table 1). A variety of components were identified by the program as essential for providing continuum orthopedic care in developing countries (see Table 2).

Component	Recipe for Success
CBR	Identification, awareness, & assistance
Physiotherapy	Secondary assessment & diagnosis
Orthopedic surgery access	Alleviate or eliminate disability
Rehabilitation centers/hostels	Post-surgery relapse prevention
Appliance workshops	Manufacture orthotics
Transportation system	Transport to and from referral centers

Common Conditions Needing Surgery

- Congenital clubfoot deformity
- Osteomyelitis/septic arthritis
- Trauma reconstruction/burns
- Cleft lip/plastic surgery
- Congenital & angulatory deformities

Table 1. The most common conditions that required reconstructive surgery are listed, Uganda, 2001.

Table 2. The "Recipe for Success" as deemed by the project is shown.

CRITIQUE

If any component of the "Recipe for Success" was missing, children were prone to relapse and failed to achieve optimal recovery of function. By outlining the essential components needed to provide continuum of care, the project enabled future CBR programs to be successful. Follow-up statistics on patients were not included, which could have further shown the benefit of continuum care. Inclusion of follow-up statistics regarding relapses would be useful to compare to other CBR projects to highlight the impact of the components of the "Recipe for Success."

REFERENCE

Penny, N., Zulianello, R., Dreise, M., & Steenbeek, M. (2007). Community-based rehabilitation and orthopedic surgery for children with motor impairment in an African context. *Disability and Rehabilitation*, 29(11-12), 839-843.

REHABILITATION EFFECTS ON MULTIPLE SCLEROSIS

A critique of the work of Wahls et al. (2010), "Rehabilitation with neuromuscular electrical stimulation leads..." R. E. Boettcher - rboettcher14@my.whitworth.edu - Whitworth University

PURPOSE

Gait disability seldom improves in patients with secondary progressive multiple sclerosis (SPMS) or primary progressive multiple sclerosis (PPMS). The purpose of the reviewed study was to test the effects of neuromuscular electrical stimulation (NMES) and exercise on gait disability of patients with SPMS or PPMS (Wahls, Reese, Kaplan, & Darling, 2010).

METHODS

Nine patients, four males and five females with either PPMS or SPMS, participated in the NMES home exercise program (NMES-HEP) accompanied by NMES. The patients were given the NMES devices and advised to use the devices at home while performing the NIMES-HEP. Programs were personalized for each patient to best improve ambulation. Data was recorded using manual motor testing (MMT) and the expanded Kurtzke Disability Status Scale (EDSS).

RESULTS & DISCUSSION

Each patient received between 22 and 495 days of NMES. The mean change in EDSS was 0.778 and ranged between 0-2.0 for all patients. Patients with more than 100 days of NMES had a mean improvement in EDSS of 1.0 (see Table 1). There was a strong correlation between the number of days of NMES and the level of improvement in function in terms of EDSS scores. Most SPMS or PPMS patients experienced muscle pain, muscle spasms, and disuse-associated muscle atrophy; NMES served as a treatment modality to reduce the symptoms. Accompanied by home exercise, NMES helped improve function and gait.

Patient Outcomes					
Group	Number of Patients	Mean Days of NMES	A EDSS Range	Mean Pre-NMES	Mean Recent EDSS
1	6	190	0.5-2	5.8	5.0
2	3	39	0-0.5	5.8	5.5

Table 1. Shown in the table are the different ranges of patients' outcomes in terms of the EDSS scale. The EDSS scores are accompanied by the average length of treatment received by the patients. Each patient in Group 1 received over 100 days of NMES, while each patient in Group 2 received less than 100 days of NMES.

CRITIQUE

The study demonstrated that the combination of NMES and progressive exercise was linked with substantial improvement in ambulation for patients that experienced either SPMS or PPMS related gait disability. The study was the first to use NMES-HEP to successfully improve ambulation for patients with PPMS. A strength of the study design was how the NMES programs and HEPs were tailored to each patient to more efficiently improve ambulation. The study was limited by the small number of patients, as well as the lack of detail and accuracy in reporting methods and results. Future research should include more patients and a detailed outline of the NMES-HEP for each patient involved in the study.

REFERENCE

Wahls, T., Reese, D., Kaplan, D., & Darling, G. (2010). Rehabilitation with neuromuscular electrical stimulation leads to functional gains in ambulation in patients with secondary progressive and primary progressive multiple sclerosis: a case series report. *The Journal of Alternative and Complementary Medicine*, 16(12), 1343-1349.

QUALITY OF HEALTH AMONG LATINA IMMIGRANTS

A critique of the work of Garces et al. (2006), "An examination of sociocultural factors associated with health..." B. A. Borla - bborlal4@my.whitworth.edu - Whitworth University

PURPOSE

Cultural and structural barriers restricted Latina immigrants' access to health care and lead to an overall decline in health. The purpose of the reviewed study was to examine the sociocultural factors

that affect Latina immigrants' health in the United States (Garces, Scarinci, & Harrison, 2006).

METHODS

Participants were interviewed about their ability to maintain good overall health and seek appropriate health care. Data was collected from 54 Latina immigrants who were interviewed for one and a half hours. Their conversations were recorded, transcribed, and analyzed for common themes. The responses were organized with the PEN-3 theoretical model into positive, negative, and exotic perceptions, enablers, and nurtures.

RESULTS & DISCUSSION

The PEN-3 model summarized how immigrants viewed and responded to healthcare accessibility and health maintenance. Responses from the PEN-3 model were organized into PEN-3 categories (see Tables 1 and 2). Structural barriers such as money, language, documentation, and time restricted immigrants' access to health care and led to an overall decline in health.

Health Care Maintenance	
Perceptions (Positive)	<ul style="list-style-type: none"> Eating well, exercising, and regular check-ups Avoidance of destructive behaviors.
Perceptions (Exotic)	<ul style="list-style-type: none"> Home remedies
Perceptions (Negative)	<ul style="list-style-type: none"> New culture, change in eating habits, and lack of time
Enablers (Negative)	<ul style="list-style-type: none"> Language barriers and lack of information and access to healthcare

Table 1. The above factors affected immigrants' ability to maintain good health in the United States.

Health Care Seeking	
Perceptions (Positive)	<ul style="list-style-type: none"> Regular check-ups
Perceptions (Negative)	<ul style="list-style-type: none"> Embarrassment and fear of disease
Enablers (Negative)	<ul style="list-style-type: none"> Lack of money, health insurance, transportation, and documentation
Nurtures (Positive)	<ul style="list-style-type: none"> Quality of health care professionals in US
Nurturers (Negative)	<ul style="list-style-type: none"> Women use complimentary medicine and do not tell health providers

Table 2. The above factors affected immigrant's ability to

CRITIQUE

Important structural and cultural barriers prevented Latina immigrants from seeking and maintaining optimal health. The study successfully provided a holistic look at Latina immigrant's health. Limitations included self-reported data and a volunteer sample. In future studies, the researchers should include a random sample and different cultures of immigrants to obtain more inclusive data.

REFERENCE

Garces, T, Scarinci, T, & Harrison, L. (2006). An examination of sociocultural factors associated with health and health care seeking among latina immigrants. *Journal of Immigrant and Minority Health*, 8(4), 377-385.

EMOTIONAL BENEFITS OF RUNNING FOR WOMEN

A critique of the work of Passive and Giorgi (2010), "The experience of self discovery and mental..." B. A. Borla - bborla4@my.whitworth.edu - Whitworth University

PURPOSE

Individuals who compete in marathons frequently experience an enhanced quality of life, better health, and an improved mental state. The purpose of the reviewed study was to examine how marathon running produced a positive mental and psychological change in novice female athletes

(Boudreau & Giorgi, 2010).

METHODS

Two middle-aged, female runners in a running program for a full or half-length marathon were interviewed about the psychological change experienced in response to running. Both women were novice runners and had no prior competitive running experience. The in-depth interviews were 30-45 minutes long and were analyzed using descriptive phenomenological analysis to determine the most significant moments of change.

RESULTS & DISCUSSION

After analyzing the participant's interviews, several trends were noted regarding the change both women experienced. Participants found inner peace and achieved a greater openness with others. The participants also experienced heightened confidence and positivity. Lastly, participants found running an effective coping tool when processing feelings (see Table 1).

Participant Interviews on Running Experience	
Categories of Realization	Examples of Participant Commentary
Outdoor Environment	"... the water is very healing... it was very comforting." "Just seeing the beauty in everything because I am running."
Openness with Self and Others	"I have done things I never would have without running..." "Em more willing to listen to them [her adult children]... to support them."
Self-Improvement	"... connected, in the most intimate personal way to myself." "I feel like my authentic self..."
Mental Disposition	"More confidence... and empowered." "I have a more positive outlook." "I feel a new confidence."
Empowerment	"... now I know I can get through anything." "Running made me realize... you can do and accomplish anything."
Support for Future Challenges	"I have a really good and positive outlook on life." "Running helps process feelings and problems." "... time to refocus, and rethink how good things are."

Table 1. Commentary from both participants tied to one of six categories of realization.

CRITIQUE

The study provided a unique view of the emotional benefits of running. Detailed responses were collected from the participants' interviews, but the study lacked concrete numbers or quantitative data to evaluate the change. In future studies, an additional method to measure change would strengthen the data. Additionally, the study could have included men.

REFERENCE

Boudreau, A. L., & Giorgi, B. (2010). The experience of self-discovery and mental change in female novice athletes in connection to marathon running. *Journal of Phenomenological Psychology, 41(9)*, 234-267.

ASSESSING THE SAFETY OF GOING HIGHER

A critique of the work of Tannheimer et al. (2009), "Testing individual risk of acute mountain sickness at greater..." A. L. Calabro - acalabro13@my.whitworth.edu - Whitworth University

PURPOSE

The ability to predict an individual's susceptibility to both acute mountain sickness (AMS) and high-altitude pulmonary edema (HAPE) could improve their climbing performance and decrease casualties at high altitude. The purpose of the reviewed study was to develop an effective test that can be used at a safe altitude to evaluate whether an individual should continue the ascent (Tannheimer et al., 2009).

METHODS

Thirty-six non-smoking males participated in a five week study at varying altitudes. Three days were spent at an altitude below 3,100 ft. The sleeping altitude was increased to 11,060 ft, and altitudes of up to 13,738 ft were reached during the day. On day 7, Mt. Blanc (15,775 ft) was climbed. The test that determined acclimation ability consisted of descending and ascending a flight of stairs in the Turin hut. Oxygen saturation levels were recorded at the bottom and top of the stairs (SaO2 bottom,

SaCEtop)- Participants ascended the stairs as fast as possible. Time (time_{perftest}), lowest saturation (SaO₂ top), and highest pulse (pulse_{top}) were recorded for each participant at the top of the stairs. A Spearman's rank correlation coefficient was used to analyze the data. A *p* value of <0.05 was accepted as statistical significance.

RESULTS & DISCUSSION

The mean values of data were summarized (see Table 1). There was a significant correlation between Time_{perftest} ($r=0.48$; $z \geq 0.006$), SaO₂_{perftest} ($r=-0.3$; $z \geq 0.04$) and the degree of AMS during the summit of Mt. Blanc. Rank was assigned for time_{perftest} and SaO₂_{perftest} (fastest time and highest saturation = rank 1). A sum of these ranks was taken and the sum correlated highly ($r \geq 0.56$; $z \geq 0.001$) to the high altitude symptoms test. In addition there was a significant ($r=0.33$; $z \geq 0.05$) correlation between SaO₂_{perftest} and SaCEMt. Blanc-

Mean Values of Data

SaO ₂ Mt. Blanc	Pulse Mt. Blanc	SaO ₂ perf test
79%	96.2	81.1%

Table 1. Means are summarized, pulse recorded on Mt Blanc, SaO₂ Mt Blanc, SaO₂ perftest-

CRITIQUE

Participants' test performances showed significant correlation to the severity of AMS experienced on Mt. Blanc. The performance test was simple and effectively assessed the susceptibility to AMS. The test was very simple because of this the test was easy to standardize, easy repeat, and restricted the amount of confounding variables. However, the test was performed on individuals who were already acclimated at an altitude higher than their living altitude. This made the test less effective in predicting AMS in individuals at their home altitude. Further research should be done with arterial blood gases (ABG), which would yield a more accurate O₂ saturation and provide pH levels, CO₂ levels, lactate, and hemoglobin concentration.

REFERENCE

Tannheimer, M., Albertini, N., Ulmert, H., Thomas, A., Engelhardt, M., & Schmidt, R. (2009). Testing individual risk of acute mountain sickness at greater altitudes. *Military Medicine*, 174(4), 363-369.

MAXIMUM OUTPUT FROM WHOLE-BODY VIBRATION

A critique of the work of Bedient et al. (2009), "Displacement and Frequency for Maximizing Power Output..." S. M. Carlson - scarlson13@my.whitworth.edu - Whitworth University

PURPOSE

Whole-body vibration (WBV) training has been shown to increase upper and lower-body output in both athletes and non-athletes alike. However, the best acute response from the combination of frequency, displacement, and duration has yet to be determined. The purpose of this study was to examine WBV procedures with intention to maximize power performance (Bedient et al, 2009).

METHODS

Repeated-measures analysis of variance was used to evaluate 20 men and women who were recreational athletes with no competitive training during the study. The combinations of frequencies (30, 35, 40 and 50 Hz), amplitudes (2-4 mm or 4-6 mm) and duration of 30 seconds were tested on a Power Plate device. The subjects attended 24 sessions, each separated by a 24 hour recovery period. During each session, subjects were instructed to stand in an isometric half-squat position with feet shoulder width apart, and perform three jumps separated with slight pauses. All jumps were recorded on a pressure sensitive mat that computed the jump heights. The highest jump height was selected for statistical analysis. Data for jump heights was collected immediately after WBV and at 1 min, 5 min, and 10 min post-WBV.

RESULTS & DISCUSSION

Jump height data showed a significant effect in frequency ($p < 0.026$) and time ($p < 0.0001$).

Frequency of jumps exhibited higher values after the 30 Hz condition compared to the 35 Hz ($p < 0.026$) and 40 Hz ($p < 0.028$) conditions. Also, power performance peaked at 1 min post-WBV and decreased at 5 min and 10 min post-WBV.

Frequency <i>Cttz.</i>	Xime (Normalized Jump Power $^{\circ}A \gg$)
30 Hz Condition: 1.OI	Pretest: 100%
35 Hz Condition: 1.OO	Immediately Post: 100.3%
40 Hz Condition: 1.OOI	1 Minute Post: 100.1 %
50 Hz Condition: 1.QQ5	5 Minute Post: 100.411)
	10 Minute Post: 100.15%

Table 1. Changes in the countermovement jump (CMJ) were recorded in frequency and normalized jump time.

CRITIQUE

The highest improvement of peak power was from the 30 Hz condition and occurred at 1 min post-WBV. This study provided strong assurance to WBV's effectiveness and what levels of intensity offer the best results of improvement during exercise. The study did not show an accurate variance between the 1-min peak performance compared to the other durations due to fatigue from testing all three conditions repetitiously. Testing procedures could be improved by testing one condition each day with each individual eliminating the factor of fatigue.

REFERENCE

Bedient, A. M., Adams, J. B., Edwards, D. A., Serravite, D. H., Huntsman, E., Mow, E. S.,... Signorile, J. F. (2009). Displacement and frequency for maximizing power output resulting from a bout of whole-body vibration. *Journal of Strength and Conditioning Research*, 23(6), 1683-1687.

NEUROMUSCULAR ACTIVATION REHABILITATION

A critique of the work of Anderson et al. (2006), "Neuromuscular activation in conventional therapeutic exercises..." S. M. Carlson - soccer_fanatic_2@live.com - Whitworth University

PURPOSE

Rehabilitation of post-traumatic injuries should include exercises that trigger muscular bulking as well as activation of neural responses to damaged muscle fibers. The purpose of the reviewed study was to examine the amount of neuromuscular activation in the knee joint using four basic therapeutic exercises (Anderson et al, 2006).

METHODS

Thirteen young males with no previous exercise training participated in the study. Eight different exercises (four being conventional, four being heavy resistance) were examined using surface electromyography (EMG) to assess activation of three muscle groups during the exercises: quadriceps group, hamstring group, and the gluteus maximus. The root mean square (RMS) and EMG amplitudes were then compared between exercises.

Conventional Exercises	Heavy Resistance Exercises
Quadriceps Femoris Muscle Setting	Free-weight Squats With a Barbell
Manual Lateralization of the Patella	Horizontal Seated Leg Press
Rhythmic stabilization	Isolated Knee Extension With a Cam Mechanism
Pelvic Bridging Exercise	Isolated Hamstring Muscle Curl

Table 1. Eight exercises were used during EMG amplitude recordings of the three muscles tested.

RESULTS & DISCUSSION

In conventional exercises, the RMS EMG amplitudes were between 9-34% compared to resistance exercises tested, which were 12-86%. The EMG activity for quadriceps group was greatest during isolated knee extension with amplitudes of 68-74%. The EMG activity in the hamstring group was largest during isolated hamstring muscle curl with amplitudes of 67-70%. The EMG activity of the gluteus maximus muscle was higher in the squat and leg press exercises with EMG values of 55-60%.

CRITIQUE

Conventional exercises elicited moderately low levels of neuromuscular activation in contrast to heavy resistance exercises which were not functional for knee rehabilitation. This study showed significant evidence that different exercises provided assistance in knee rehabilitation. However, it may not be necessary to utilize heavy resistance training due to the stress it imposes on the ligaments of the knee. Further description about conventional exercises could give this study a more in depth approach to what type of exercise is the best for rehabilitation of the knee.

REFERENCE

Andersen, L. L., Magnusson, S. P., Nielsen, M., Haleem, J., Poulsen, K., & Aagaard, P. (2006). Neuromuscular activation in conventional therapeutic exercises and heavy resistance exercises: implications for rehabilitation. *Physical Therapy*, 86(5), 683-697.

STRENGTH TRAINING IN OVERWEIGHT CHILDREN

A critique of the work of McGuigan et al. (2008), "Eight weeks of resistance training can significantly alter..." D. K. Childers - kaylynn_childers@eagles.ewu.edu - Eastern Washington University

PURPOSE

Previous research of exercise regimens designed for overweight children have primarily dealt with aerobic activities. New research suggests that resistance training may be a more effective way to implement a fitness program for this demographic. The purpose of this study was to evaluate change in body fat of overweight and obese children through a resistance training curriculum (McGuigan, Tatasciore, Newton, & Pettigrew, 2008).

METHODS

Twenty-six girls and 22 boys (7-12 years old) participated in three resistance training sessions per week for eight weeks. Pre- and post-test values were obtained for lean body mass and percent body fat using dual-energy X-ray absorptiometry, one-repetition maximum (1RM) squat, static jump (SJ), countermovement jump (CJ), and maximal push-ups. A one-way analysis of variance was used to compare data between pre- and post-test values. Significance was set at $p < 0.05$.

RESULTS & DISCUSSION

A significant decrease in percent body fat and significant increases of lean body mass (LBM), 1RM squats, push-ups, CJ, and SJ were found (see Table 1). The results suggest that an eight week resistance training program can improve percent body fat, lean muscle mass, muscular strength and power for overweight and obese children.

Resistance Training Variables During an 8-Week Period

Variable	Week 0	Week 8	% change
LBM (kg)	32.2 ± 5.5	33.9 ± 5.3	5.3 % *
Percent Body Fat	39.9 ± 4.6	37.3 ± 4.3	2.6 % *
1RM Squat (kg)	22.3 ± 8.7	38.8 ± 16.1	74.0 % *
Push-Ups	2.7 ± 4.0	5.0 ± 4.8	85.0 % *
CJ Height (cm)	19.5 ± 6.2	22.1 ± 5.3	8.0% *
SJ Height (cm)	23.1 ± 7.9	26.7 ± 7.3	4.0% *

Table 1. Values are presented as mean ± standard deviation where * equals a p value of < 0.05 .

CRITIQUE

This study by McGuigan and colleagues (2008) showed significant changes in body composition. The researchers strengthened the validity of their experiment by performing a power analysis to determine the number of participants needed. Also, they used low cost equipment such as resistance bands, medicine balls, and dumbbells that could be more easily attainable for schools than machines. A potential concern with the research was that the p value for LBM was given at 0.07 and reported as significant. A suggestion for further research would be to implement a resistance program for entire school districts to see the effects on children (5-18 years old).

REFERENCE

children who are overweight or obese. *The Journal of Strength and Conditioning Research*, 22(6), 1-6.

COMMON INJURIES OF TRACK AND FIELD ATHLETES

A critique of the work of Jacobsson et al. (2011), "Prevalence of musculoskeletal injuries in Swedish elite track..." M. C. Enman - menman14@my.whitworth.edu - Whitworth University

PURPOSE

Injuries are common among all athletes, including those who participate in track and field. The purpose of the reviewed study was to establish common injury patterns among track and field athletes.

METHODS

Two hundred and seventy eight track and field athletes, ranging from youth to adult competitors, volunteered to participate in this study. Data was collected via a web-based questionnaire of self-reported injury data. The athletes were separated into event groups and their data was classified by type of injury. Both period (e.g. one calendar year) and point estimates (e.g. at a specific point within the year) were used to report the injury data. Descriptive statistics were used to summarize the data and χ^2 tests were used to compare the data between groups.

RESULTS & DISCUSSION

The average overall prevalence of injuries in male and female athletes was 42.5%. Injury prevalence seemed to vary with age and gender (see Table 1). The type of injury with the highest prevalence was inflammation and pain with gradual onset. The body regions that incurred the most injuries were the knee and lower leg. In fact, nine out of ten injuries were reportedly in the lower extremities. The authors suggested that high impact forces across many track and field events led to both long term and acute injuries in the lower extremities.

Injury Prevalence By Gender & Age

	Male Adult	Female Adult	Male Youth	Female Youth
1 yr. retrospective	50%	47%	44%	29%
1 yr. point prev.	36%	39%	18%	45%

Table 1. The prevalence of injuries in different gender and age groups.

CRITIQUE

The predominant diagnosis was reportedly non-traumatic, gradual onset injuries, which often indicate an etiology related to overuse. The large sample population and delimitation of musculoskeletal injuries were strengths this study. Also, the three-week time-loss definition combined with point injury prevalence added additional context to the interpretation of study results. Some weaknesses of the study were that it excluded long-term injuries, which may have introduced a "healthy worker bias". Lastly, the study was a self-reported retrospective study, which introduced the possibility of recall bias. Based on the present results, a suggested area of future study is to focus more effort on youth athlete injuries. Doing so may provide information that will help coaches and therapists better identify at-risk groups, so that many of these injuries can be prevented or reduced.

REFERENCE

Jacobsson, J., Timpka, T., Kowalski, J., Nilsson, J., Ekberg, J., & Renstrom, P. (2011). Prevalence of musculoskeletal injuries in Swedish elite track and field athletes. *American Journal of Sports Medicine*, 40(1), 163-169.

LEG STRENGTH AND TOTAL KNEE ARTHROPLASTY

A critique of the work of Zeni and Synder-Mackler (2010), "Early postoperative measures predict..." E. C. Fonken - efonken14@my.whitworth.edu - Whitworth University

PURPOSE

Though total knee arthroplasty (TKA) improved patients' functional abilities, the degree to which patients improved was variable. Pre- and post-operative measures, sex, body mass index (BMI),

and age affected results after surgery. The purpose of the study was to determine which of these factors most predicted the outcome of surgery in one to two years (Zeni & Synder-Mackler, 2010).

METHODS

One hundred and fifty-five people with a unilateral TKA underwent evaluations at three stages of recovery: first in initial outpatient physical therapy, then one and two years out of surgery. Researchers used five tests to evaluate patients (see Table 1). Average height (1.72m), age (64.9yrs), and weight (89.1kg) were considered. A hierarchical regression model was used to analyze the data.

Test	Description of Tests Implemented				
	Quadriceps Muscle Strength	Knee Range of Motion (ROM)	Timed Up & Go (TUG)	Stair-climbing Task (SCT)	Knee Outcome Survey (KOS)
Description	Measured force generated by knee	Used goniometer to measure knee angles	Measured time needed to stand, walk three meters, return, and sit	Measured time needed to ascend and descend twelve stairs	Survey of pain level and perceived functional ability

Table 1. Five different tests were used to evaluate the level of recovery of the patients at three different points.

RESULTS & DISCUSSION

The TUG, SCT, and KOS scores all improved when re-evaluated one and two years after TKA. The most successful surgeries involved younger participants with lower BMI. These patients tended to have stronger quadriceps muscles in the non-operated leg, which led to better recovery because it increased functional ability. Similar positive results occurred in people with greater preoperative flexion ROM since the muscles around their knee were more flexible. One and two year results were similar because greatest recovery occurred in the first year after surgery.

CRITIQUE

Strength of the non-operative quadriceps was the largest determining factor in recovery from TKA. A strength of the study was implementation of long term observation of the participants, and the use of many measurable tests. A limitations was that patients went to different rehabilitation clinics and did not see the same physical therapist. This caused the exact process of recovery to vary between patients, adding experimental variable to the study. Future studies should focus on the most effective way to strengthen the non-operated limb after TKA. Additionally, each physical therapist should have the same outline of which methods to use in rehabilitation.

REFERENCE

Zeni, J.A., & Snyder-Mackler, L. (2010). Early postoperative measures predict 1- and 2-year outcomes after unilateral total knee arthroplasty: Importance of contralateral limb strength. *Physical Therapy, 90(1)*, 43-54.

PARKINSON DISEASE: EXERCISE AND SELF-EFFICACY

A critique of the work of Ellis et al. (2011), "Factors associated with exercise behavior in people with Parkinson..." E. C. Fonken - efonken14@my.whitworth.edu - Whitworth University

PURPOSE

Exercise increases quality of life for people with Parkinson disease (PD). Researchers organized factors associated with exercise behavior in patients with PD. The purpose of the reviewed study was to explore which factors influenced the exercise habits of people with PD most (Ellis et al., 2011).

METHODS

Two hundred and sixty patients over age 40 with a PD diagnosis between Hoehn and Yahr (H&Y) stages one through four were placed in outpatient therapy for one year. Using the Stages of Readiness Questionnaire to find exercise habits, participants were split into two groups: exercisers and non-exercisers. Participants were evaluated with ten tests (see Table 1). Data was analyzed using two-

tailed independent *t* tests and chi-square tests.

Description of Tests Implemented

Test	Description
Physical Activity Scale for the Elderly (PASE)	Ten question survey of exercise of people 65 yrs. or older
Step Watch 3 Activity Monitor (SAM)	Monitor worn to capture free-living ambulatory activity
Unified Parkinson Disease Rating Scale (UPDRS)	Motor examination to quantify severity of disease
Comorbidities	Asked whether patient suffered from disease other than PD
Geriatric Depression Scale (GDS)	Thirty question self report instrument testing depression
Six-Minute Walk Test (6MWT)	Measured distance traveled walking all out for six minutes
Fall History	Quantified number of falls within the last six months
Parkinson's Disease Questionnaire-39 (PDQ-39)	Self report tool testing physical mobility in life situations
Physical and Environmental Factors	Self report on conditions and factors influencing health
Self-Efficacy for Exercise (SEE) Scale	Self report on patients' perceived ability to exercise

Table 1. Ten tests were used to evaluate factors influencing PD patients' exercise habits.

RESULTS & DISCUSSION

People with high self-efficacy were more likely to exercise regularly than those who scored low on the SEE. College education and age also influenced exercise habits while disability and physical restrictions did not. These factors had the greatest effect on exercise habits because they integrated both physical and psychological traits of patients in a holistic approach.

CRITIQUE

A PD patient's self-efficacy was the largest determining factor of whether the patient exercised regularly. The implementation of tests and the relatively large number of participants specific to the study were strengths of the study. Limitations arose in the cross-sectional nature of the study which diminished the ability to determine causal influences over time. Additionally, many of the tests were self-surveys with potential for inaccurately reported data. Future studies should be longitudinal and self-efficacy should be integrated into PD patient exercise programs.

REFERENCE

Ellis, T., Cavanaugh, J. T., Earhart, G. M., Ford, M. P., Foreman, K. B., Fredman, L., ... Dibble, L. E. (2011). Factors associated with exercise behavior in people with Parkinson disease. *Physical Therapy* 91(12), 1838-1848.

ALTERNATIVE MEDICINE BENEFITS IN HIV PATIENTS

A critique of the work of Chang et al. (2007), "The combined effect of relaxation response and acupuncture..." B. N. Fowler - bfowler14@my.whitworth.edu - Whitworth University

PURPOSE

Complementary and alternative medicine (CAM) treatments may improve the quality of life (QoL) for people who suffer from chronic diseases such as human immunodeficiency virus/acquired immune deficiency syndrome (HTV/AIDS). The purpose of this study was to look at the effects of a relaxation response (RR) in combination with acupuncture in improving the QoL in HTV/AIDS patients (Chang, Boehmer, Zhao, & Sommers, 2007).

METHODS

One hundred and nineteen HTV/AIDS patients who had received acupuncture treatments and had at least one of the predominant HTV-related symptoms were divided into an intervention group (N=58) and a control group (N=61). During acupuncture sessions that ranged from 45-60 minutes, the intervention group listened to audiotapes with instructions to stimulate a RR, which was followed by soft music, while the control group listened only to soft music. During a twelve-week period, three scales were used to measure QoL: the Medical Outcomes Study HTV health survey (MOS-HTV), the Functional Assessment of HTV Infection (FAHT), and the Functional Assessment of Chronic Illness Therapy-Spiritual Well-Being (FACIT-Sp). A paired *t* test was used to analyze the data.

RESULTS & DISCUSSION

Four categories showed changes throughout this study (see Table 1). The intervention group improved more than the control group ($p = 0.07$; see Table 2). An increase in QoL for the intervention group suggested that adding RR to acupuncture treatments may improve QoL for HTV/AIDS patients because they alleviated the HTV-related symptoms; whereas the increase in the control group's QoL could be attributed to the placebo effect of expected QoL improvement.

QoL Changes in These Categories	Paired t-Test Scores Evaluating QoL			
	EWB	PEACE	PHS	MHS
Emotional well-being (EWB)				
Peace/Spiritual (PEACE)				
Physical health summary (PHS)				
Mental health summary (MHS)				
	Intervention	$p = 0.0002$	$p = 0.02$	$p = 0.003$
	Control	$p < 0.01$	NA	NA

Table 2. Paired t test scores were used to represent QoL changes for both control and intervention groups.

Table 1. QoL changes showed the greatest improvements in these four areas.

CRITIQUE

The combination of RR and acupuncture treatments in HTV/AIDS patients may enhance QoL. This was the first study that examined the effects of two CAM techniques with potential synergistic effects. However, the study was limited as it was only conducted in one acupuncture clinic serving only low-income patients. Future studies should include various clinics to get a view of different populations suffering from HTV/AIDS.

REFERENCE

Chang, B.H., Boehmer, U., Zhao, Y., & Sommers, E. (2007). The combined effect of relaxation response and acupuncture on quality of life in patients with HIV: A pilot study. *The Journal of Alternative and Complementary Medicine*, 13(8), 807-815.

CONTAMINATION OF PHONES USED IN HOSPITALS

A critique of the work of Nikolic et al. (2011), "Bacterial contamination of mobile phones used in hospitals" B. N. Fowler - bfowler14@my.whitworth.edu - Whitworth University

PURPOSE

The objects that healthcare workers use could play a critical role in the spread of microorganisms, a problem seen in many hospitals today. The purpose of the study was to investigate bacterial contamination of mobile phones used in hospitals by healthcare workers in order to develop preventative measures (Nikolic, Arandjelovic, Stankovic, Krivokapic, 2011).

METHODS

This cross-sectional study used 280 mobile phones, which had been used for at least three months. The phones were sampled from both healthcare workers (N=210) and visitors at the healthcare facility (N=70). Each of the participants was asked to fill out a questionnaire, which discussed the use and hygiene of their mobile device. The participants' phones were then sampled with a swab moistened with saline and streaked onto two plates, a blood agar and an Endo agar. Gramstain, colony morphology, and biochemical tests were used after incubation to identify the species. A student's t -test was then used to analyze the data.

RESULTS & DISCUSSION

Nine different types of isolates were found on the 280 mobile phones examined. The non-healthcare showed a higher percentage of bacterial growth (85.7%) than the healthcare group (71.4%), however this was not a significant difference (see Table 1). The high level of contamination on mobile phones by both healthcare and non-healthcare workers suggested that there was not adequate knowledge in the handling on both the community and professional level.

Number of Isolates	Healthcare workers mobile phones (n=210)	Non-healthcare workers mobile phones (n=70)	p-value
No growth	60	10	
One specie	114	51	
Two species (spp.)	32	9	0.245
Three and more spp.	4	0	

Table 1. The number of microorganisms isolated on phones of health care and non-healthcare workers is summarized in this table.

CRITIQUE

There were high levels of contamination on mobile phones of healthcare and non-healthcare workers. This was the first study from Balkan countries to examine mobile phone contamination. The study was limited because it was done on a volunteer basis, which could have produced a bias in the results. Further studies should look at alternative ways to gather information other than questionnaires from the participants to prevent over-report behavior.

REFERENCE

Nikolic, M., Arandjelovic, M., Stankovic, A., & Krivokapic, L.J. (2011). Bacterial contamination of mobile phones used in hospitals. *Journal of Society for development in the new net environment in B&H*, 5(5), 1254-1259.

INCREASING OXYGENATION OF ISCHEMIC TISSUE

A critique of the work of Cabrales (2010), "Low oxygen-affinity hemoglobin solution increases oxygenation of..." P. K. Inouye - pinouye12@my.whitworth.edu - Whitworth University

PURPOSE

Increasing the oxygenation of partially ischemic tissue under acute anemic conditions can be used to reduce tissue hypoxia and death. The purpose of the reviewed study was to identify the role of low-affinity O₂ hemoglobin concentrations circulated during anemic conditions using the hamster chamber window model (HCWM) (Cabrales, 2010).

METHODS

Polymerized bovine hemoglobin (PBH) was used to facilitate transport of O₂ to chronic partially ischemic tissue of Golden Syrian hamsters massed at 55-65g. The study used the HCWM implant to observe the effects of PBH micro-vascular perfusion and oxygenation after a transfusion of 40% of the animal's blood was replaced with concentrations of PBH0, PBH4 and PBH13. The data was then analyzed using the Kruskal-Wallis test.

Gas Exchange and Transfusion Results

	Htc (%)	MAP (mmHg)	HR (bpm)	P _a O ₂ (mmHg)	P _a CO ₂ (mmHg)
Baseline	48.8 ±0.9	112±7	431±27	57.9±6.2	54.0± 5.2
PBH0	28.8±0.8	92±7	452± 36	72.7± 8.9	48.6±6.5
PBH4	29.1±0.7	110±8	433±34	68.7±6.8	50.2± 6.0
PBH 13	29.2± 0.7	126± 10	409± 30	74.7±8.1	44.8± 6.4

Table 1. Mean values ± standard deviation for hematocrit concentration (Hct%), mean arterial pressure (MAP), heart rate(HR), partial pressure of O₂ (P_aO₂) and partial pressure of CO₂ (P_acO₂) gathered using the HCWM.

RESULTS & DISCUSSION

The data from Table 1 shows that PBH13 restores the O₂ carrying capacity but, increased blood pressure and vasoconstriction when compared to PBH4 and PBH0. PBH4 was also able to increase the tissue of P_aO₂ and the arteriolar O₂ supply and extraction of partially ischemic tissue when compared to PBH0 and PBH13. The increase in the oxygenation was observed when using PBH4 concentrations between 1.4 g/dL and 3.7 g/dL. The results show the probable existence of an optimal concentration of PBH to increase oxygenation of partially ischemic tissue under anemic conditions.

CRITIQUE

The increase in the amount of O₂ supplied to ischemic tissue under anemic conditions suggests that an optimal concentration of PBH exists. The tests performed gave good data for a small study group. The placement of the observation windows allowed for direct comparisons between test subjects maximizing the accuracy of the study. However even with the data that was gathered a final PBH concentration for optimal O₂ supply could not be found, only that there is a suggested optimal concentration. Future research should include procedures to find the optimal PBH concentration that will maximize the supply of O₂ to partially ischemic tissue.

REFERENCE

Cabrales, P. (2010). Low oxygen affinity hemoglobin solution increases oxygenation of partially ischemic tissues during Acute Anemia. *Journal of American College of Surgeons*, 210, 271-279.

RUNNING ECONOMY BASED ON FOOTWEAR

A critique of the work of Perl et al. (2012), "Effects of footwear and strike type on running economy." M. R. Jarvis - max.jarvis@eagles.ewu.edu - Eastern Washington University

PURPOSE

Humans have evolved to run barefoot and have only recently seen the invention of a minimal shod running shoe, which has been shown to have no effect on barefoot running economy. Therefore, the purpose of the study was to determine whether relative cost of transport (COT), was affected by choice of footwear, comparing standard and minimal shod running shoes as well as strike type in terms of forefoot strike (FFS) and rearfoot strike (RFS; Perl, Daoud, & Lieberman, 2012).

METHODS

Thirteen male and two female subjects without major injuries or preconditions were selected for the study. Subjects selected were accustomed barefoot runners and considered physically fit. The shoes used included Asics Gel-Cumulus 10™ for a standard running shoe and Vibram FiveFingers™ for minimal shod shoes. To counteract weight imbalances between shoes, subjects ran the minimal shod trials with ankle weights. Subjects were instructed to run for approximately two minutes for habituation and determination of running frequency on a treadmill at 3.0 m/s. Subjects were connected to a respirometer and then performed four trials using a combination of the footwear and strike types listed above. Trials were run for at least five minutes with one of those minutes maintaining a steady volume of oxygen consumption. Five minute breaks were taken between trials. Each subject's COT was measured and statistical differences were calculated between shoe and foot strike type using an analysis of variance ($p < 0.05$).

RESULTS & DISCUSSION

Percentile differences between shoe types are shown in Table 1. During FFS, COT was 2.41% ($p < 0.03$) lower in minimal shod shoes than in standard shoes, while RFS COT was even lower in minimal shoes at 3.32% ($p < 0.002$). The reduction in COT for each running strike type was possibly due to increased elastic energy found in leg muscles, specifically in the foot and ankle.

Varying Cost of Transport in Minimal and Standard Shoes

	FFS	RFS
COT in ml Q ₂ /kg/min	-2.41% ±3.82%	-3.32% ±3.35%

 Table 1.

Percentage differences between minimal and standard shod shoes are summarized with means ± standard deviations.

CRITIQUE

Minimal shod running was slightly more economical than running in standard shoes regardless of strike type. Measuring different strike types, using ankle weights to equal the weight for both shoes, and determining and maintaining a specific running cadence all aided in validity. This study was limited by the size of the population studied. Further studies should incorporate a larger

subject sample to determine if larger populations would affect consistency of COT values.

REFERENCE

Perl, D. P., Daoud, A. T., & Lieberman, D. E. (2012). Effects of footwear and strike type on running economy. *Medicine and Science in Sports and Exercise*, in press. Epub ahead of print retrieved June 11, 2012 from <http://journals.lww.com/acsm-msse/pages/default.aspx>

EARLY ORTHOSES FOR DOWN SYNDROME INFANTS

A critique of the work of Looper and Ulrich (2010), "Effect of treadmill training and supramalleolar orthosis..." J. A. Kelly - jkelly14@my.whitworth.edu - Whitworth University

PURPOSE

Children with Down Syndrome (DS) display a delayed onset of walking. Treadmill training in pre-walkers and the use of orthoses in walking DS children are common therapies to progress the onset of walking and improve gait. The purpose of this study was to examine the effect of combining treadmill training and supramalleolar orthoses (SMOs) use in pre-walkers with DS (Looper & Ulrich, 2010). **METHODS**

Seventeen DS infants participated in this study. The study began at the time each participant could pull themselves into a standing position and concluded when three independent steps were taken. Participants were randomly assigned to a control or experimental group. Both groups received eight minutes of treadmill training five days per week. The experimental group also wore SMOs for eight hours per day, five days per week. Progress was measured monthly using the Gross Motor Function Measure (GMFM). T-tests were used for comparison between groups.

RESULTS & DISCUSSION

The average times for walking onset were 268 (control group) and 206 days (experimental group) with standard deviations (SD) of 88 and 109 days, respectively. There was no statistical significance between groups; however, the experimental group was slightly favored, which suggested a pronounced effect given a larger sample. Both groups improved in GMFM scores over time (see Table 1). Differences between groups in linear time x group interaction suggested different developmental processes. One month after walking onset, the control group scored 1.55 SD higher on the GMFM than the experimental group (see Table 1). This may have been because SMOs limited foot and ankle movement and were detrimental to skills such as balance.

GMFM Score Improvement Over Course of Study		
	Control Group	Experimental Group
GMFM Score at Entry (SD)	130.89(7.10)	148.40(9.08)
GMFM Score One Month After Walking Onset (SD)	195.67(8.12)	183.78(7.22)
Average Time in Study (SD)	268 (88) days	206 (109) days

Table 1. Both the control and experimental group showed GMFM score improvement over the course of the study.

CRITIQUE

The use of SMOs in DS pre-walkers detrimentally affected motor skill ability. This study was the first to examine the effect of SMOs use in DS infants, which is creditable. Frequent progress monitoring during the study highlighted different developmental paths between groups, which may have been overlooked with less observation. However, the small sample size and sample of convenience limited the study's statistical power. Future studies should use a larger sample size, add a SMOs only group, and begin earlier in development for more comprehensive observation.

REFERENCE

Looper, J., & Ulrich, D. A. (2010). Effect of treadmill training and supramalleolar orthosis use on motor skill development in infants with Down Syndrome: A randomized clinical trial. *Physical Therapy*, 90(3), 382-390.

BIOMECHANICS OF PUSH AND PULL MOVEMENTS

A critique of the work of Pearson et al. (2009), "Kinematics and kinetics of the bench-press and..." D. A. Koerner - daniel.koerner@eagles.ewu.edu - Eastern Washington University

PURPOSE

The purpose of the reviewed study was to understand the power-load relationship between upper body push and pull movements. This relationship directly affects how each muscle group should be trained (Pearson, Cronin, Hume, & Slyfield, 2009).

METHODS

Twelve elite-level male weight lifters participated in this study. The subjects' mean age and weight were 33.9(+ 5.5) years and 97.8(±12.5) kg. Each subject performed both the bench-press and bench-pull exercises on a modified Smith machine. First, each participant completed three to four self-determined warm-up sets of each exercise using progressively heavier loads. Once completed, each subject's one repetition maximum (1-RM) was found and power outputs were then determined at increasing intervals of 10% from 10% to 100% of each individual's 1-RM. Force and velocity were measured during the concentric phase only. The bench-press began about 30mm off of the subjects chest, while the bench-pull was started from a reinforced position. The findings of this study were analyzed by a two-tailed unpaired *t*-test where $\alpha < 0.05$.

RESULTS & DISCUSSION

Statistics showed little difference in power outputs between the two exercises at light loads, though as the load increased, power output for the bench-pull exponentially increased (see Table 1). The mean values of force output were higher on the bench-press exercise while velocity values were statistically greater for the bench-pull exercise. This resulted in velocity output for the bench-pull to be greater by 526% of the bench-press at 100% of the 1-RM and power output to be 442% higher (Pearson et al, 2009).

Mean Power Outputs for Bench-Press and Bench-Pull Exercises

Load (% of 1-RM)	10	30	50	70	90	100
Bench-Press	117 + 36	253 + 57	306 + 75	284 + 64	153 + 50	105 + 38
Bench-Pull	125 + 32	315 + 80	432 + 82	499 + 88	468 + 80	462 + 78

Table 1. Power outputs were measured in watts and are displayed as mean + standard deviation.

CRITIQUE

These results reinforced the idea that higher relative loads should be used when training upper body pull movements. The Smith machine used created some friction when lifting and therefore underestimated force outputs. For power lifters and bodybuilders, this study provided new training techniques which may give greater results. In future studies, free weights should be used to prevent friction that the Smith machine creates.

REFERENCE

Pearson, S. N., Cronin, J. B., Hume, P. A., & Slyfield, D. (2009). Kinematics and kinetics of the bench-press and bench-pull exercises in a strength trained sporting population. *Sports Biomechanics*, 8(3), 245-254. doi: 10.1080/14763140903229484

EFFECTS OF MUSIC THERAPY IN DEMENTIA PATIENTS

A critique of the work of Raglio et al. (2010), "Effects of music therapy on psychological symptoms and heart..." J. M. Loo - jlool3@my.whitworth.edu - Whitworth University

PURPOSE

Dementia is a cognitive impairment that severely affects social and behavioral functions. Music therapy (MT) is a non-pharmacological intervention used to treat behavioral and psychological symptoms (BPSD) associated with dementia. The purpose of the reviewed study was to assess if effects of MT on BPSD of patients with dementia are associated with changes in physiological parameters of heart rate (HR) and heart rate variability (ETRV) (Raglio et al., 2010).

METHODS

Twenty dementia patients were randomly assigned to MT treatment or standard care and were assessed pre- and post-intervention. Patients underwent neuropsychological assessment and HR and ETRV were monitored for 24 hours using an Electrocardiogram (ECG) Holter. Patients in MT treatment received two 30-min sessions a week for 15 weeks where they played rhythmic-melodic instruments. The control underwent educational and occupational activities. T test for paired samples was used for comparison in groups, with P values <0.05 considered significant.

RESULTS & DISCUSSION

After treatment, scores of all cognitive impairment evaluations and functional evaluation tests were unchanged in both MT and control groups. The depression sub-score of the Neuropsychiatric Inventory (NPI) significantly decreased after treatment for 50% of patients in the MT group (see Table 1). The beneficial effects of MT on behavioral and psychological symptoms may be due to the interaction between sonorous-musical instruments and the regulation of emotional components. The MT group also had an improvement of pNN50 in 50% of all patients. Sound and music may activate specific brain areas that affect the autonomic control of the heart, explaining the increased ETRV of MT patients.

Pre and Post-intervention Assessments		
	Before treatment	After treatment
Music therapy	17.1±11.6	14.8±7.3
-Depression sub-score	2.4±3.7	1.0±2.8
Standard care	11.4±7.8	13.9±8.6

Table 1. Means ± standard deviation of NPI scores before and after treatment in MT group and control group are summarized.

CRITIQUE

Long-term MT treatment may benefit patients with dementia, specifically by improving depression symptoms and increasing ETRV. This study was the first to investigate the relationship between MT and physiological parameters, which deserves merit. Limitations of the study include a small sample size, as well as the inability to strictly standardize each MT session. Future research should evaluate the effects of MT treatment on specific cardiovascular diseases.

REFERENCE

Raglio A., Oasi O., Gianotti M., Manzoni V., Bobs S., Ubezio M. C., Gentile S., Villani D., & Stramba-Badiale M. (2010). Effects of music therapy on psychological symptoms and heart rate variability in patients with dementia: a pilot study. *Current Aging Science*, 3(3), 242-246.

THERAPEUTIC YOGA AS SCHIZOPHRENIA TREATMENT

A critique of the work of Visceglia and Lewis (2011), "Yoga therapy as an adjunctive treatment for..." J. M. Loo -jl0013@my.whitworth.edu - Whitworth University

PURPOSE

Symptoms of schizophrenia are often aggravated by traumatic and stressful events. The purpose of the reviewed study was to investigate the effects of yoga therapy on the psychopathology and quality of life of schizophrenic adults in a state psychiatric facility (Visceglia & Lewis, 2011).

METHODS

Eighteen adult patients (12 men and 6 women) were assessed on quality of life and symptom severity (see Table 1) before and after intervention using the World Health Organization Quality of Life BREF (WHOQOL-BREF) and the Positive and Negative Syndrome Scale (PANSS). Patients were randomly assigned to the Yoga Therapy program (YT) or the Waitlist group (WL). For eight weeks the YT group received 45 minute yoga classes twice a week where they learned stretches, postures, breathing exercises and relaxation techniques. Sample *t* tests were performed on the calculated scores of patients' pre- and posttests with a fixed at 5%.

Pre-intervention Assessm	lents
--------------------------	-------

WHOQOL-BREF	YT:	WL:
-Physical Health	71.90±14.98	73.63±13.67
-Psychologic	46.20±24.54	66.63±18.91
-Social relationships	35.60±28.30	48.50±25.29
-Environment	53.90±15.91	54.75±20.55
PANSS total	85.10±19.82	78.50±20.91

Table 1. Means ± standard deviation of schizophrenic symptoms and quality of life in YT group and WL group are summarized.

RESULTS & DISCUSSION

In the YT group, patient PANSS scores significantly improved with a decrease of 25.2 points total. Thought disturbance was the only subscale that did not improve for the YT group. The quality of life (QOL) scores also improved for patients in YT, particularly the physical health and psychologic domains. In the WL group, QOL and PANSS scores remained unchanged. Patients in YT reported that movements and focused breathing were relaxing and the skills were useful in helping cope with other daily stressors.

CRITIQUE

Yoga therapy appeared to be a valid treatment option for schizophrenic patients. Even though yoga therapy did not improve thought disturbance in patients, therapeutic yoga classes could be beneficial when coupled with conventional psychiatric treatment. Patients were assessed using very thorough medical scales before and after treatment intervention, which was a strength of this study. Some limitations included a small sample size, along with the lack of an active control group to compare to the YT group. Future research design should include evaluation of specific yoga exercises that are most effective in reducing schizophrenic symptoms.

REFERENCE

Visceglia, E., & Lewis, S. (2011). Yoga therapy as an adjunctive treatment for schizophrenia: a randomized, controlled pilot study. *Journal of Alternative and Complementary Medicine*, 17(1), 601-607.

EXERCISE NOW MAY PREVENT OSTEOPOROSIS LATER

A critique of the work of Moghadasi and Siavashpour (2012), "The effect of 12 weeks of resistance training on..." A. G. Medlin - amedlin2008@eagles.ewu.edu - Eastern Washington University

PURPOSE

Osteoporosis is a skeletal disease that decreases the density of bones, which increases the risk of bone fractures. Exercise increases strength, and at a young age, could have a positive effect on bone metabolism density. More research needs to be done in this area. The purpose of the reviewed study was to examine how a 12 week resistance training program affected bone formation hormones in young, inactive women (Moghadasi & Siavashpour, 2012).

METHODS

Twenty, healthy, inactive, female volunteers, aged 25.3 ± 3.2 years, were randomly assigned to either a resistance training (RT) group ($n = 10$) or a control (C) group ($n = 10$). The RT group performed a weight training circuit 50-60 min per day, three days a week. The circuit consisted of eight stations where two to four sets of 8-12 repetitions were performed using 60%-80% of the one repetition maximum (1-RM), which was measured pre- and post- training. Paired t tests were used to compute mean changes in strength. Fasted, resting morning blood samples were taken and a two-way analysis of covariance was used to determine significant differences ($p < 0.05$) in the hormones pre and post exercise.

RESULTS & DISCUSSION

Significant increases ($p < 0.05$) in bone formation hormones were seen in the RT group. There were also significant increases in upper body and lower body strength after the 12 weeks in the RT

group (see Table 1). These results indicate that resistance training can cause strength gains and increases in hormones of bone formation, which may prevent osteoporosis later in life.

Strength Changes Pre- and Post-'		Testing	
C		RT	
Exercise	Pre	Post	Post
Chest Press	21.2 ±6.3	21 ±6	20 ±5.6
Leg Press	54.2 ±11.3	54 ± 10	51.4± 9.3
			46.1 ±6.8
			61.8±9

Table 1. Maximal strength values for upper and lower body, pre- and post- testing, were measured for both groups and are shown as mean ± standard deviation.

CRITIQUE

The results showed a significant, positive increase in bone formation hormones in the RT group when compared to the control group. The duration of exercise was an advantage to the reviewed study because it gave significant time for hormones to change and adapt to the training load. However, baseline bone density had not been measured and could not be compared to bone density values at the end of the study. Future research should determine baseline and final bone density in order to study how an increase in bone formation hormones would affect bone density.

REFERENCE

Moghadas, M., & Siavashpour, S. (2012). The effect of 12 weeks of resistance training on hormones of bone formation in young sedentary women [published online ahead of print May 5, 2012]. *European Journal of Applied Physiology*, doi: 10.1007/s00421-012-2410-0

MRI FINDINGS IN LUMBAR DISKS OF DANCERS

A critique of the work of Capel, et al. (2009), "Magnetic resonance study of lumbar disks in female dancers..." J. M. Newberg -jnewbergl4@my.whitworth.edu - Whitworth University

PURPOSE

Competitive dancing for an extended period of time can cause strain on the disks of the lumbar spine. The purpose of the reviewed study was to analyze the development of degenerative diskopathy in female dancers in comparison to asymptomatic, nonathletic females in the same age group (Capel, Medina, Medina, & Gomez, 2009).

METHODS

Forty female dancers from 18 to 31 years of age underwent MRI of the lumbar spine. They were compared with a control group of 20 women in the same age group. In a cross-sectional study, a descriptive analysis was done and the two groups were compared by contingency table analysis using a Pearson-chi square test.

RESULTS & DISCUSSION

Nine out of the 20 women in the control group (45%) had disk degeneration. This number shows ($\chi^2=0.892$) that competitive dancing doesn't put enough strain on the lumbar disks of the spine to cause degenerative diskopathy. Of the 100 disks explored, there were only 12 degenerated in the control group compared with 21 of the 200 disks studied (10.5%) in the dancer group (see Table 1). The chi-square test resulted in 0.153, therefore dancing cannot be considered a leading factor for disk degeneration in women.

Degenerated Disks Findings in Competitive Dancers and Non-dancers

	Controls (20 Women)	Dancers (40 Women)
LI-2		0
L2-3		5
L3-4		5
L4-5		25
L5-S1		25

Grade, n (%)	
I	2(16.6)
II	4 (33.3)
III	6(50)
IV	0

0
2.5
10
12.5
27.5
4(19)
8(38)
9(43)
0

Table 1. The percentage of degenerated disks and percentage of degenerated disks examined at each lumbar level and number and percentage for each grade of degeneration in both controls and dancers.

CRITIQUE

Twelve degenerated disks were detected in the control group (out of 100 disks examined) and 21 were detected in the dancer group (10.5% of 200 disks examined). A strength was that dancers of different styles were studied (ballet and flamenco). A limitation of the study was that only females were studied. Future research should include testing male dancers as well as testing tap dancers.

REFERENCE

Capel, A., Medina, F., Medina, D., & Gomez, S. (2009). Magnetic resonance study of lumbar disks in female dancers. *American Journal of Sports Medicine*, 37(6), 1208-1213.

YOGA BENEFITS, BARRIERS, AND CUES

A critique of the work of Atkinson and Permuth-Levine (2009), "Benefits, barriers, and cues to action of yoga..." D. A. Olson - dolson14@my.whitworth.edu - Whitworth University

PURPOSE

Yoga is a 3000 year-old discipline that focuses on quieting the mind. Yoga is recognized as mind-body medicine and integrates physical, mental, and spiritual components. The purpose of the reviewed study was to explore benefits, barriers, and cues for yoga among those who practice and those who do not (Atkinson & Permuth-Levine, 2009).

METHODS

Fifty heterogeneous participants were separated into six focus groups as 1) never practiced yoga, 2) practiced less than once a year, and 3) practiced more than once a year. The focus groups averaged eight participants of men and women with 10%-30% minorities. The four groups with yoga practitioners (n=36) were 85% female. For persons who never practiced yoga (n=14), 50% were women and the age ranged from 22 to 59. The Health Belief Model was the theoretical foundation of inquiry for which the investigators developed two moderators' guides. Then the focus groups were asked questions, and responses were audio taped and recorded. One guide was used for both groups of yoga practitioners and another for the group that never practiced yoga. The authors used a qualitative research design for data analysis.

RESULTS & DISCUSSION

All groups agreed on the perceived benefits (see Table 2) including health promotion and wellness, disease prevention, and social & psychological benefits. The perceived barriers (see Table 1) were more varied in responses between current practitioners and those who had not tried yoga. The perceived barriers were time, costs, negative preconceptions, and negative health effects. These results were obtained by the answers that were given by the participants and then inserted to a chart.

Perceived Barriers Expressed by Discussants

Negative Health effects • Negative Preconceptions
 Costs • Time

Table 1. Barriers to yoga practice.

Perceived Benefits Expressed by Discussants

• Health Promotion and Wellness • Social and Psychological Benefits
 • Disease Prevention

Table 2. Benefits to yoga practice.

CRITIQUE

The results from this study show that yoga is a great tool for overall health, but results vary from person to person. A strength of the study was that the practice of yoga was generally perceived as beneficial. However, the study did not represent a random sample of participants. The participants were largely upper-middle class and female, so lower income and male groups were not equally represented. In future research, the study should try to obtain statistical results that show the benefits and barriers, instead of just opinions of the participants. Results can be obtained by calculating the number of responses and giving percentages of them.

REFERENCE

Atkinson, N. L., & Levine, R. P. (2009). Benefits, barriers, and cues to action of yoga practice: A focus group approach. *American Journal of Health Behavior, 33*(1), 3-14.

ELBOW FLEXION EFFECTS IN PITCHING LEVELS

A critique of the work of Fleisig et al. (2009), "Variability in baseball pitching biomechanics among various..." B. T. Piek - bpiek@eagles.ewu.edu - Eastern Washington University

PURPOSE

With higher coordination of the body in pitching, there is a possibility for less biomechanical variability and vice versa. The purpose of the reviewed study was to compare pitching biomechanics between different baseball competition levels (Fleisig, Chu, Weber, & Andrews, 2009).

METHODS

Ninety-three healthy male baseball pitchers were split into five categories based on their level of competition: youth (n = 20), high school (n = 19), college (n = 20), Minor League (n = 20), and Major League (n = 14; see Table 1). Reflective markers were placed on 15 bony landmarks. Once warm, participants were instructed to throw ten to 15 pitches. The five fastest pitches thrown for strikes were then analyzed. The researchers took maximum (max) elbow flexion and analyzed it between the groups (see Table 1). An analysis of variance (ANOVA) was used to find significant differences. Fisher's least significance difference test was then used after the ANOVA to tell which pairs had significant differences ($P < 0.05$).

A	ge, Experience, and Max Elbow Flexion		
	Age	Pitching Experience	Max Elbow Flexion (°)
Youth	13.6 ± 1.1	4.90 ± 1.8	1.9±0.7
High School	16.8± 1.1	6.30 ±2.4	1.8±0.8
College	20.5 ± 1.1	10.1 ±3.4	1.5 ±0.7
Minor League	20.8 ± 1.6	9.10± 4.1	1.4 ±0.7
Major League	27.6 ±3.4	15.9±5.6	1.1 ±0.4

Table 1. This table shows pitcher characteristics (years) in the levels of competition and max elbow flexion in degrees (mean ± standard deviation).

RESULTS & DISCUSSION

Within the five levels of pitchers, max elbow flexion did show significant differences ($P = 0.003$). Variability was significantly different between youth and Minor League, youth and Major League, high school and Minor League, high school and Major League, and college and Major League. This was based on teaching consistency and pitching repetition. This meant that muscle memory and pitching biomechanics were related to the pitchers level of competition.

CRITIQUE

The study showed that, significant differences were based upon the variability in the competition levels. Improvements in max elbow flexion increased in consistency or decreased in variability from youth to high school. When the level got higher, variability plateaued. Having more pitches thrown would have allowed for a wider range of data to be used. Also, pitch speed in relation to distance from the mound to home plate, having different pitch types and pitcher mechanics like overhand, side armed, or submarine could be suggestions for future research.

REFERENCE

Fleisig, G., Chu, Y., Weber, A., & Andrews, J. (2009). Variability in baseball pitching biomechanics among various levels of competition. *Sports Biomechanics*, 8(1), 10-21. doi: 10.1080/14763140802629958

INTERNAL FIXATION OF HUMERAL FRACTURES

A critique of the work of Raghavendra and Bhalodiya (2007), "Internal fixation of fractures of the shaft of the..." C. E. Rahn - crahn13@my.whitworth.edu - Whitworth University

PURPOSE

Internally fixating fractures of the humerus may be effective in stabilization while healing. The purpose of the reviewed study was to determine which implants for internal fixation would be most effective with different humeral fractures (Raghavendra & Bhalodiya, 2007).

METHODS

Thirty-six patients went through operations on acute fractures; half operated with compression plating and half operated with interlock nailing. The patients were observed for 12 to 24 months. Following operation, each patient was required to do active shoulder and elbow mobilization exercises. Patients were evaluated periodically, assessing union of bones and checking for complications. Outcome criteria (see Table 1) were used to evaluate each patient. The data was analyzed with student's t-test and nonparametric tests.

Outcome Criteria				
Criteria	Excellent	Good	Fair	Poor
Union	Uneventful	Uneventful	Secondary Procedure	No union
Radial nerve palsy	None	Temporary	No recovery	Additional procedure needed
Joint Movement	Normal	Over 75%	50 to 75%	Less than 50%

Table 1. Full and successful recovery of a fracture is based on different criteria that all greatly affect the outcome.

RESULTS & DISCUSSION

Both groups of patients achieved union by the end of the study and a majority of the patients achieved union within one year of operation. Although both groups had full union of their fractures, those in the plating group achieved union within 25.9 weeks compared to the 34.6 weeks that it took patients of the nailing group to achieve union. Those treated with nailing took longer to heal because they underwent more secondary bone grafting procedures. Those with interlock nailing also had significant restriction of shoulder movement because of how the nails were placed in the humerus. There was little or no restriction of motion of the elbow range in either group. Patients of the plating group reported to have excellent or good overall results more frequently.

CRITIQUE

Both compression plating and interlock nailing were found to be effective in helping the union of humeral fractures. However, compression plating allowed for quicker union and less likelihood of additional procedures. The strength of this investigation is that it has shown that compression plating is more likely than interlock nailing to have good results. The types of humeral fractures that patients had were not specified, which may have affected the results. Future research should focus on how compression plating may affect the union of different types of fractures.

REFERENCE

Raghavendra, S. & Bhalodiya, H. P. (2007). Internal fixation of fractures of the shaft of the humerus by dynamic

compression plate or intramedullary nail: A prospective study. *Indian Journal of Orthopaedics*, 41(3), 214-218.

SLEEP EFFECTS ON MEMORY

A critique of the work of Lahl and Pietrowsky (2006), "Does the "sleep effect" on memory depend of sleep or on..." A. A. Reardon - reardonA10@hotmail.com - Whitworth University

PURPOSE

The purpose of the reviewed study was to test if participants showed better retention results after nocturnal sleep (sleeping during the night), nocturnal wakefulness (awake during the night) or diurnal wakefulness (awake during the day) using the constant circadian factors (Lahl & Pietrowsky, 2006).

METHODS

There were 40 students who participated; 21 females and 19 males. Subjects were not allowed to smoke, consume alcoholic beverages and psychoactive medications, and other possible sleep disturbances within the last 4 weeks before the experiment. Participants were also unable to nap 12 hours prior to the experiment. Each group of students was given the same tests and same 7 hour retention period without sleep, but at different times of the day. Sleep recordings were analyzed and compared to the standard criteria and various memory tests were performed on each student.

RESULTS & DISCUSSION

The results showed that retention and learning were not affected by the amount of sleep the participants obtained. However, subjects in the Wake/Night condition demonstrated the expected rise in sleepiness over night. On average, they felt "foggy" and lost interest in staying awake. Whereas subjects in the Sleep/Night condition felt awake but relaxed and not fully alert. As expected, the Wake/Day subjects were functioning at a high level and were able to concentrate. Even though sleep deprived subjects did not get as much sleep and showed severe levels of drowsiness, they showed recall levels comparable to those who were not sleep deprived.

Analyzing Memory & Recall Procedures

Computer Learning/Recall Test

Memory Trial Pre-Sleep

Deprivation

Learning Trial

Wake/Day

Memory Trial Post-Sleep Deprivation

Wake/Night

Sleep/Night

Table 1. Tests used within the experiment measured levels of items recalled, response rates, and sleepiness of patients.

CRITIQUE

The number of participants was an efficient amount for the test results. However, different and more specific tests could have been used to make the study more clear and also get more accurate results. Many people do not think about the effect of the amount of sleep they have acquired. For college students especially, the amount of sleep correlates with how successful one is. To further the subject for future studies, researchers should test the effect of sleep on the body both physically and mentally.

REFERENCE

Lahl, O., & Pietrowsky, R. (2006). Does the "sleep effect" on memory depend on sleep or night time. *Sleep and Hypnosis*, 8(2), 61-70.

VIBRATION DECREASES BONE AND MUSCLE LOSS

A critique of the work of Armbrrecht et al. (2009), "Resistive vibration exercise attenuates bone and muscle..." A. K. Vyakhk - annikavahk@yahoo.com - Eastern Washington University

PURPOSE

Research has shown that a sustained period of bed rest decreases certain body functions; this

effect is mainly seen in the loss of muscle and bone mass. The purpose of the study was to investigate if resistive vibration exercise (RVE) prevents bone mass loss and increases bone creation (Armbrecht et al, 2009).

METHODS

For eight weeks, 20 male participants were confined to bed rest. Subjects were either in a control group (CTRL) (mean±(SD) age=33.4±6.6 years) or RVE group (age=32.6±4.8 years). The dual X-ray absorptiometry (DXA) was used to gather bone and muscle mass values for the entire body, excluding the head, before bed rest and on random days throughout the study (Days - 18, 31, 44, & 55). In the analysis of variances (ANOVA) of the body composition DXA data was used, p values at 0.05 or less were considered statistically significant.

RESULTS & DISCUSSION

Osteoclast activity increased in the CTRL group more than in the RVE group. Creation of bone increased in the RVE group and decreased in the CTRL group (p=0.0001). Overall, after 56 days of bed rest, the CTRL group showed a larger decrease in total bone mass compared to the RVE group (see Table. 1).

Total Bone Mass Throughout Bed Rest		
<u>Study day</u>	<u>CTRL Group</u>	<u>RVE Group</u>
Baseline	2,423.9 g (128.7 g)	2,401.3 g (128.7 g)
BedRest-18	2,422.0 g (11.4 g)	2,406.4 g (14.0 g)
Bed Rest-31	2,408.3 g (7.5 g)*	2,393.4 g (10.9 g)
Bed Rest-44	2,396.6 g (10.1 g)	2,378.5 g (9.9 g)*
<u>Bed Rest-55</u>	<u>2,396.2 g (9.7 g)</u>	<u>2,387.4 g (10.4 g)</u>

Table 1. The dual X-ray absorptiometry measurement gave identical values for both groups' baseline. Values of significance are shown in *p<0.05.

CRITIQUE

Armbrecht and colleagues (2009) provided beneficial data on the decrease of bone mass during prolonged bed rest. Along with the study, the researchers ensured successful recovery by following the subject up to 12 months after completion. Absence of the dietary aspect was a limitation to the study; differences in the diets could have affected the data. Further research should consider two RVE groups, one at a low frequency and the other at a high frequency to see if these changes differ in data. The findings can provide a new approach when dealing with deterioration in seniors or coma patients that are bed ridden.

REFERENCE

Armbrecht, F., Belavy, D. L., Gast, U., Bongrazio, M., Touby, F., Beller, H. J., ... Felsenberg, D. (2009). Resistive vibration exercise attenuates bone and muscle atrophy in 56 days of bed rest: Biochemical markers of bone metabolism. *Osteoporosis International*, 21, 597-607.

DRUGS AND MENTAL HEALTH IN THE MILITARY

A critique of the work of Bray and Pemberton. (2010) "Substance use and mental health trends among..." E. T. Watt - ewatt13@whitworth.edu - Whitworth University

PURPOSE

In the U.S. military many service men and women suffer from substance abuse and mental health issues including stress, depression and anxiety. The purpose of the reviewed study was to examine substance use and mental health issues among U.S. military personnel from 1980 to 2008 (Bray & Pemberton, 2010).

METHODS

A survey was created to examine substance use and mental health among U.S. military personnel. Then, the survey was sent to 40,436 active duty personnel from all branches of the military and

64 installations across the world. No ROTC cadets, recruits, or combat deployed personnel were sampled. Of the 40,436 that were sampled, only 28,546 completed the survey (70.6% response rate). Completed surveys were administered by civilian researchers on-site and data collection was anonymous.

RESULTS & DISCUSSION

Survey responses for cigarette use, illicit drug use, and heavy alcohol use are summarized in Table 1. Notably, illicit drug use declined sharply from 1980 to 2002, but increased in 2008. It was presumed that illicit drug increased in 2008 due to changes in the wording of the survey and the addition of prescription drugs to this category. With regard to mental health, stress at work decreased from 2002 to 2008. However, being away from home was still the worst perceived stressor. Depression reportedly declined since the first survey was conducted in 1980 and apparently did not change whether respondents were deployed or not. Lastly, anxiety levels have apparently remained steady for deployed personnel.

Survey Category	1980	1982	1985	1988	1992	1995	1998	2002	2008
Cigarette Use	52%	53%	47%	41%	37%	35%	30%	36%	30%
Illicit Drug Use	24%	19%	9%	4%	3%	3%	2%	3%	11%
Heavy Alcohol Use	21%	23%	22%	19%	17%	19%	17%	18%	20%

Table 1. Cigarette and illicit drug use demonstrated trends for decreased use since 1980, although heavy alcohol use remained similar.

CRITIQUE

Strengths of this study included the detail and size of the survey, and the large sample population. A weakness of the study was that combat-deployed personnel were not sampled. Combat deployed personnel are at the greatest risk for cigarette, drug, and alcohol abuse, misuse, and addiction. In addition, they are under extreme stress during combat deployment. An additional limitation was that self-perceived levels of stress were reported, which have the potential to be inaccurate. Further research in this area should utilize an improved system for stress reporting and should include combat deployed personnel.

REFERENCE

Bray, R., & Pemberton, M. (2010). Substance use and mental health trends among U.S. military active duty personnel. *Military Medicine*, 175(6), 390.

CHILDREN CROSSING ROADS: DANGEROUS?

A critique of the work of Tabibi & Pfeffer (2007). "Finding a safe place to cross the road: The effect of..." C. Woytovech - lucklucky7@yahoo.com - Washington State University

PURPOSE

The purpose of this study was to identify the ability in children to examine safe or dangerous road-crossing sites. The focus of the study was attention span and ability to identify appropriate street crossing sites. Tabibi and Pfeffer (2007) related safety of children to attention and decision making that occurred during brief moments under conditions of multiple, distracting stimuli.

METHODS

The study employed a total of 117 participants, 88 children (6-7 years, 8-9 years, and 10-11 years) and 29 adults over 21 years of age. The instrumentation used was a computer-presented task that showed street scenes for which they made crossing decisions. The participants were tested on selective and divided attention (see Table 1).

Testing During Experiment

Selective Attention Divided Attention

With on-screen distracters

Without distracters With off-

Table 1. Safe crossing sites were selected by children 8-9 years old that were able to divide attention (Tabibi & Pfeffer, 2007).

RESULTS & DISCUSSION

Children with poor ability in selective attention (6-7 years of age), identified fewer safe or dangerous road-crossing sites in the on-screen distracters test. For children 6-7 years of age with high ability to divide attention, a greater number of safe or dangerous road-crossing sites were identified in the off-screen distracters test. The study demonstrated that high ability to divide attention positively affected identification of safe or dangerous road crossing sites.

CRITIQUE

Participants were not told that distracters would be present. The surprise when distracters occurred resulted in a more real effect. The procedure used, and the controlled experimental conditions, focused attention on the immediate task. Teaching children to affectively divide attention could increase safe choices when crossing roads. But, only two distracter types were used during the experiment (auditory and on-screen visual). Future research should reflect multiple real world distracters present in the environment.

REFERENCE

Tabibi, Z. & Pfeffer, K., (2007). Finding a safe place to cross the road: The effect of distracters and the role of attention in children's identification of safe and dangerous road-crossing sites. *Infant and Child Development*, 16(2), 193-206.

LITERATURE REVIEW ABSTRACTS

PHYSICAL INACTIVITY AND TEAM CLIMATE

J. G. Balaban — julia.balaban@email.wsu.edu — Washington State University

ISSUE

Numerous health risks were associated with the culture and the climate of an inactive lifestyle (Ntoumanis & Biddle, 1999). Positive team climate in sport predominately was based on the atmosphere of social relationships and motivation gained through social interaction (Powell, Slater, & Chaloupka, 2004). The purpose of this paper was to explore the concept of team climate as an indicator of physical activity and physical inactivity.

OVERVIEW

Children and adults were attracted to physical activity because of an internal desire to be active (Zahariadis & Biddle, 2000). Parents who participated in physical activity influenced internal desire in children and affected activity levels (Weiss, 2000). The TARGET acronym (task, authority, recognition, grouping, evaluation, and time) indicated that cognitive components were critical in team climate (see Table 1; Ntoumanis & Biddle, 1999).

Critical Issues in Team Climate

TARGET	Mastery	Performance
Tasks	Challenges	Absence of Challenge
Authority	Leadership	No Decision-Making
Recognition	Progress	Social Comparison
Grouping	Peer Interaction	Basis of Ability

Evaluation	Mastery Tasks	Outperforming Others
Time	Personal Capability	Uniform Learning

Table 1. Both mastery and performance affected team climate.

CONSIDERATIONS

The strength of this review was in the easily remembered 'TARGET' acronym which organized multiple components of team climate. Motives for encouraging positive team climate included fun, sociability, and skill development (Zahariadis & Biddle, 2000). Future research should be encouraged to explain team climate related to physical inactivity.

REFERENCES

- Ntoumanis, N. & Biddle, S. (1999). A review of motivational climate in physical activity. *Journal of Sports Sciences*, 17(1), 643-665. Powell, L., Slater, S., & Chaloupka, F. (2004). The relationship between community physical activity settings and race, ethnicity and socioeconomic status. *Open Mind Journals Limited*, 1(2), 135-144. Weiss, M. (2000). Motivating kids in physical activity. *Physical Fitness and Sports*, 3(11), 1-6. Zahariadis, P. & Biddle, S. (2000). Goal orientations and participation motives in physical education and sport: Their relationship in English school children. *The Online Journal of Sport Psychology*, 2(3), 1-9. Retrieved from <http://www.athleticinsight.com/Vol2Iss1/EnglishPDF.pdf>, during summer 2012.

INSPIRATORY MUSCLE TRAINING ON ATHLETES

K. A. Brandt - kbrandt13@my.whitworth.com - Whitworth University

ISSUE

Coaches, athletic trainers, and others have debated on how to train athletes for endurance performances. Different levels of intensity training have attempted to increase muscle performance. In the reviewed studies, they observed people with cystic fibrosis. Inspiratory muscle training (IMT) was a new technique that was becoming popular with athletes. The IMT benefited an athlete in respect to lung capacity, exercise capacity and power output.

OVERVIEW

Inspiratory muscles should respond to training in the same manner as locomotor muscles if correct the physiological load was applied (Enright & Unnithan, 2011; Enright et al, 2006). Peak pressure of 80% intensity has been shown to increase lung capacity (see Table 1; Enright & Unnithan, 2011). Inspiratory muscle training (IMT) has been used, both clinically and experimentally, to show the improvement in exercise performance as well as increase in functional capacity (Fregonezi et al, 2009). During the experiment, participants developed a learned response, which attributed to improved neuromuscular recruitment patterns. Also, when trained at 80% of maximal efforts the learned response indicated an increased ability of the inspiratory muscle in the thoracic cavity.

		Inspiratory Muscle Training		P(Ti me & Group)
		Before Training	After Training	
	Vital Capacity (VC) L	4.1	4.4	<0.05
	Total Lung Capacity (TLC) L	5.7	6.1	<0.05
■	Maximum Inspiratory Pressure (MIP) cm H ₂ O	90		<0.01
	Sustained Maximum Inspiratory Pressure (SMIP)	504	688	<0.01

Table 1. The results shown are taken from an eight-week program of IMT with maximal effort at 80%.

CONSIDERATIONS

Individuals who used the IMT at a set consistent level with an appropriate load demonstrated improved inspiratory muscle strength (MIP) and endurance (SMIP) (see Table 1; Enright et al, 2006). These results were correlated with increased lung volume, diaphragm thickness and improved exercise capacity. However, researchers had a lack of workload control. Researchers found that 80% of maximal effort resulted in an increase in MIP and SMIP, etc., but 40% of maximal effort could not show effective outcomes (Enright & Unnithan, 2011). In the future, researchers would benefit the strength of the study by looking at the functional outcomes of 40%

maximal effort.

REFERENCES

- Enright, S. J. & Unnithan, V. B. (2011). Effect of inspiratory muscle training intensities on pulmonary function and work capacity in people who are healthy: a randomized controlled trial. *Research Report, 91(6)*, 894-905.
- Enright, S. J., Unnithan, V. B., Heward, C., Withnall, L. & Davies, D. H. (2006). Effect of high-intensity inspiratory muscle training on lung volumes, diaphragm thickness, and exercise capacity in subjects who are healthy. *Research Report, 86(3)*, 345-354.
- Fregonezi, G. A. F., Azevedo, I. G., Araujo, T. L., Dias, F. A. L. & Resqueti, V. R. (2009). Adaptation of the threshold IMT with double spring load allows higher inspiratory pressure for muscle training. *Clinical Physiology Functional Imaging, 29(6)*, 462-464.

EFFECTS OF MUSIC ON EXERCISE PERFORMANCE

T.M. Esqueda - tesquedal3@my.whitworth.edu - Whitworth University

ISSUE

Athletes often use music during exercise for motivation and performance enhancement. Testing outcomes have been mixed as a result of not being able to control the environment. However, studies tend to lean positively toward the use of fast rhythm music (FRM) during exercise. Effects of music on exercise performance include fast versus slow rhythm music, anaerobic versus aerobic exercise, and efficiency in terms of wattage (W) versus heart rate (HR) ratio.

OVERVIEW

Listening to FRM while on a cycling ergometer was shown to increase power in comparison to slow rhythm music (SRM) (Szabo, Small, & Leigh, 1999; Brooks & Brooks, 2010). The addition of music to exercise on a cycling ergometer seemed to correspond with a higher efficiency ratio (W/FTR), with one outlier (Brooks & Brooks, 2010; Szabo et al, 1999; Yamamoto et al, 2003). Brooks and Brooks (2010) compared aerobic and anaerobic exercise with music. Improved performance was found in aerobic testing; anaerobic testing was inconsistent and required more data as seen in Table 1.

	Aerobic Exercise Avg. Workload	Anaerobic Exercise Avg. Workload
No Music	193.75 W	525 W
Fast Rhythm Music	191.67 W	602.5 W
Slow Rhythm Music	189.58 W	520 W
Fast -^ Slow Rhythm Music	193.75 W	-
Slow -^ Fast Rhythm Music	203.13 W	-

Table 1. Mean workload (Watts) in two different types of exercise showed an affinity for music with a fast rhythm and a change in rhythm during exercise.

CONSIDERATIONS

Even with a lack of consistent positive effects of music on exercise, there were no negative effects in the research. A limitation was that Yamamoto et al. (2003) reported no change in performance in similar settings. However, most research reported that the addition of FRM to aerobic exercise on a cycle ergometer improved W. Music's effects on anaerobic testing should be further evaluated along with the influence of motivational music and frequency of exercise. There were no adverse effects found; therefore the use of music with exercise should only be used on a personal preference basis.

REFERENCES

- Brooks, K., & Brooks, K. (2010). Enhanced sports performance through the use of music. *Journal of Exercise Physiology, 13(2)*, 52-51.
- Brooks, K., & Brooks, K. (2010). Difference in Wingate power output in response to music as motivation. *Journal of Exercise Physiology, 13(6)*, 14-20.
- Szabo, A., Small, A., & Leigh, M. (1999). The effects of slow- and fast-rhythm classical music on progressive cycling to voluntary physical exhaustion. *Journal of Sports Medicine and Physical Fitness, 39(3)*, 220-220-5.
- Yamamoto, T. T., Ohkuwa, T. T., Itoh, H. H., Kitoh, M. M., Terasawa, J. J., Tsuda, T. T., & Sato, Y. Y.

(2003). Effects of pre-exercise listening to slow and fast rhythm music on supramaximal cycle performance and selected metabolic variables. *Archives of Physiology & Biochemistry*, 111(3), 211-214.

OBESITY AND AGGRESSION

A. A. Gengnagel — adrienne.gengnagel@email.wsu.edu — Washington State University

ISSUE

Obesity and aggression were interrelated. The relationship was influenced by social, psychological, and biological factors. Inversely, biological response to stress led to weight gain and aggression (see Figure 1).

Obesity and Aggression

Aggression
Obesity

Figure 1. Obesity and aggression shared an indirect, cyclic relationship.

OVERVIEW

Viewing aggression during childhood doubled odds of obesity in adulthood (Rohde, Ichikawa, Simon, Ludman, Linde, Jeffery, & Operskalski, 2008). Depression from aggression was linked to emotion-based coping strategies such as binge eating (Greenfield & Marks, 2009). Stress led to Cortisol release from the hypothalamic-pituitary-adrenal axis (Rudolph, Troop-Gordon, & Granger, 2010). Cortisol release increased hunger and fat storage, which ultimately led to weight gain. Negative stigmas were attached to obese populations such as unhealthy, lazy, and incompetent. Often, societal stigmas led to low self-esteem, sadness, and nervousness (Strauss, 2000). Social, biological, and psychological factors influenced aggression and obesity.

CONSIDERATIONS

Individual differences may have varied. Results differed between males and females. Negative stigmas for obesity were targeted more at women than men. Females were more affected by mood, especially depression. Future studies should take into consideration gender and personal health history.

REFERENCES

- Greenfield, E. A. & Marks, N. F. (2009). Violence from parents in childhood and obesity in adulthood: Using food in response to stress as a mediator of risk. *Social Science and Medicine*, 68(5), 791-798. Retrieved from <http://aging.wisc.edu/pdfs/2277.pdf>, on May 15, 2012.
- Rohde, P., Ichikawa, L., Simon, G. E., Ludman, E. J., Linde, J. A., Jeffery, R. W., & Operskalski, R. H. (2008). Associations of child sexual and physical abuse with obesity and depression in middle-aged women. *Child Abuse and Neglect*, 32(9), 878-887. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/18945487>, on May 15, 2012.
- Rudolph, K. D., Troop-Gordon, W., & Granger, D. A. (2010). Peer victimization and aggression: Moderation by individual differences in salivary Cortisol and alpha-amylase. *The Journal Abnormal Child Psychology*, 38(6), 843-856. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/20405198>, on May 15, 2012.
- Strauss, R.S. (2000). Childhood obesity and self-esteem. *Pediatrics*, 105(1), e15. Retrieved from <http://pediatrics.aappublications.org/content/105/1/e15.short>, on May 15, 2012.

OBESITY AND EXTRINSIC MOTIVATION

S. J. Hinkle - stephanie.hinkleOO@email.wsu.edu - Washington State University

ISSUE

A person battling obesity had to overcome the societal pressures of extrinsic motivation to find true satisfaction in improved health. Extrinsic motivational factors were not enough to satisfy a

OVERVIEW

All three studies relied primarily on intake logs to determine EI of participants (Beidleman et al, 1995; Christensen et al., 2002; Fudge et al, 2006). Fudge et al. (2006) ensured accuracy by weighing food intake. Christensen et al. (2002) used 24-hour recall interviews to verify participants were maintaining regular EL Elite runners tended to lose body mass and be at a -AE (Beidleman et al., 1995; Christensen et al, 2002; Fudge et al., 2006) (see Table 1). Beidleman et al. (1995) concluded although runners' EE was higher, their overall efficiency was lower than control subjects. However, Christensen et al. (2002) concluded athletes were eating enough to sustain healthy peak performance.

Energy and Body Mass			
Averages	Beidleman	Christensen	Fudge
AE (kJ/d)	-4131	-24	-1370
ABM (kg)	-.48	.7	07 18.4
BMI	omitted	18.8	

Table 2. Average E, body mass differences, and in body mass index of runners are listed.

CONSIDERATIONS

These studies were useful because they provided extensive dietary intake records on numerous subjects (female and male, 15-34 years-old). For future studies, the weighed dietary intake model would ensure the most accuracy, while 24-hour recall method could be used to provide a higher level of consistency (Christensen et al., 2002). Weight maintenance seemed to be the best dietary strategy for a runner, especially for avoiding long-term adverse affects of -AE (Beidleman et al. 1995). Although, -AE could theoretically improve short-term efficiency in runners because of decreased body fat (Fudge et al. 2006), it is not advised for elite athletes because it does not increase overall efficiency (Beidleman et al. 1995). Further research into the long-term effects of negative energy balance is the next logical step in this area.

REFERENCES

- Beidleman, B. A., Puhl, J. L., & De Souza, M. J. (1995). Energy balance in female distance runners. *The American Journal of Clinical Nutrition*, 61(2), 303.
- Christensen, D. L., van Hall, G., & Hambraeus, L. (2002). Food and macronutrient intake of male adolescent Kalenjin runners in Kenya. *The British Journal of Nutrition*, 88(6), 711-717.
- Fudge, B. W., Westerterp, K. R., Kiplamai, F. K., Onywera, V. O., Boit, M. K., Kayser, B., & Pitsiladis, Y. P. (2006). Evidence of negative energy balance using doubly labeled water in elite Kenyan endurance runners prior to competition. *The British Journal of Nutrition*, 95(1), 59-66.

ANXIETY ABOUT FALLS IN THE ELDERLY

N. Imhoff-nickimhoff@yahoo.com - Washington State University

ISSUE

Anxiety in the elderly led to decreased quality of life. A common source of anxiety in older people was the fear of falling. Activity avoidance decreased the individual's quality of life. Long term effects from short term avoidance of activities diminished the physical and mental health of an older person (Deshpande, Metter, Laurentani, Bandinelli, Guralnik, & Lerrucci, 2008, see Figure 1). Interventions were developed to resolve the rising problem in elderly population.

Consequences of Activity Avoidance

Activity Avoidance
 Loss of Postural Control
 Loss of Strength

y^

^:x

Figure 1. Activity avoidance produced negative consequences including loss of muscle strength, loss of postural control, and sedentary lifestyle.

OVERVIEW

Avoidance of activity occurred with higher age, poor perceived health, and individuals with past experience with falls. Tai Chi and home-based fall related multifactorial interventions were successful in improving muscle strength, postural control, cardio respiratory function, and reducing the fear of falling (Lin, Hwang, Wang, Chang, & Wolf, 2006; Zijlstra, Haastregt, Rossum, Eijk, Yardley, & Kempen, 2007). As the elderly population increased, the improvement of quality of life gained importance.

CONSIDERATIONS

Decreased quality of life occurred from fear of falling. Depression decreased social interaction, mobility, and loss of independence which impacted the quality of life of older people. Intervention programs, like Tai Chi, were a good beginning to reduce effect of fear of falling. Further research should focus on influences that caused the development of fear of falling. They should focus on production of more effective intervention programs.

REFERENCES

- Deshpande, N., Metter, E., Laurentani, F., Bandinelli, S., Guralnik, J., & Ferrucci, L. (2008). Activity restriction induced by fear of falling and objective and subjective measures of physical function: A prospective cohort study. *Journal of American Geriatrics Society*, 56, 615-620. Retrieved from <http://web.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=3e163fa5-eaaf-4ad1-83cc-b0953a4ae2e0%40sessionmgr12&vid=2&hid=105>, in Summer 2012.
- Lin, M., Hwang, H., Wang, Y., Chang, S., & Wolf, S. (2006). Community-based Tai Chi and its effect on injurious falls, balance, gait, and fear of falling in older people. *Journal of the American Physical Therapy Association*, 86, 1189-1201. Retrieved from <http://web.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=3da9840e-896e-4780-b2e3-2ba7b90a9cb7%40sessionmgr11&vid=2&hid=105>, in Summer 2012.
- Zijlstra, G., Haastregt, J., Rossum, E., Eijk, J., Yardley, L., & Kempen, G. (2007). Interventions to reduce fear of falling in community-living older people: A systematic Review. *Journal of the American Geriatrics Society*, 55, 603-615. Retrieved from <http://web.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=7284e31c-80a8-45a6-9d0b-ccfd593b9460%40sessionmgr104&vid=2&hid=105>, in Summer 2012.

IMPACT OF POPULATION ON FOOD PRODUCTION

B.L. Keeton - breunak@yahoo.com - Washington State University

ISSUE

Population growth outweighed the increase of food production due to consumption not obtaining balance with the production of food in land-scarce countries (Rask & Rask, 2009; see Figure 1). Countries attempted use of a two-stage food production system. Low production in the world was the expected outcome (Akkerman & Pieter van Donk, 2007).

Population Growth and Food Supply

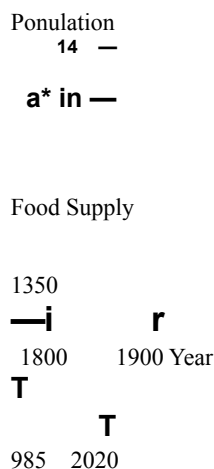


Figure 1. As the population grows, food production must improve to avoid starvation in the world population.

OVERVIEW

Increases in per capita food demand in developing economies and the increasingly strong pressure on food production resources was considered. Comparing nine different regions of the world and the impact of population growth on food between the years of 1350-2020, provided an estimate of the population demand on available food sources (Schneider, Havlik, Schmid, Walin, Mosnier, & Obersteiner, 2009).

CONSIDERATIONS

Considering food production and population growth, food processing industry in the world could not keep up with the growing demand of the population. Food ran scarce in countries where population growth was three times faster than food production growth. While global agricultural land was expected to increase by 14% between 2010 and 2030, population growth was expected to be 28% for the same time period (Schneider et al., 2009). Suggestion of stronger bioenergy policies may substantially reduce global food production potentials (Schneider et al., 2009).

REFERENCES

- Akkerman, R. & Pieter van Donk, D. (2007). Product prioritization in a two-stage food production system with intermediate storage. *International Journal of Production Economics* , 7(3), 43-53.
- Rask, K. J. & Rask, N. (2009). Economic development and food production- consumption balance: A growing global challenge. *Food Policy*, 186-196.
- Schneider, U. A., Havlik, P., Schmid, E., Walin, H., Mosnier, A., & Obersteiner, M. (2009). Impacts of population growth, economic development, and technical change on global food production and consumption. *Agricultural System* , 3, 204-215.

PHYSICAL INACTIVITY AND SPORT ORIENTATION

S. A. Lewis — sami.lewis@email.wsu.edu — Washington State University

ISSUE

Competition as a part of sport orientation, produced an effect on physical activity. The purpose of this review was to analyze the relationship between sport orientation and physical inactivity.

OVERVIEW

Participants of low physical activity level tended to have a greater need for harmony in the type of physical activity chosen (Keresztes, Piko, Gibbons, & Spielberger, 2009). Thus, competition was a major hindrance to physical activity (Dwyer, Allison, Goldenberg, Fein, Yoshida, & Boutilier, 2006). Bauer, Yang, and Austin (2004) discovered that adolescents were unlikely to participate in physical education classes because of the athletic competition and bullying (see Table 1). General competitiveness undermined enjoyment motivation as well as intrinsic motivation (Frederick-Recascino & Schuster-Smith, 2003).

Negative Effects of Competition

- Less gifted participants were bullied
- Undermined enjoyment motivation
- Undermined intrinsic motivation

Table 1. Competition had a negative

CONSIDERATIONS

The competitive environment influenced physical inactivity. As a part of sport orientation, competition caused a decrease in physical activity in adolescent gym classes and adult exercise programs. Sport and exercise facilitators should create a non-competitive environment for people who desired less competition. The research did not consider the relationship between competitiveness levels and skill level. Future research should study the relationship between high skill level, low skill level, and competitiveness. The affect of competition on levels of the

physical activity between males and females also should be studied.

REFERENCES

- Bauer, K. W., Yang Y. W., & Austin, S. B. (2004). "How can we stay healthy when throwing all of this in front of us?" Findings from focus groups and interviews in middle schools on environment influences on nutrition and physical activity. *Health Education & Behavior*, 31(1), 34-46. Retrieved from <http://blog.lib.umn.edu/kin/pe/research/Focus%20group%20findings%20for%20middle%20school%20environmental%20influences%20on%20PA.pdf>, on May 13, 2012.
- Dwyer, J. J. M., Allison, K. R., Goldenberg, E. R., Fein, A. J., Yoshida, K. K., & Boutilier, M. A. (2006). Adolescent girls' perceived barrier to participation in physical activity, *Adolescence*, 41(1), 75-89. Retrieved from <http://ntserver1.wsulibs.wsu.edu:2108/ehost/detail?sid=8966176a-1193-44d4-a9de-31b12cec0f54%40sessionmgr15&vid=1&hid=12&bdata=JnNpdGU9ZWwhvc3QtG12ZQ%3d%3d>, on May 13, 2012.
- Frederick-Recascino, C. M. & Schuster-Smith, H. (2003). Competition and intrinsic motivation in physical activity: A comparison of two groups. *Journal of Sport Behavior*, 26(3), 240-254. Retrieved from <http://ntserver1.wsulibs.wsu.edu:2108/ehost/pdfviewer/pdfviewer?sid=13b61b88-02de-427b-adde-7bd46050909%40sessionmgr12&vid=2&hid=106>, on May 16, 2012.
- Keresztes, N., Piko, B. F., Gibbons, F. X., & Spielberger, C. D. (2009). Do high- and low-active adolescents have different prototypes of physically active peers? *Psychological Record*, 59(1) 39-52.

THE MEDIA AND OBESITY

C. McDaniels - cmcdaniels@wsu.edu - Washington State University

ISSUE

The media profoundly has affected the increased rates of obesity in the United States. The first study that demonstrated a link between obesity and media consumption was published in 1985. This study concluded the prevalence of obesity increased by 2% in 12-17-year-olds for each additional hour of television viewed. Since then, the media has been regarded as one of the key contributors to the global obesity epidemic (Boyce 2007).

OVERVIEW

The time spent watching television was related to being overweight or obese (See Figure 1). Children were exposed to a large number of unhealthy stimulations in terms of food intake when watching television (Caroli, Argentieri, Cardone, & Masi 2004). These commercials targeted children and highlighted the false importance of junk food. Furthermore, when the television was on, activity ceased and time for exercise was reduced significantly. The heart and other muscles of the body were not strengthened. Calories were not expended in excess of resting metabolism during television viewing (Caroli et al. 2004).

Media and Obesity

Unhealthy food consumption
Increased snacking
Body image

Figure 1. The media influenced obesity through body image, increased snacking, and unhealthy consumption.

CONSIDERATIONS

Television watching must be decreased and physical activity increased in order to avoid obesity. In the last twenty years, the incidence of obesity increased markedly in both children and adults (Benton 2004). Television could be a prominent tool to spread correct information on good nutrition and obesity prevention (Caroli et al. 2004). The article outlined the vulnerabilities of commercials but failed to provide information on how to use commercials constructively.

REFERENCES

- Benton, D. (2004). Role of parents in the determination of the food preferences of children and the development of obesity. *International Journal of Obesity*, 28(7), 858-869. Retrieved from EBSCO on May 30, 2012.

Boyce, T. (2007). The media and obesity. *Obesity Reviews*, i(8), 201-205. Retrieved from EBSCO on May 30, 2012.

Caroli, M., Argentieri, L., Cardone, M., & Masi, A. (2004). Role of television in childhood obesity prevention.

International Journal of Obesity and Related Metabolic Disorders: Journal of the International Association for the Study of Obesity, 28(1), 104-108. Retrieved from EBSCO on May 30, 2012.

OBESITY AND LISTENING SKILLS

H.R. Oberst - hrol22990@msn.com - Washington State University

ISSUE

Listening skills affected an individual's tendency to be overweight or obese. The amount of media people viewed on a daily basis influenced the choices made about food. Viewing also took time away from physical active. Particularly, adolescents were at risk to be influenced by television or video games because it became a way of life (Robinson, 1999; see Figure 1). This generation was much more sedentary than the previous one.

Obesity and Time Spent Watching TV

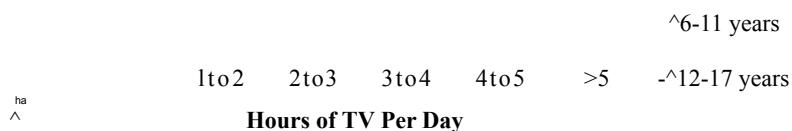


Figure 1. Obesity was predicated on hours of television viewed daily.

OVERVIEW

The primary influence on childhood obesity was increased energy intake combined with decreased physical activity (Deckelbaum & Williams, 2001). The association of obesity with geographic region, population density, and family characteristics suggested some of the causes were environmental. Also, there were highly significant and reproducible associations of television watching with obesity in children and adolescents (Dietz & Gortmaker, 1985).

CONSIDERATIONS

The findings suggested that television viewing preceded obesity. An intervention targeting only television and video game use produced statistically significant and clinically significant changes in BMI (Oken & Gillman, 2003). A reduced amount of television viewing and an increased amount of physical activity could help diminish the prevalence of obesity.

REFERENCES

Deckelbaum, R. J. & Williams, C. L. (2001). Childhood obesity: The health issue. *Obesity Research*, 9(4), 239-242.

Retrieved from <http://student.purduecal.edu/~lu65/Researches/Childhood%20obesity.pdf> on May 16, 2012. Dietz, W. H.

& Gortmaker, S. L. (1985). Do we fatten our children at the television set? Obesity and television

viewing in children and adolescents. *Pediatrics*, 75(5), 807-812. Retrieved from [http://corcoml30-spl0-](http://corcoml30-spl0-advertising.wikispaces.umb.edu/file/view/Pediatrics+May+1985.pdf)

[advertising.wikispaces.umb.edu/file/view/Pediatrics+May+1985.pdf](http://corcoml30-spl0-advertising.wikispaces.umb.edu/file/view/Pediatrics+May+1985.pdf) on May 16, 2012. Oken, E. & Gillman, M. W.

(2003). Fetal origins of obesity. *Obesity Research*, 11(4), 496-504. Retrieved from

<http://integrativehealthconnection.com/wp-content/uploads/2011/11/Fetal-Origins-of-ObesityO.pdf> on May 17,

2012. Robinson, T. N. (1999). Reducing children's television viewing to prevent obesity. *JAMA*, 282(16), 1566.

Retrieved

from <http://jama.jamanetwork.com/article.aspx?volume=282&issue=16&page=1561> on May 18, 2012.

CAUSES OF AGGRESSION IN SPORT

J. Radmall - radjery@gmail.com - Utah Valley University

ISSUE

Aggression is a behavior that is intended to inflict physical or psychological harm (Keeler, 2004).

Most people argue aggression in sport will lead to decreased performance and the aggressive behavior distracts the athlete and the team. Despite its negative effects, aggression is still prevalent in sports.

The best way to reduce aggression in sports is to understand sources of aggression so that coaches, parents, participants, officials, and spectators can recognize inappropriate behavior and encourage positive behavior (Keeler, 2004).

OVERVIEW

The social learning theory asserts that aggression is learned (Keeler, 2004). If role models tolerate aggression, children will believe aggression is acceptable (Chow, Murray, and Feltz, 2009). Bredemeier's theory of moral reasoning and aggression asserts that aggressive behavior is related to moral maturity (Holowchak, 2003). The frustration-aggression theory states that certain specific triggers must be present in order for an already frustrated person to resort to aggression (Keeler, 2004). According to the instinct theory, humans are naturally aggressive and can control this natural aggression by venting in organized sport (Keeler, 2004). Similar to the instinct theory, the catharsis effect theory says that aggression comes from pent up frustration about unaccomplished goals (Holowchak, 2003; see Table 1).

Theories on Causes of Aggression	
Theory	Cause of Aggression
Social Learning Theory	Learned behaviors
Theory of Moral Reasoning and Aggression	Low moral maturity
Frustration-Aggression Theory	Frustration
Instinct Theory	Natural tendencies
Catharsis Effect Theory	Frustration from unaccomplished goals

Table 1. Various theories present possible sources of aggression displayed in sport

CONSIDERATIONS

There are various ways to reduce aggression in sport. Research by Chow, Murray, and Feltz (2009) shows that coaches should spend time on character development because coaches have the most significant influence on players' expression of aggression. As a society we also must establish universal moral standards to encourage excellence and discourage violence (Keeler, 2004).

REFERENCES

- Chow, G. M., Murray, K. E., & Feltz, D. L. (2009). Individual, team, and coach predictors of players' likelihood to aggress in youth soccer. *Journal of Sport and Exercise Psychology, 31*(4), 425-443.
- Holowchak, M. A. (2003). Aggression, gender, and sport: Reflections on sport as a means of moral education. *Journal of Social Philosophy, 34*(3), 387-399.
- Keeler, L. A. (2004). The differences in sport aggression, life aggression, and life assertion among adult male and female collision, contact, and non-contact sport athletes. *Journal of Sport Behavior, 30*(1), 57-75.

HUMERAL FRACTURES & RADIAL NERVE DAMAGE

C. E. Rahn - crahn13@my.whitworth.edu - Whitworth University

ISSUE

Humeral fracture types vary from person to person. Radial nerve damage associated with humeral fractures is common. With different types of fractures and with some cases of radial nerve damage, it is important to determine what the best treatment is (see Table 1) that will result in the best outcome. The type of care and surgical or non-surgical treatment decisions are based on the location of the fracture, severity of the fracture, and any associated nerve damage.

Recommended Care for Fractures	
Type of Fracture	Type of Care
Proximal Humerus Fracture	Treatment may depend on position of tendon insertions
Mid-Shaft Humerus Fracture	Most often will heal without surgery
Distal Humerus Fracture	Most often require surgical treatment unless bones are held in proper position

Table 1. Different types of fractures may require different types of care.

OVERVIEW

The most common fractures seen in the humerus occur in the proximal end and often times can heal without operation, but slight differences in location can require operation (Court-Brown &

McQueen, 2004; Hartog et al, 2010). Some humeral fractures can be very severe or consist of multiple fractures, requiring operative treatment to maintain fracture alignment (Raghavendra & Bhalodiya, 2007). Radial nerve damage or radial nerve palsy can result from humeral fractures and have the possibility of complicating surgical treatment (Duz et al., 2010; Larsen & Barfred, 2000). These factors help to determine if surgery or non-surgical treatment is best.

CONSIDERATIONS

Surgical treatment was used in many cases to help the union of humeral fractures (Court-Brown et al, 2004; Hartog et al, 2010; Raghavendra et al, 2007). Surgery also helped to improve radial nerve damage in some cases (Duz et al, 2010). There were a few cases in which surgery caused infection or radial palsy. When radial palsy occurred, it improved over time. With serious humeral fractures and radial nerve damage that would not heal correctly on its own, surgery allowed for full recovery. It is important to identify the seriousness of an injury, because if surgery is not necessary it could lead to further damage. Future research could evaluate humeral fractures and radial nerve injury to determine if there are specific risk factors leading to nerve injury.

REFERENCES

- Court-Brown, C. M. & McQueen, M. M. (2004). The impacted varus (A2.2) proximal humeral fracture. *Acta Orthopaedica Scandinavica*, 75(6), 736-740.
- Duz, B., Solmaz, T, Civelek, E., Onal, M. B., & Pusat, S., Daneyemez, M. (2010). Analysis of proximal radial nerve injury in the arm. *Neurology India*, 58(2), 230-234.
- Hartog, D. D., Lieshout, E. M. M. V., Tuinebreijer, W. E., Polinder, S., Beeck, E. F. V., Breederveld, R. S., Bronkhorst, M. W. G. A. et al. (2010). Primary hemiarthroplasty versus conservative treatment for comminute fractures of the proximal humerus in the elderly (ProCon): A Multicenter Randomized Controlled trial. *BMC Musculoskeletal Disorders*, P7(11), 1471-2474.
- Larsen, L. B. & Barfred, T. (2000). Radial Nerve Palsy After Simple Fracture Of The Humerus. *Scandinavian Journal of Plastic & Reconstructive Surgery & Hand Surgery*, 34, 363-366.
- Raghavendra, S. & Bhalodiya, H. P. (2007). Internal fixation of fractures of the shaft of the humerus by dynamic compression plate or intramedullary nail: A prospective study. *Indian Journal of Orthopaedics*, 41(3), 214-218.

EFFECTS OF EXERCISE ON IDIOPATHIC SCOLIOSIS

M. A. Seely - mseely14@my.whitworth.edu - Whitworth University

ISSUE

Idiopathic Scoliosis is a three-dimensional condition involving deformity of the spine. Many treatment options for scoliosis are invasive and expensive. Research has been done to prove the effectiveness of physical exercise (PE) as treatment for scoliosis. Specific areas of treatment include increased electromyographic (EMG) activity in paraspinal muscles, reduced lateral deviation of the spine, and stopping progression of the Cobb angle.

OVERVIEW

The front press and bent-over barbell row exercises increased EMG amplitude in the muscles on the concave side of the scoliotic curve (see Table 1) (Schmid, Dyer, Boni, Held, & Brunner 2010). The physio-logic® exercise system reduced lateral deviation of the spine by 2.32 mm with a/o-value of 0.02 (Weiss & Klein, 2006). Negrini et al. (2008) felt it was useless to draw conclusions from this study. The sample was not random, and the recruitment modality was not described. Hawes (2003) found many studies proved the effectiveness of PE's in stopping progression of the Cobb angle. However, Negrini et al. (2008) felt none of the studies were credible enough to prove this.

Paraspinal EMG Activity

Exercise	Difference In EMG Activity	P
Front Press	1.69 Hz	0.002
Bent-over Row	1.64 Hz	0.013

Table 1. Electrical activity increased on the concave side of the paraspinal muscles.

CONSIDERATIONS

Though Hawes (2003) found many studies that supported PE's in improvement of Cobb angles, the research methods were weak. Many of the studies were uncontrolled and none used a random sample. This made the results difficult to interpret, because one cannot realistically conclude the improvement was a direct result of intervention. Strengths of the reviewed studies showed the effectiveness of PE's in reduced lateral deviation of the spine and EMG activity in paraspinal muscles (Negrini et al, 2008; Schmid et al., 2010). Future research should look at preventing the progression of the Cobb angle in a randomized, controlled study. Still, PE's can be proposed as treatment for idiopathic scoliosis in parameters other than prevention of Cobb progression.

REFERENCES

- Hawes, M.C. (2003). The use of exercises in the treatment of scoliosis: an evidence-based critical review of the literature. *Pediatric Rehabilitation*, 6(3-4), 171-182. Negrini, S., Fusco, C. Minozzi, S., Atanasio, S., Zaina, F. & Romano, M. (2008). Exercises reduce the progression rate of adolescent idiopathic scoliosis: Results of a comprehensive systematic review of the literature. *Disability and Rehabilitation*, 30(10), 772-785. Schmid, A.B., Dyer, L., Boni, T., Held, U., & Brunner, F. (2010). Paraspinal muscle activity during symmetrical and asymmetrical weight training in idiopathic scoliosis. *Journal of Sport Rehabilitation*, 19, 315-327. Weiss, H.R., & Klein, R. (2006). Improving excellence in scoliosis rehabilitation: A controlled study of matched pairs. *Pediatric Rehabilitations*, 9(3), 190-200.

ELDERLY FALLS AND CONFIDENCE

B.L. Shumate - bree.shumate@gmail.com - Washington State University

ISSUE

Falls efficacy measured confidence levels when performing daily tasks in older people. High falls efficacy (HFE) had a significant impact on functional balance and physical functioning tests (Li, McAuley, Fisher, Harmer, Chaumeton, & Wilson, 2002). Low falls efficacy (LFE) negatively affected daily tasks and physiological functioning (Tinetti, Richman, & Powell, 1990).

OVERVIEW

HFE promoted better physical and psychological states (McAuley, Szabo, Gothe, & Olson, 2010; see Table 1). LFE led to adverse effects on the lifestyles of older people (Carpenter, Adkin, Brawley, & Frank, 2006; see Table 1).

Specific Effects of Falls Efficacy

HFE	LFE
Mediated fear of falling	Activity avoidance
Better daily performance	Balance deterioration
Increased quality of life	Depression/anxiety

Table 1. HFE produced beneficial effects in older people.

Successful falls efficacy interventions encouraged focus on body strength and promoted mindfulness. This approach produced the most beneficial results. More proactive approaches to fall prevention resulted in HFE (Clemson & Swann, 2008).

CONSIDERATIONS

HFE in the elderly suggested more desirable effects than LFE. Interventions focused on HFE exhibited advantageous results. Increased functional ability was noted in individuals with HFE. Future studies should expand sample size. The literature also should investigate confidence levels in the elderly who have fallen in comparison to those who have not.

REFERENCES

- Carpenter, M. G., Adkin, A. L., Brawley, L. R., & Frank, J. S. (2006). Postural, physiological and psychological reactions to challenging balance: Does age make a difference? *Age and Ageing*, 35(3) 298-303. Retrieved from <http://washingtontate.worldcat.org/oclc/1990360471125> in Summer 2012. Clemson, L. & Swann, M. (2008). *Stepping on: Building confidence and reducing falls, a community-based*

program for older people. Sydney, Australia: Sydney University Press. Li, F., McAuley, E., Fisher, K. J., Harmer, P., Chaumeton, N., & Wilson, N. L. (2002). Self-efficacy as a mediator between fear of falling and functional ability in the elderly. *Journal of Aging and Health, 14*(4), 452-466. Retrieved from <http://washingtonstate.worldcat.org/oclc/1990363956044> in Summer 2012. McAuley, E., Szabo, A., Gothe, N., & Olson, E. A. (2011). Self-efficacy: Implications for physical activity, function, and functional limitations in older adults. *American Journal of Lifestyle Medicine, 5*(4), 361-369. Retrieved from <http://washingtonstate.worldcat.org/oclc/746043606> in Summer 2012. Tinetti, M. E., Richman, D., & Powell, L. (1990). Falls efficacy as a measure of fear of falling. *Journal of Gerontology, Psychological Sciences, 45*(6), 239-243.

IMAGERY AND THE TREATMENT OF OBESITY

J. M. Boettcher Wells -jessica.m.wells@email.wsu.edu - Washington State University

ISSUE

The social impact of obesity on obese individuals was studied. Implications suggested that "the worst aspect of overweight and obesity [were] psychological" (Edmunds, 2008, pg. 191). Modern treatment interventions most often incorporated both physical and psychological features. Individuals that experienced emotional and physical distress sought the assistance of medical professionals. One form of therapy that gained notice was imagery. There were six types of imagery that were reported in the literature as treatments (see Figure 1).

Different Types of Imagery

Guided Imagery

Usually presented via audiotape or by a person leading an imagery session. Suggestions are made to the listener through imagery related to some specific health concern.

Progressive Relaxation

A body-centered approach in which the individual scans their body mentally as they move from head to toe.

Receptive Visualization

A process of self-discovery; individual relaxes, turns attention inward, and waits to see what emerges from their unconscious.

Clinical Imagery

A method that offers a synthesis of all imagery schools and techniques.

Programmed Visualization

Imagining a process or result; an active process in which the individual mentally creates a desired outcome in great detail.

Creative Visualization

A combination of imagery exercises, positive affirmations, and meditations geared toward a specific goal.

Figure 1. Six imagery methods were used to treat obesity during therapy sessions.

OVERVIEW

Imagery was regarded as "little pictures in the mind or head" (Roedelein, 2004, p. xi). Imagery involved the use of imagination for healing. Involving all of the senses, therapeutic imagery was directed toward specific healing and life goals.

CONSIDERATIONS

Studies showed evidential support for a better outcome in patients who used treatment and a therapist (Vanderlinden & Vandereycken, 1994). Several advantages were reported when the treatment program for an obese individual involved imagery techniques. Imagery was easily combined with most cognitive and behavioral therapy techniques. The combination of techniques led to better results (Vanderlinden & Vandereycken, 1994).

REFERENCES

Edmunds, L. D. (2008). Discussion of social impacts obesity has among obese individuals. *JSPN 13*(3), 191-200.
Roedelein, J. E. (2004). Brief history of the origin of imagery and how it is was debated and shun in psychology.
Imagery in Psychology: A Reference Guide. Vanderlinden, J. & Vandereycken, W. (1994). Discussion of the factors

influencing obesity and how they must be

addressed in therapeutic approaches. *American Journal of Clinical Hypnosis* 36(4), 248-257.

INFANTS CRAWLING VS. WALKING ON SLOPES

C. Woytovech - lucklucky7@yahoo.com - Washington State University

ISSUE

Infant perceived affordances allowed subjects to ascend or descend varying slope surfaces. The infants adjusted gait and climbing postures (crawling) in order to ascend and descend slopes. The ability to adjust motor controls is a demonstration of what Adolph, Eppler, & Gibson described as the most dramatic motor achievement in the first year of life (1993). However many notable differences were observed between crawling and walking (see Table 1).

Crawling	vs. Walking
Crawling	Walking
• Test area with hands before descent	• Tendency to overestimate walking skill
• Quadripedal stature	• Digress from walking to crawling if surface too
• Tendency to fall head first	difficult or child fell
• Learn by error	• Large gait

Table 1. Differences in crawling versus walking up and down slopes demonstrated changes in patterns.

OVERVIEW

Infants trying to transverse slopes or other surfaces that were unfamiliar (ridged and non-rigid; Gibson, Riccio, Schmuckler, Stoffregen, Rosenberg, & Taormina, 1987) began with no hesitation or by using their hands to test the area. Adolph and colleagues tested infants on ascent and descent and observed perceived affordances largely determined success (1993). The results from Rosinski and Levine's texture gradient research suggested that the use of slant judgment included both relative and texture information (1976).

CONSIDERATIONS

Infants' ability to perceive the surface prior to ascent or descent increased the success of ascent or descent without falling (i.e. falling caused infants to become non-cooperative). Infants who "learned by trial and error" and fell during the attempts, tended to crawl (Gibson, 1988). In future research, it may be beneficial to study the age for successful crawling on steep surfaces.

Another study idea would focus on the use of a safety device. Using the device, would infants improve success rates for walking and avoid falls?

REFERENCES

- Adolph, K. E., Eppler, M. A., & Gibson, E. J. (1993). Crawling versus walking infants' perception of affordances for locomotion over sloping surfaces. *Child Development*, 64, 1158-1174.
- Gibson, E. J. (1988). Exploratory behavior in the development of perceiving acting, and the acquiring of knowledge. *Annual Review of Psychology*, 39, 1-42.
- Gibson, E. J., Riccio, G., Schmuckler, M. A., Stoffregen, T. A., Rosenberg, D., & Taormina, J. (1987). Detection of the traversability of surfaces by crawling and walking infants. *Journal of Experimental Psychology*, 4, 533-544.
- Rosinski, R. R., & Levine, N. P. (1976). Texture gradient effectiveness in the perception of surface slant. *Journal of Experimental Child Psychology*, 22, 261-271.

ORIGINAL RESEARCH ABSTRACTS

EFFECTS OF DYNAMIC AND PNF ON VERTICAL JUMP

A. E. Ayres, A. J. Kluge, & A. C. Glass - aayres13@my.whitworth.edu - Whitworth University

PURPOSE

There is evidence that dynamic stretching prior to athletic performance is more effective than static stretching (Faigenbaum et al., 2006). Proprioceptive neuromuscular facilitation (PNF) and its effects on performance have been studied minimally. Proprioceptive neuromuscular facilitation is a modified form of static stretching so there is the risk that it could be detrimental to performance (Guissard & Reiles, 2005). The purpose of this study was to compare the effects of PNF and dynamic stretching on vertical jump height. The research hypotheses were 1) that dynamic stretching would result in a higher vertical jump than PNF and 2) PNF would result in higher vertical jump heights than no stretching.

METHODS

Participants: A convenience sample of 24 college-aged students volunteered for participation ($n_{male} = 7$, $n_{female} = 17$). All participants were defined as healthy (e.g. no lower limb injuries in the last six months). **Equipment:** Vertical jump heights were recorded with a Vertec 22550. The stationary exercise bike used for the warm-up was the Monark 818E Ergometric. **Procedures:** Prior to testing, all participants completed a familiarization session. **Dynamic stretching procedures.** Four dynamic stretches were done to stretch the hamstrings, quadriceps, gluteal, and calf muscles (see Figure 1). **PNF procedures.** Four PNF stretches were performed to stretch the same muscle groups as above (see Figure 2). In the hamstring, quadriceps, and gluteal muscle stretches, the participants pushed against the researcher's hand at approximately 30% of their maximal effort for six seconds, then rested for four seconds with the cycle repeating six times. During the rest periods, the stretch was gradually progressed. In the calf muscle stretch, the participants leaned their bodies toward the wall, rather than against the researcher, and followed the same format. **Vertical jump test procedures.** Participants were allowed to jump three times in each session and all three jump heights were recorded. In the standing reach, participants were instructed to stand directly under the Vertec, heels on the floor, and reach as high as possible with the dominant hand to hit the plastic vanes away that were within reach. The participants reached with the same hand for each jump. All three jump heights were recorded to the nearest 0.5 inch and the highest was used for the statistical analysis. **Statistics:** A repeated measures analysis of variance was used to investigate significant differences for the vertical jump heights between each stretching protocol for each participant. Statistical significance was set at an alpha level of $p < 0.05$.

Dynamic stretches				
Muscle Group	Hamstrings	Quadriceps	Gluteals	Calves
Dynamic Stretch	B5 ?	*^3jr *'	J l	« J £ m

Figure 1. Each dynamic stretch was performed 20 times per leg.

PNF Stretches				
Muscle Group PNF Stretch	Hamstrings	Quadriceps	Gluteals	Calves
	mm *	^g		''^

Figure 2. Each PNF stretch was performed for a minute per leg.

RESULTS

Descriptive data for each stretch condition is summarized in Table 1. The multivariate result of the ANOVA comparison for jump height indicated a statistical difference ($p = 0.015$) between stretch conditions. Research hypothesis 1 was correct and hypothesis 2 was incorrect.

Mean Jump Heights and Statistical Significance

Stretch Protocol	Mean Jump Height (cm)	Std. Deviation (cm)	Piecewise Comparisons	N
Control	43.1	9.3	V. PNF ≥ 0.004	24
PNF	41.2	8.7	V. Dynamic ≥ 0.035	24
Dynamic	43.1	10.1	V. Control $p = 0.00$	24

Table 1. The highest jump from each protocol was recorded for each participant to the nearest .05 inch.

DISCUSSION

The results that dynamic stretching improved performance were consistent with other studies, which compared a static stretch and dynamic stretch protocol of vertical jump height performance (Faigenbaum et al., 2006). However, since the PNF was used in the present study, the results cannot be directly compared because PNF is a modified form of static stretching. Previous studies have noted that PNF may decrease athletic performance as compared to a control condition (Marek et al, 2005; Guissard and Reiles, 2005). This was also shown in the present study. Marek et al. (2005) reported fatigue as a major contributor to performance reduction due to the repeated contractions. The present study was the first, to the knowledge of the researchers', to directly study the differences in vertical jump height between PNF and dynamic. These findings may be helpful for athletes who want to improve their performance in situations similar to the vertical jump. The lack of a statistical difference between the control and dynamic protocols may be due to a Type II error. Future research into different stretching techniques and their benefits would be valuable.

REFERENCES

- Faigenbaum, A. D., McFarland, J. E., Schwerdtman, J. A., Ratamess, N. A., Kang, J., & Hoffman, J. (2006). Dynamic warm-up protocols, with and without a weighted vest, and fitness performance in high school female athletes. *Journal of Athletic Training, 41*(4), 357-63.
<http://search.proquest.com/docview/2066516217accountidM149>
- Guissard, N., & Reiles, F. (2005). Effects of static stretching and contract relax methods on the force production and jump performance. *Computer Methods in Biomechanics & Biomedical Engineering, 8*127-128.
doi:10.1080/10255840512331388588
- Marek, S. M., Cramer, J. T., Fincher, A. L., Massey, L. L., Dangelmaier, S. M., Purkayastha, S., Fitz, K. A., & Culbertson, J. Y. (2005). Acute effects of static and proprioceptive neuromuscular facilitation stretching on muscle strength and power output. *Journal of Athletic Training, 40*(2), 94-103.
<http://search.proquest.com/docview/2066508737accountidM149>

EFFECT OF WINGATE TRAINING ON A TWO-MILE PERFORMANCE RUN

K. A. Brandt, E. R. Travis, & E. T. Watt - kbrandt13@my.whitworth.edu - Whitworth University

PURPOSE

Prolonged anaerobic exercise training has been shown to be effective at improving anaerobic power (Bayati, Farzad, Gharakhanlou, and Alinejad, 2011), maximal oxygen consumption ($\dot{V}O_{2max}$; Billat 2001), and in endurance performance. This training has been recommended for improving cycling performance. The purpose of this study was to test the effectiveness of a two week high-intensity cycle interval exercise training on the two-mile running time trial performance. There were two null hypotheses. The first null hypothesis was that a two-week Wingate training session would improve two-mile running performance time; the second null hypothesis was participants in the control group would not improve in the two-mile run time.

METHODS

Participants: A convenience sample of 12 college-age (18-22 years old) students volunteered for

participation ($n_{maie}=4$, $n_{emaie}=8$). All participants were defined as physically active (e.g. 30-min. of exercise, three times per week). **Equipment:** Both the control and the experimental groups ran their pre- and post-two-mile runs on the Whitworth University Track. The experimental group completed their training sessions on the Monark 894e cycle ergometer. **Procedures:** At the beginning of the study, participants familiarized themselves with two, two-mile running time trials and a Wingate session. After becoming familiarized, participants gathered at the Whitworth University track and were timed on the two-mile run pre-test. Staggered starts were used so participants did not feel they were competing. Each study investigator tracked and recorded the participants' time. After the pre-test two-mile run, participants were randomly divided into control and experimental groups. The experimental group completed a high intensity Wingate training program which was completed in two weeks. Each Wingate trial took 30 seconds to perform. The Burgomaster protocol was utilized for the Wingate training which has been used in previous studies as shown in Table 1 (Burgomaster, 2005). Participants completed their set Wingate trials three times per week with a 24 hour rest period in between in order to provide optimal recovery and performance adaptation. For each Wingate test, participants warmed up at a self-selected workload and duration. After the subject was warmed up, the investigators started timing the test once the subject got above 150 rates per minute ($F < PM$). During the Wingate, participants received verbal encouragement to increase their cadence. Following the training period, all participants from both groups performed a "post-test" two-mile running time trial where the running times were recorded for data analysis. For statistical analysis the independent variable was the training condition (control vs. intervals) training; the dependent variable was two-mile running time. Means and standard deviations were utilized to describe the central tendency and variance for all measured dependent variables. Alpha (α) was set at $p < 0.05$ to determine statistical significance for each factorial ANOVA comparison. Based on previous literature for two-mile run testing, the anticipated effect size for time was 0.9 (Grier et al, 2011). Consequently, beta was estimated to be $B = 0.05$ and *a priori* statistical power were estimated about 0.8.

Wingate Training Sessions

Trial Number	12	3	4	5	6
<u>Amount of Wingates</u>	4	5	6	7	4

Table 1. Amount of Wingate sessions performed at each trial are shown.

RESULTS

Descriptive data for the two-mile run times were summarized in Table 2. The factorial ANOVA indicated statistical difference ($p=0.001$) between and within groups. A pairwise comparison within groups (pre vs. post testing) indicated a significant difference between two-mile run times ($p=0.001$). In addition, a pairwise comparison between training groups (control vs. Wingate) indicated a significant difference between two-mile run times ($p=0.046$). Therefore, the researchers accepted the first research hypothesis and rejected the other.

Two- Mile Running Times Results

Group	Mean	Std.	Deviation	N
Pre-Test (s)				
Control	1019.7		93.3	7
Wingate	960.3		67.4	4
Post-Test (s)				
Control	1016.9		80.0	7
Wingate	855.8		43.5	4

Table 2. Mean number of participants and standard deviation are shown for each condition.

DISCUSSION

The purpose of this study was to test the effectiveness of a two week high-intensity cycle interval exercise training on the two-mile running time trial performance in healthy college-aged adults (18-22 years old). During the study, Participant A was considered a statistical outlier. Recalculation of the factorial ANOVA without Participant A actually increased the probability that the two week Wingate training could have had a positive effect on post-test two-mile running times ($p=0.001$). In addition to a possible outlier, the sample size of the research population was

small ($n=1$). In combination with a small observed effect size ($d= 0.749$) and a high observed beta ($\beta=0.991$ if $p=0.001$) or $\beta=0.831$ if $p=0.001$) the actual statistical power for the study was very low (0.001). Subjects from both control and experimental groups showed improvement on running time from pre- to post-test with the exception of two from the control group who ran slower during the post-test. The improvement from both groups could be attributed to the learning effect received from the pre-test (Sperlich, 2009). Future studies should analyze other dependent variables such as a larger sample size.

REFERENCES

- Bayati, M., Farzad, B., Gharakhanlou, R., & Agha-Alinejad, H. (2011). A practical model of low-volume high-intensity interval training induces performance and metabolic adaptations that resemble 'all-out' sprint interval training. *Journal of Sports Science and Medicine*, 10, 571-576.
- Billat, L. V., (2001). Interval training for performance: a scientific and empirical practice. *Sports Med.* 31(2), 75-90.
- Burgomaster, K. A., Hughes, S. C, Heigenhauser, G. F., Bradwell, S. N., & Gibala, M. J. (2005). Six sessions of sprint interval training increases muscle oxidative potential and cycle endurance capacity in humans. *Journal of Applied Physiology*, 98, 1985-1990.
- Grier, T. L., & Morrison, M. S., Knapik, J. J. (2011). Risk Factors for Injuries in the U.S. Army Ordnance School/ *Military Medicine*, 176(11), 1292-1299.
- Sperlich, B., Fricke, H., Marees, M., Linville, J. W., & Mester, J. (2009). Does Respiratory Muscle Training Increase Physical Performance? *Military Medicine*, 174(9), 977-982.

VALUE OF NUTRITION, SPORT AND PHYSICAL ACTIVITY IN THAILAND

A.S. Chae, D.D. Irby, J.G. Balaban, N.R. Imhoff, B.L. Shumate, J.M. Boettcher-Wells, B.N. Dein, A.A. Gengnagel, S.J. Hinkle, K.J. Larson, S.A. Lewis, M.M. McCanna, C.A. McDaniels, J.E. Nelson, H.R. Oberst, L.D. Bruya, F. Parkay, J.A. Sievers - Washington State University, and G.S. Wood, Rosmini College, New Zealand.

PURPOSE

Obesity is a disease that overshadowed other epidemics around the world (Pi-Sunyer, 2002; James, Leach, Kalamara, & Shayeghi, 2001; Wang & Wang, 2002). Solutions proposed to combat this epidemic were nutrition, sport, and physical activity (Resnlcow, 1993: Salmon, Bauman, Crawford, Timperio, & Owen, 2000; Sallis, McKenzie, Conway, Elder, Prochaska, Brown, Zlve, Marshall, & Alcaraz, 2003). The purpose of this study was to determine the views and attitudes held by a sample population of Thai individuals toward the importance of nutrition, sport and physical activity within the Thai culture.

Null Hypothesis #1: There was no difference between Thai men and women on views of nutrition, sport, and physical activity in Thai culture.

Null Hypothesis #2: There was no difference between Thai educators and representatives from other occupations in Thailand on views of nutrition, sport, and physical activity in Thai culture.

Null Hypothesis #3: There was no difference between Thai teacher educators and Thai educational administrators on views of nutrition, sport, and physical activity in Thai culture.

METHODS

Participants: Subjects consisted of a convenience sample of Thai individuals ($N=23$) that attended an educational workshop at a division 1 university. From this group, males numbered thirteen ($n_m=13$) with ten females ($n_f=10$). Educational teachers numbered twelve ($n_t=12$) with five educational administrators ($n_{ea}=5$). There were seventeen educators ($n_e=17$) and six persons from other occupations ($n_{oc}=6$). All participants were of Thai lineage and citizenship.

Instrumentation: The International Nutrition, Sport and Physical Activity (INSPA) survey consisted of 14 questions distributed between Nutrition (Q_n 's=3), Sport (Q_s 's=5), and Physical Activity (Q_{pa} 's=2). Some questions grouped sport and physical activity together (Q_g 's=4).

Selected professionals in the field determined questions were appropriate. All questions used a four point Likert scale. **Procedures:** Fifteen JR/SR university students were trained as

interviewers. A packet of materials used for the interview included a use of human subjects form, the INSPA survey, sheets to record additional comments relative to each question and a sheet to record personal information. Students interviewed one to two Thai individuals. Completed instruments were separated for analysis. Information sheets were sorted and used to gain insight into scores. **Statistics:** A two-tailed t-test was used to assess differences for each hypothesis. An alpha level of $p < 0.05$ was used for decision making ($\alpha = .05$).

RESULTS

For Hypothesis 1, Thai male and female group means were compared. For Hypothesis 2, Thai educators and other occupation group means were compared. For Hypothesis 3, Teacher educators and administrative educator group means were compared (see Table 1).

Three Hypotheses Used for the Study											
H1= Gender Difference				H2= Education Prof and Other				H3= Teachers and Administrators			
Gender	Mean	S.D.	Sign.	Occup.	Mean	S.D.	Sign.	Educ.	Mean	S.D.	Sign.
Male	2.90	0.88	0.0000	Educ.	3.23	0.72	0.00000	Tchrs.	3.23	0.72	0.62
Female	3.31		0.732	Other	2.77	0.70	4	Admn.	3.16	1.17	

Table 1. The gender and profession hypotheses produced significant results. The teacher/Administrator hypothesis produced no difference.

Scores on the INSPA survey were different between males and females. Hypothesis 1 was rejected. Scores on the INSPA survey were different between the education profession and other professions. Hypothesis 2 was rejected. Scores indicated that education teachers and administrators were not different. Hypothesis 3 was accepted.

DISCUSSION

Interventions were considered the best solution upon which to base a program to change attitudes in society concerning obesity related to nutrition, sport and physical activity (Resnlcow, 1993; Sallis, McKenzie, Conway, Elder, Prochaska, Brown, Zlve, Marshall, & Alcaraz, 2003). Results of the study should be used to plan targeted interventions based on gender and differences in profession.

Future studies should consider gender and its assessment. To make a difference in the Thai culture, intervention programs should focus on gender differences and account for them when constructing intervention materials. In addition, these programs should also look at different directions for those in education, compared to other professions.

Random sampling would increase the importance of the results of this study. Sampling would allow wider application of results across Thai society.

REFERENCES

- James, P.T., Leach, R., Kalamara, E., & Shayeghi, M. (2001). The worldwide obesity epidemic. *Obesity Research*, 9(Suppl. 4), 228S-233S. Pi-Sunyer, X. (2002). The obesity epidemic: Pathophysiology and consequences of obesity. *Obesity Research*, 10(Suppl. 2), 97S-104S. Resnlcow, K. 1993. School-based obesity prevention: Population versus high risk interventions. *Ann N Y Acad Sci.*, 699, 154-166. Sallis, J.F., McKenzie, T.L., Conway, T.L., Elder, J.P., Prochaska, J.J., Brown, M., Zlve, M.M., Marshall, S.J., & Alcaraz, J.E. (2003). Environmental interventions for eating and physical activity: A randomized controlled trial in middle schools. *American Journal of Preventive Medicine*, 24(3), 209-217. Salmon, J., Bauman, A., Crawford, D., Timperio, A., & Owen, N. (2000). The association between television viewing and overweight among Australian adults participating in varying levels of leisure-time physical activity. *International Journal of Obesity and Related Metabolic Disorders*, 24, 600-606. Wang, Y. & Wang, J.Q. (2002). A comparison of international references for the assessment of child and adolescent overweight and obesity in different population. *European Journal of Clinical Nutrition* (2002), 56, 973-982.

COMMUNICATION IN RUGBY PLAYERS

K. M. Ciciora — katiemeg06@yahoo.com — Washington State University

PURPOSE

Athletes used the skill of communication to enhance performance in practice and competition. Communication was used in competition as much as practice (Slabbert, & Ukpere, 2009). Effective communication skills were used in successful team performance (Sullivan, 1993). Players used communication to learn from teammates (Fenton, & Pitter, 2010). The purpose of the study was to compare the use of communication between novice and experienced collegiate rugby players. **Null Hypothesis:** There will be no difference in communication between novice and experienced collegiate rugby players.

METHODS

Methods for the study included discussion of subjects, instrumentation, procedures, and statistics.

Subjects. The subjects for the study were female collegiate rugby players from a division 1 university. Twenty athletes were used in the study (N=20). Subjects were divided into two groups, novice and experienced athletes. Novice had one year or less of experience ($n_n=11$). Experienced athletes were those with more than two years of competition experience at the collegiate level ($n_e=9$). The average competitive experience differed between the two groups (see Table 1).

Average Competitive Experience

Novice	3.72 years
Experienced	8.33 years

Table 1. There was a difference in competitive experience between groups.

Instrumentation. A Communication Use Questionnaire was employed for the study (adapted from Weinberg & Gould, 2007). Questions were related to the sport and focused on communication use in rugby situations. There were ten questions that were ranked on a Lickert scale from 1-4 based on the use of communication during the game. **Procedures.** Through an appointment scheduled with the coach, each athlete was given a chance to participate. Data was obtained on the outdoor field at a division 1 university during the spring of the year. To help prevent confusion, a script was used to clearly present the study to the subjects. Each athlete was informed of the confidentiality of the information collected, and was asked to read an implied consent form before participating (approved by WSU IRB No. 5847). Packets were distributed to each participant. The packets included a questionnaire and a logistics sheet recording participant's competitive and communication history. Upon completion, athletes were asked to return the packets to the surveyor for analysis. **Statistics.** Upon completion, mean scores were determined for each group. Collected information was compiled on a data sheet (see Table 2) and submitted to a two tailed t-test for comparison between groups. Alpha was set at .05 ($\alpha = .05$).

Sample Data Compilation Sheet

SCORE:	Q1	Q2	Q3	Q4	Q5	Q6	Q7...	Q10	Total:
GI S1	3	2	3		3	2	2		24
GI S2	3	2	3	1	1	1	3	3	21
GI S3 GI S4	2 1	3 3	1 1	1 1	1 2	1 1	2 3	1 4	15 18

Table 2. The data compilation sheet included all scores from the assessment instruments.

RESULTS

The hypothesis stated no difference in communication between novice and experienced collegiate rugby players. The null hypothesis was accepted. Group one recorded a mean score of 22.45 out of 40 possible points and a standard deviation of 3.93. Group two recorded a mean score of 24.44 out of 40 points and a standard deviation of 4.18. The p score was 0.13.

DISCUSSION

Factors that affected communication use were past training in technique, competitive rugby experience, and cohesion with the team. Average competitive experience among athletes in the novice group was lower than athletes in the experienced group (see Table 1). It was assumed that athletes

with little competitive experience would use communication less successfully during competition. This did not prove to be the case. Some literature suggested no difference (Sullivan, 1993).

To increase the probability of differences, a broader range of subjects, including male rugby players, would be valuable to study the affect of gender. Increased specificity of instrument questions might be valuable to measure communication between players. A comparison between a team with a winning record and a team with a losing record would increase understanding of communication between players in all settings.

REFERENCES

- Fenton, L. T., & Pitter, R. (2010). Keeping the body in play: Pain, injury, and socialization in male rugby. *Research Quarterly for Exercise and Sport*, 81(2), 212-223. Slabbert, A. D., & Ukpere, W. I. (2010). A preliminary comparative study of rugby and football spectator attitudes towards violence. *Business Papers and Reports*, 5(1), 2-25. Sullivan, P. A. (1993). Communication skills training for interactive sports. *The Sports Psychologist*, 7(1), 79-91. Weinberg, R. S., & Gould, D. (2007). *Foundations of sport and exercise psychology*. (5th ed.). Champaign, IL: Human Kinetics Publishers.

CORRELATION OF UTAH CHARTER SCHOOLS' P.E. CLASS TIME AND CHILDHOOD OBESITY

N. S. Davis, C. K. Hansen, C. Worthen, B.H. Boyer D.P.T. - nickalus.davis@gmail.com - Utah Valley University

PURPOSE

In the past 25 years, child obesity has become such a common problem that medical professionals consider it an epidemic (Moffat, 2010). The decreasing amount of physical education (P.E.) classes in public schools is a suspected problem as the trends in childhood obesity are increasing. Other questions arise from this trend regarding the attitude of young people towards physical health and fitness and its importance in maintaining a healthy lifestyle. Determining the amount of physical education class time that is offered by schools in Utah may help the general public find solutions to these problems, as well as help determine why children are preferring activities that are passive in nature instead of those that are more related to physical activity and exercise (Hart, 2005). As work has been done in Utah public schools, the purpose of this study is to assess the trends of physical education class time in Utah charter schools from before and after the No Child Left Behind Act (NCLB). Our hypothesis is that there is a decline in the amount of physical education class time taking place in Utah charter schools. If the hypothesis is found to be true, physical education can then be targeted as one of the possible variables for the increasing trend of childhood obesity.

METHODS

A literature review was completed that focused on childhood obesity in public schools in the United States with an emphasis on those schools in Utah. A list was then composed of 10 specific questions regarding P.E. class time. A consent form was also sent to inform the school principals of the purpose of the survey and how the data collected will be used. After a list of every district, school, and principal (as well as their e-mail) in the state of Utah from the Utah Department of Education website was obtained, the consent form and survey were sent through email to all charter schools principals. The majority of the questions inquired about the time students spent in physical education classes each week, while others asked about the quality of foods found in the school's vending machines. The data was analyzed and percentages were used to identify trends in the amount of physical education class time in the charter schools per week. See Figure 1 for a portrayal of children actively engaged in a physical education class.

Figure 1. Photo of youth participating in physical education class.

RESULTS

Analysis of the data revealed that the hypothesis was rejected as PE time in charter schools is

increasing since the onset of NCLB. Refer to Table 1 for a representation of the responses to survey questions as represented in percentages.

Table 1. Results of Utah Charter School Responses to P.E. Time Questionnaire (Percentages)

P.E. time fixed or changeable	77.78% said fixed	11.11% said changeable
NCLB Act affected P.E. time in schools	11.11% said yes	88.89% said no
Amount of P.E. in one week	33.33% said < 2 hours	66.66% said between 3 and 5 hours
P.E. time per week prior the NCLB Act	44.44% said < 2 hours	55.55% said between 3 and 5 hours
Vocalized requests for more or less P.E. after the NCLB Act	22.22% said there was a need for more	0% said there was a need for less (the rest reported no change)
Vocalized requests for more or less P.E. prior the NCLB Act	11.11% said there was a need for more	0% said there was a need for less (the rest had no vocalized report)

DISCUSSION

The data from the surveys taken from 9 charter schools in Utah showed that 77.78% have fixed time their students spend in physical education class, 11.11% have changeable P.E. time, and 11.11% expressed other. The principles indicated that of these charter schools, 11.11% were affected by the onset of NCLB on how much P.E. time a student is given each week, and 88.89% were not affected. Of the hours these charter school students spend in P.E. class each week, 33.33% reported that their students spend 2 hours or less in P.E. and 66.66% reported between 3 and 5 hours a week. Since the enactment of NCLB, it is apparent that there is actually an increase in the amount of class time charter schools give their students. The results show that 44.44% of charter schools provided students with 2 hours or less each week and 55.55% said they allowed between 3 and 5 hours of P.E. time a week. Furthermore, even with this increase, there was a greater call for more P.E. time from the parents for the students in Charter schools. The results from this study show that there was a trend towards constant or increased physical education time provided for students in charter schools in Utah. This is in contrast to physical education time provided for students in Utah public schools (Hansen 2012 in review). An explanation for this could be the fact that in charter schools there is more leeway for principals and teachers to implement activities in the classroom or as part of the daily schedule as they feel (Huerta, 2009). Public schools remain under the direction of the state board and its policies, whereas charter schools (while not exempt from the same educational standards set by the State) act autonomously with more control and flexibility exercised by the principals and teachers (Duffet, 2008). Due to the adaptable nature of the structure of charter schools, the students could be allowed more outside-the-classroom activities such as physical education (Renzulli, 2011). This was shown by the results of this study.

A limitation of this study was the small sample size of the charter schools that answered the survey. In order to obtain a more representative understanding of the population of charter schools in Utah, a larger sample size will need to be taken. Only 9 of the 800+ schools in Utah responded to the survey.

REFERENCES

- Duffet, A., Farkas, S., Rotherham, A. J., Silva, E. (2008). Waiting to be won over: teachers speak on the profession, unions, and reform. Retrieved from <http://www.educationsector.org>
- Hansen, C.A., et al. (2012). An assessment of the amount of physical education class time in Utah public schools. *Western Society for Kinesiology and Wellness*. Under Review.
- Hart, M.A. (2005). Influence of a physical education methods course on elementary education majors' knowledge of fundamental movement skills, *52*, (4).
- Huerta, L.A. (2009). Institutional v. technical environments: reconciling the goals of decentralization in an evolving charter school organization. *Peabody Journal of Education*, *84* (2), 244-261.
- Moffat, T. (2010). The "childhood obesity epidemic." *Medical Anthropology Quarterly*, *24* (1), 1-21.
- Renzulli, L.A.; Macpherson, H.P., Beattie, I.R. (2011). Racial mismatch and school type: teacher satisfaction and retention in charter and traditional public schools. *Sociology of Education*, *84* (1), 23-48.

GLUCOSE INGESTION DURING EXERCISE ON RESISTING COGNITIVE INTERFERENCE

T. M. Esqueda, J. J. Real, & M. A. Seely - snowcondia@gmail.com - Whitworth University

PURPOSE

Exercise performance and cognitive performance can be improved by glucose ingestion (Sherman, Peden, & Wright, 1991; Siinram-Lea, Foster, Durlach, & Perez, 2001). Since exercise and cognition translate to the physical and mental aspects of sport, the addition of a glucose solution (GS) prior to exercise may improve resistance to cognitive interference. The purpose of this study was to examine the effect of a GS ingested before exercise on resistance to cognitive interference. The research hypotheses were that 1) GS ingestion would lower Stroop Word and Color Test (ST) errors at +15-min and +30-min time points, and 2) GS ingestion would lower ST time to completion (s).

METHODS

Participants: A convenience sample of nine moderately active college-age students volunteered for participation ($n_{male}=6$, $n_{female}=3$). All participants were defined as physically active (i.e. regular exercise twice a week for at least 30-min a session). **Equipment:** Height and weight were measured with a balance-scale stadiometer. Heart rate was measured using a Polar Coded heart rate monitor worn around the chest. Blood glucose was measured with a Microlet2 glucometer. Participants exercised on a g-force RT recumbent cycle ergometer. The ST was used to measure resistance to cognitive interference. **Procedures:** Participants completed two testing sessions. Upon arrival to the first session, height, weight, age, and resting heart rate (PvHR) were measured. Participants were exposed to one of two conditions, a 6% GS or a zero-calorie sweetened placebo (P) solution, in a randomized fashion. Each GS contained water and dextrose powder equal to 5 mL/kg of body weight, and each P contained the same amount of water and Sweet & Low. Upon consumption of the solution, participants waited an additional 15-min before exercise. After the rest interval, participants performed 30-min of cycle exercise at 70-75% heart rate reserve, which is considered high-intensity exercise and appropriate for the sample population (American College of Sports Medicine, 2010). A ST was administered and blood glucose was measured at the +15-min and +30-min time points (see Figure 1). Upon completion, the participants were offered a chance to cool down, thanked, and left the lab. **Statistics:** A factorial analysis of variance (ANOVA) with repeated measures was used to determine significant differences between drink conditions. For each ANOVA comparison, alpha (α) was set at $p < 0.05$.

Test Procedures Timeline Expressed in -min

-20	-15	0	+15	+20
BG	W	BG	BG	BG
DS		BE	ST#1	ST #2

Key: BG - Blood glucose measured; DS - Drink solution (5-min given); W - Wait 15-min; BE - Begin exercise; ST #1 - ST#1

Figure 1. Participants arrived at the -20-min time point and left at the +30-min time point, making each testing session approximately 50-min long.

RESULTS

Mean data for ST errors and ST time to completion for each solution and +15-min and +30-min time points are summarized in Table 1. For the number of ST errors, the factorial ANOVA indicated that there was no statistical difference ($p = 0.554$) between GS and P trials or between the +15-min and +30-min time points ($p = 0.426$). Therefore, the first research hypothesis was false. For the ST time to completion, the factorial ANOVA indicated that there was a statistical difference ($p = 0.017$) between the +15-min and +30-min time points within each trial, but not between GS and P trials ($p = 0.201$). Therefore, the second research hypothesis was false.

ST Errors and Time to Completion for Solutions and Time Points		
	ST errors	ST time to completion (s)
GS	0.833 ±0.325	20.649 ± 1.328
P	0.556 ±0.325	18.143 ±1.328
+15-min.	0.778 ±0.265	20.565 ± 1.046*

+30-min.	0.611 ±0.237	18.227 ± 1.025*
----------	--------------	-----------------

Table 1. Means ± SE are presented for ST errors and ST time to completion. * indicates significant difference between +15-min. and +30-min. for ST time to completion.

DISCUSSION

Glucose solutions elicited no beneficial effects for reduction of the amount of ST errors committed, though ST time to completion within a session improved. However, the effect of glucose ingestion on ability to resist cognitive interference during exercise with the ST is not well documented. The lack of improved ST errors in the present study ($p = 0.554$) suggested ingestion of a GS does not enhance resistance to cognitive interference or that the ST was not sensitive enough to detect small changes in resistance to cognitive interference. Research has revealed a significant difference in ST time to completion between sessions ($p = 0.003$) that was not observed in the present study (Welsh, Davis, Burke, & Williams, 2002). This result may have been attributed to the use of a carbohydrate (CHO) solution as opposed to a straight GS. In the body, CHO's are converted into glycogen to be stored for later use as an energy source. Because glucose requires more energy than glycogen to be broken down, it may not have the same effect on enhancing cognitive function as CHO's (Wilmore, Costill, & Kenney, 2008). Overall, the present study has considerable value in that it can be a foundation for further research in the area of glucose levels during exercise for resistance to cognitive interference. The statistical power of the present study was extremely low due to a small sample size and an ineffective cognitive test. Future investigations should examine the use of more effective cognitive tests and a higher sample size to improve statistical power.

REFERENCES

- American College of Sports Medicine (2009). *ACSM's Guidelines for Exercise Testing and Prescription* (8th ed.). Philadelphia, PA: Author.
- Sherman, W.M., Peden, M.C., & Wright, D.A. (1991). Carbohydrate feedings 1 h before exercise improves cycling performance. *American Journal of Clinical Nutrition*, 54, 866-870.
- Stinram-Lea, ST., Foster, J.K., Durlach, P., & Perez, C. (2001). Glucose facilitation of cognitive performance in healthy young adults: examination of the influence of fast-duration, time of day and pre-consumption plasma glucose levels. *Psychopharmacology*, 157(1), 46-49.
- Welsh, R.S., Davis, J.M., Burke, J.R., & Williams, H.G. (2002). Carbohydrates and physical/mental performance during intermittent exercise to fatigue. *Medicine and Science in Sport and Exercise*, 34(4), 723-731.
- Wilmore, J.H., Costill, D.L., & Kenney, W.L. (2008). *Physiology of Sport and Exercise* (4th edition). Champaign, IL: Human Kinetics.

A KINEMATIC COMPARISON OF BAREFOOT AND VIBRAM FIVEFINGERS® RUNNING

I. Fonken, T. Hill, and C. Northcott - swabbapple@gmail.com - Wmtworth University

PURPOSE

It is a common assumption that Vibram FiveFingers® closely imitate barefoot running and are dissimilar to shod running. Shod versus barefoot running kinematics in relation to ankle angle at touchdown and stride length have been researched in multiple studies (Divert, Momieux, Baur, Mayer, & Belli, 2004; Squadrone & Gallozzi, 2008, 2011; Wit, Clercq, and Aerts, 2000). With the exception of Squadrone and Gallozzi (2008), few studies have compared Vibram FiveFingers® to barefoot running. The purpose of this study was to compare ankle angle at touchdown and stride length while running barefoot and with Vibram FiveFingers® shoes in active runners between the ages of 18 and 50 years old. It was hypothesized that there would be no difference between barefoot and Vibram FiveFingers® running conditions for ankle angle at touchdown based on previously mentioned research.

METHODS

Participants: A convenience sample of three eligible female (n=3) and two eligible male (n=2) college-age students volunteered for participation (height: 169.60 ± 12.82-cm, weight: 164.8 ± 36.43-lbs, age: 26.8 ±

11.90-y). Every participant owned his/her own pair of Vibram FiveFingers® and was accustomed to running in them prior to the study. **Procedures & Equipment:** During a familiarization session, each participant performed a VCFpeak test, which was used to determine the running speed for the testing session (70% vVCFpeak). During the VCFpeak test, metabolic data was continuously analyzed using a TrueOne 2400 mobile metabolic cart (ParvoMedics, Sandy, UT). During a separate testing session, participants' gait was video recorded while running barefoot or while wearing Vibram FiveFingers®. Prior to running, circular markers were placed on the fifth metatarsophalangeal joint, the tuber calcaneum, the lateral malleolus, and the head of the fibula on the right leg of each participant. The landmarks were used to facilitate kinematic video analysis as shown in Figure 1. Once marked, each participant completed a one minute running interval in each condition (randomly ordered) 70% vV0_{2peak}- **Statistics:** A dependent group t-test was used to investigate significant differences between conditions for each dependent variable (ankle angle at touchdown and stride length). Statistical significance was set at an alpha level of $p < 0.05$.

Figure 1. A screenshot of the kinematic analysis illustrates the anatomical landmarks used for reference and how the software was used to determine ankle range of motion.

Familiarization Session

RESULTS

Mean data for each condition are summarized in Table 1. Mean stride lengths between barefoot and Vibram FiveFingers® conditions were not significantly different ($p = 0.62$; $f .9 \pm 0.2$ -m vs. $f .8 \pm 0.2$ -m, respectively). Therefore, the null hypothesis for stride length was accepted. Ankle angles between barefoot and Vibram FiveFingers® conditions also were not significantly different ($p = 0.79$; $f 03.4 \pm 11.6$ degrees vs. $f 02.4 \pm 7.5$ degrees, respectively). Therefore, the null hypothesis for ankle angle at touchdown was accepted.

Comparison of Barefoot and Vibram FiveFingers®

	Ankle Angle at Touchdown	Stride Length
Barefoot	103.4±11.6	1.9±0.2-m
Vibram FiveFingers®	102.4 ±7.5	1.8 ± 0.2-m
<i>p</i> value	.79	.62

Table 1. Mean data for ankle angle at touchdown and stride length are summarized for both running conditions.

DISCUSSION

The purpose of this study was to compare ankle angle at touchdown and stride length while running barefoot and with Vibram FiveFingers® shoes in active runners between the ages of 18 and 50 years old. Based on the observed results, the barefoot condition was comparable to the Vibram FiveFingers® condition for both ankle angle and stride length when participants ran at 70% vV0_{2peak}. The present study was novel because it was the first to compare ankle angle at touchdown and stride length while running barefoot or in Vibram FiveFingers® in a sample population that included various levels of training. It also is unique since a relative running velocity was utilized for each participant instead of an absolute running velocity as in previous research (Wit et al, 2000). Lastly, the study included participants with varied levels of training in Vibram FiveFingers®, which was not the case with previous research (Squadrone & Gallozzi, 2008, 2011). The lack of significant differences between running conditions for each dependent variable may have been attributed to the sub-maximal aspect of the running velocity chosen or the similarity of Vibram FiveFingers® to the barefoot condition. The results for ankle angle at touchdown were comparable to previous research (Squadrone & Gallozzi, 2008; Wit et al, 2000). However, the similarity in stride length between the two conditions was not consistent with the previous research (Squadrone & Gallozzi, 2008). This may have been due to the consistent 70% V0_{2peak} velocity running speed of this study. Without a doubt, the internal validity and the ability to infer generalizations from these results were limited by the small sample size in the study. In the future, more participants must be used. Another suggestion for future research is to examine ankle inversion and eversion in addition to ankle plantarflexion and dorsiflexion.

REFERENCES

- Divert, C, Mornieux, G., Baur, H., Mayer, F., & Belli, A. (2005). Mechanical comparison of barefoot and shod running. *International Journal of Sports Medicine*. 26(1), 593-598. Squadrone, R., & Gallozzi, C. (2008).

Biomechanical and physiological comparison of barefoot and two shod conditions in experienced barefoot runners. *The Journal of Sports Medicine and Physical Fitness*. 49(f), 6-13.

Squadrone R., & Gallozzi C. (2011). Effect of a five-toed minimal protection shoe on static and dynamic ankle position sense. *The Journal of Sports Medicine and Physical Fitness*, 51(3), 401-408.

Wit, B. D., Clercq, D. C., & Aerts, P. (2000). Biomechanical analysis of the stance phase during barefoot and shod running. *Journal of Biomechanics*, 33, 269-278.

AN ASSESSMENT OF THE AMOUNT OF PHYSICAL EDUCATION CLASS TIME IN UTAH SCHOOLS

C. K. Hansen- chasekorey@gmail.com - Utah Valley University, Bret H. Boyer D.P.T.

PURPOSE

A lack of physical education is a suspected problem as the trends in childhood obesity are increasing and the rising generation does not have a full understanding of the importance of exercise (Jacobs, 2005). Finding out how much physical education class time is offered by schools in Utah may help us to understand a variable as to why more people are not taking advantage of the opportunity to be active and exercising (Hart, 2005). The purpose of this study is to assess the trends of physical education class time in Utah schools from before and after the No Child Left Behind Act (NCLB).

Our hypothesis is that there is a decline in the amount of physical education class time taking place in Utah schools. If our hypothesis is found to be true, then we can target physical education as one of the possible variables for the increasing trend of childhood obesity (Jacobs, Wayne).

METHODS

After completing a literature review targeted on the topic of interest, a list was formed of 10 specific questions as well as a consent form to inform the participants (school principals) of the purpose of the survey, and how the data collected will be used. After a list was obtained of every district, school, and principal (as well as their e-mail) in the state of Utah from the Utah Department of Education website, the consent form and survey were sent through email to all public and charter schools principals. Most of the questions dealt with the time spent in physical education classes each week, while others dealt with the quality of foods in vending machines. Percentages were used to identify trends in the data, and portrayed the amount of physical education class time per week. This data was gathered using straight percentages from the responding population. See Figure 1 for a portrayal of children activity engaged in a physical education class.

Figure 1. Photo of youth participating in physical education class.

RESULTS

Refer to Table 1 for a representation of the responses to survey questions as represented in percentages.

Percentages Gathered for the Data Collected on the Amount of Physical Education in Utah Schools

Physical education time fixed or changeable	23.53% said changeable	70.59% said fixed
NCLB Act effected physical education in schools	29.41% said it did	70.59% said it didn't
Amount of physical education in one week	56.72% said 1 hour or less	13.43% said 2 hours a week (the rest varied up to 5 hours)
Amount of physical education in a week prior the NCLB Act	47.69% said 1 hour or less	23.08% said 2 hours a week (the rest varied up to 5 hours)
Vocalized requests for more or less physical education after the NCLB Act	41.18% said there was a request for more	1.47% said there was a need for less (the rest had no vocalized reports)

Vocalized requests for more or less physical education prior the NCLB Act	2.94 said there was a request for more	17.71% said there was a request for less (the rest had no vocalized reports)
---	--	--

Table 1. Responses to survey questions as represented in percentages

Currently, 29.41% of principals indicated that physical education class time had decreased since the onset of NCLB Act. While this is a smaller percentage than anticipated, it still indicates a trend for decreased physical education class time. 56.72% of principals indicated students received one hour or less of physical education class time per week while 13.43% indicated up to two hours while the remainder was varied up to but not exceeding five hours. 40% of principals reported parents requesting more physical education while 1.4% requested less. Prior to the NCLB Act 2.94% of principals noted parents requested more physical education and 14.71% reported that they requested less. 47.79% of principals indicated students receiving one hour or less of physical education class time while 23.08% indicated up two hours. The remainder was spent up to but not exceeding five hours. 2.94% of principals noted parents requested more physical education time while 17.71% requested less.

DISCUSSION

The first set of questions regarding physical education classes being fixed or changeable may not give an accurate set of numbers. There is a difference from before and after the NCLB Act, but as many principals commented, there seems to be more of a "fixed" hold on the physical education program due to funding cuts to support other academic programs. It is easy to see with the next set of questions that there was more physical education taking place before the NCLB Act; not a huge difference, but a big enough one to let us know that physical education time is dropping in Utah schools. The last set of questions asked about parents vocalizing a need for more or less activity has a big difference which is another indication that there was more physical education time in Utah schools in the past.

REFERENCES

Hart, Melanie A., (2005) *Influence of a Physical Education Methods Course on Elementary Education Majors' Knowledge of Fundamental Movement Skills*. 00318981, 20051201, Vol. 52, Issue 4. Jacobs, Wayne, (2005) *The Childhood Obesity Epidemic: What We Can Do*. LeTourneau University.

WINGATE ANAEROBIC TEST OF MALE VS. FEMALES

G.A. Hoffman, N. A. Davenport - geoffrey.hoffman@email.wsu.edu - Washington State University




PURPOSE

Maximal anaerobic power and capacity was shown to be essential as it pertains to competitive sports (Smith & Hill, 1991). Many factors contributed to the overall success of an athlete. Fatigue had a negative effect on athletic performance (Bradley & Ball, 1992). The purpose of this study was to examine the difference in fatigue index (power drop) between males and females. This information helped to determine whether training regimens should be different for male and female athletes. **Null Hypothesis:** There was no difference between the fatigue index of males and females.

METHODS

Subjects. The population for this study consisted of division 1 university students enrolled in the kinesiology program. Nineteen participants (N=19) were used in this study. Eleven subjects were male ($n_m=11$) and eight subjects were female ($m=8$). Both collegiate athletes and non-athletes participated. Each subject was tested during one of two sessions. **Equipment.** Data was collected using a computer loaded with Monark Anaerobic Test software with a Wingate test specific Monark 874E cycle ergometer. **Procedures.** Initial contact with the subjects was made by email. Information that explained the study was sent to four separate classes within the kinesiology program (see Figure 1). Interested participants were assigned a 15-minute block of time in which to take part in the test.

Timeline of Events

Sent Out

 Setup time, date,

 April 7, 10am-1pm,

 Wingate Test




-3
 Sent Out

 April 17, 4-5pm,

 Wingate Test

 Thank All

Figure 1. Open and consistent communication with the participants was essential for the success of the study. It was important that everyone involved knew the timeline of events so that the study ran smoothly.

The subject's height, weight, year of birth, and sex were recorded. The subject was asked to warm-up for 5-minutes on the cycle ergometer with one kilogram of resistance added to the flywheel. At the conclusion of the initial 5-minute warm-up, the subjects were told to dramatically accelerate peddling. Upon reaching 150 revolutions per minute (RPM), 7.5% of the subject's body weight (in kilograms) was added to the cycle ergometer's flywheel as resistance. The subjects were to peddle at maximum capacity for the entire duration of the 30 seconds. Upon completion of the test, the participants were instructed to actively cool down by continuing to pedal at a moderate pace for 3-5-minutes. **Statistics.** The scores on the computer generated Wingate test reports were transferred to a data compilation sheet (see Table 1). The relative mean peak power, relative mean minimum power, and fatigue index were calculated and compared. The alpha level for this study was 0.05. A two-tailed t-test was conducted using the scores on the completed data compilation sheet. The data compilation sheet was used to record the means and totals.

Completed Data Compilation Sheet Examples

Males Participants	Max W/ Kg	Min W/ Kg	Fatigue Index
G1 S01	9.03	5.56	57.33
G1 S07	9.30	6.73	45.58
MEAN	9.91	6.37	51.83
Female Participants	Max W/ Kg	Min W/ Kg	Fatigue Index
G2S03	8.88	6.36	43.62
G2S05	9.37	5.94	54.64
MEAN	8.69	5.49	53.31

Table 1. The data showed that males had a higher relative maximum and minimum power output, and produced a lower fatigue index.

RESULTS

The alpha level for this study was 0.05. The p-value for the relative maximum peak power output was 0.005, which demonstrated significance. The relative minimum power also was significant at 0.01. The fatigue index demonstrated no significance with a p-value of 0.70 (see Table 2). The null hypothesis was accepted.

Comparison of Statistical Data

Group	n	Max W/ Kg	S.D.	Significance
1	11	9.91	0.67	0.005
Min W/ Kg		8.69	0.86	
6.37	0.80		0.01	
Fatigue Index				Significance
51.83	8.91			0.70
53.31	7.80			

Table 2. The data demonstrated that males had a higher relative peak power output. Females had a lower relative minimum peak power. There was little difference between male and female fatigue index.

DISCUSSION

This study aided in further understanding fatigue rates relative to training regimens. But, little difference was found between the fatigue rates of males and females. The variation in time and day between the two tests could affect the subject's overall fatigue level prior to the experiment. The difference in conditioning levels between athletes and non-athletes also could affect the results. In the future, the use of practice tests may achieve more accurate results (Barfield, Sells, Rowe, & Hannigan-Downs, 2002).

REFERENCES

- Barfield, J., Sells, P. D., Rowe, D. A., & Hannigan-Downs, K. (2002). Practice effect of the Wingate anaerobic test. *Journal of Strength and Conditioning Research*, 16(3), 472-473.
- Bradley, A. L., & Ball, T. E. (1992). The Wingate test: Effect of load on the power outputs of female athletes and non athletes. *Journal of Applied Sports Science Research*, 6(4), 193-199.
- Smith, J. C., & Hill, D. W. (1991). Contribution of energy system during a Wingate power test. *British Journal of Sports Medicine*, 25(4), 196-199.

REWARD PREFERENCES IN YOUTH WRESTLING

G. A. Hoffman - geoffrey.hoffman@email.wsu.edu - Washington State University

PURPOSE

Athletes in different sports with varying skill levels preferred different types of rewards. Rewarding an athlete appropriately was shown to increase performance and intrinsic motivation (Amorose & Horn, 2001). The purpose of this study was to determine the reward preferences of experienced and inexperienced youth wrestlers. **Null Hypothesis:** There was no difference between experienced and inexperienced reward preferences in youth wrestlers.

METHODS

Methods for this study included discussion of the subjects, instrumentation, procedures, and statistics. **Subjects.** The population for this study consisted of youth wrestlers. Twenty wrestlers (N=20) between 5-12 years were used in this study. Twelve wrestlers were experienced ($n_e=12$), and eight wrestlers were inexperienced ($n_i=8$). Experienced wrestlers were defined as having wrestled for four or more years. Inexperienced wrestlers were those with no prior wrestling experience. Data was collected from all participants over a two-day process. **Instrumentation.** A reward preferences questionnaire was used in this study. The questionnaire specifically focused on experiences wrestlers found most rewarding with regards to participation in the sport. Participants judged preferences based on a six point Likert Scale (see Figure 1).

Strongly disagree		Likert Scale				Strongly agree
1	2	3	4	5	6	

1. I feel motivated to succeed when my coach singles me out to complement me.

Figure 1. Ten questions were presented on the questionnaire. Each question followed the same format for the revised instrument.

Procedures. Initial contact with the head coach of the wrestling team was made by email. The meeting time, date, and location was established during the email conversations. Two different meeting times were arranged, with one week separating the meetings. The survey packets, which contained a parental consent form, cover sheet with subject number, logistics sheet, and survey were distributed at the first meeting (approved by WSUIRB No. 5847). Participants were informed of the manner in which to complete the packet. A script was used during both meetings to present information in a structured and replicable manner. The survey packets were collected at the beginning of the second meeting. The information gathered with the logistics sheets and reward preference survey was analyzed and compared. **Statistics.** A data compilation sheet was used to record the information for each group. The significance level between the two groups was calculated using a two-tailed independent t-test provided by Microsoft Excel (2007). Significance was determined using $\alpha=0.05$.

RESULTS

The group of experienced wrestlers recorded a mean confidence score of 37.5 ± 1.72 . The inexperienced wrestlers recorded a mean confidence score of 31.7 ± 1.89 (see Table 1).

Reward Preferences of Youth Wrestlers

Group	n	Mean	S.D.	Significance
Experienced	12	37.5	1.72	0.04
Inexperienced	8	31.7	1.89	

Table 1. The experienced group demonstrated a significantly higher mean level than the inexperienced group.

DISCUSSION

The null hypothesis stated no difference between experienced and inexperienced reward preferences in youth wrestlers. The null hypothesis was rejected.

Factors that affected the subject's reward preferences included the age of the wrestler, increased knowledge of technique over time, and the quality of family support. Coach feedback (positive or negative), coaching style (positive feedback, training and instruction, democratic behavior, social support, and autocratic behavior), teammate support, and competitive wrestling experience also influenced the answers on the questionnaire.

Turman (2003) indicated that increased experience raised the wrestler's desire for training and instruction and for autocratic coaching behavior. These wrestlers also were more open to constructive criticism. Experienced wrestlers were motivated by external rewards, such as trophies and medals.

The inexperienced group preferred positive feedback and social support. Chelladurai and Saleh (1980) determined that inexperienced wrestlers preferred an encouraging environment because coaches were supportive even when the athlete was not successful. These wrestlers also were not motivated by external rewards. Each was concerned with the enjoyment of the wrestling experience with friends rather than the competitive aspect of the sport.

To better understand reward preferences in young athletes a larger sample size across a greater number of sports would be helpful. Subjects should be of both genders to determine reward

preference differences.

REFERENCES

Amorose, A. J., & Horn, T. S. (2001). Pre- to post-season changes in the intrinsic motivation of first year college athletes: Relationships with coaching behavior and scholarship status. *Journal of Applied Sport Psychology, 13*(4), 355-373. Turman, P. (2003). Athletic coaching from an instructional communication perspective: The influence of coach experience on high school wrestlers' preferences and perception of coaching behaviors across a season. *Communication Edition, 52*(2), 73-86. Chelladurai, P., & Saleh, S. D. (1980). Dimensions of leader behavior in sports: Development of a leadership scale. *Journal of Sport Psychology, 2*(1), 34-45.

VALIDATION OF THREE BODY COMPOSITION DEVICES

K. E. Johnson - kej20@zips.uakron.edu - The University of Akron

PURPOSE

Excess abdominal fat has shown to be strongly associated with increased risk for many obesity-related conditions including insulin resistance, type 2 diabetes, dyslipidemia, hypertension, the metabolic syndrome, and cardiovascular disease (Center for Disease Control., 2011; Biaggi et al, 1999). Currently the public health messages focusing on the obesity epidemic have encouraged individuals to be interested in regular measurement of body composition. The cost of assessment can range from only a few dollars to thousands of dollars depending on the equipment used and the technical skills required for the test. Recently, a new ultrasound (US) device, the Body Metrics BX-2000 manufactured by IntelliMetrix, was created to be a midrange clinical method used by fitness and wellness professionals. It not only measures percent body fat (%BF), but also has the capacity to identify and measure both subcutaneous and visceral fat layers independently. The purpose of this study was to cross-validate three measures of body composition using an octopolar Bioelectrical Impedance machine (BIA), the Body Metrix Ultrasound (US), and Air-Displacement Plethysmography (ADP). The null hypothesis of this study is that no significant differences for percent body fat between the three machines would be observed.

METHODS

Participants: Twenty-six college-aged (22.9 ± 1.35 years) men ($n = 18$) and women ($n = 8$) gave written consent to participate in the present study. **Equipment:** To measure %BF the BodPod, a Tanita BC-418 octopolar Bioelectrical impedance machine, and the Body Metrix Ultrasound device in which all measurements taken were in accordance with manufacturers' guidelines. **Procedures:** All participants abstained from eating or drinking for two hours as well as moderate or vigorous exercise for 24 hours before all testing. All testing was performed with males wearing spandex shorts and no shirt, and females wearing a sports bra and spandex shorts. The order of testing was all participants completed the ADP first so the weight determined could be used for the US assessment. The Bioelectrical Impedance machine and US were then randomly assigned for the second and third tests. **Statistics:** A one-way analysis of variance and a Pearson correlation were used to determine significance as well as associations between machines for the three-body composition measured. Statistical analyses were performed using SPSS version 17.0 (SPSS Inc., Chicago, IL) with the level of significance being set at $p < 0.05$.

RESULTS

The three clinical grade machines were all significantly correlated with high (0.85) r values (see Table 1). However, no significant differences were found using a one-way analysis of variance (null hypothesis accepted).

Percent Body Fat Correlations for the Three Devices Measured

%BF by Machine (M ± SD)	BIA	US	ADP
BIA (15.3 ± 8.43)	1		
US (15.7 ± 5.14)	.862**	1	
ADP (15.5 ± 5.83) **p = 0.01	.872**	.879**	1

Table 1. Pearson Product Moment Correlations between the three machines when measuring %BF.

DISCUSSION

Having valid ways to measure body composition that are accessible in terms of being transportable, cost effective, and simple to use, should become a part of preventive medicine. Additionally, it is important for fitness providers to use valid measures of body composition regularly. Regular measurement will allow for better tracking of an individual's %BF both for prevention and treatment, help lower public health costs by identifying risk earlier, and help prevent certain pathologies. Percent body fat estimates with BIA versus ADP ($r = 0.872$) showed comparable correlations with those of Levenhagen et al. (2011), ($r = 0.90$), and Biaggi et al. (1999), ($r = 0.859$), both of which measured healthy adults. Ultrasound machines used to determine %BF are relatively new so few validation studies have been reported. Only one study by Pineau et al. (2007) used a higher grade ultrasound with better sonographic capabilities than the BodyMetrix device, but compared the US to the same equipment as the present study, ADP and BIA. Therefore, if current health or fitness professionals were looking for ways to measure body composition, all three instruments used in this study can measure %BF with equal validity, the BIA adds the benefit of a trunk measure of %BF which may help identify risk, but only the US is able to measure visceral fat depth at the same time as it measures %BF. This study only used healthy college aged students, so the results found may be generalized to a young, relatively healthy population. Further research should include general and broader populations, i.e. obese children and adults as well as other individuals who present with risk factors for the lifestyle-related diseases such as insulin resistance, abdominal obesity, metabolic syndrome, or inflammation that are known to be associated with visceral fat.

REFERENCES

- Biaggi, R. R., Vollman, M. W., Nies, M. A., Brener, C. E., Flakoll P. J., Levenhagen, D. K., . . . Chen, K. Y. (1999). Comparison of air-displacement plethysmography with hydrostatic weighing and bioelectrical impedance analysis for the assessment of body composition in healthy adults. *American Journal of Clinical Nutrition*, *69*(5), 898-903. CDC Home, Healthy weight - it's not a diet, it's a lifestyle! (2011). Retrieved from <http://www.cdc.gov/healthyweight/index.html> Levenhagen, D. K., Borel, M J., Welch, D. C, Piasecki, J. H., Piasecki, D. P., Chen, K. Y., & Flakoll, P. J. (2011). A comparison of air displacement plethysmography with three other techniques to determine body fat in healthy adults. *Journal of Parenteral Enteral Nutrition*, *23*, 293-299. Pineau, J. C, Guihard-Costa, A. M., & Bocquet, M. (2007). Validation of ultrasound techniques applied to body fat measurement. *Annals Nutrition Metabolism*, *51*, 421-427.

TEAM CLIMATE AMONG FOOTBALL OFFICIALS

M. Kunold - Mark.kunold100@email.wsu.edu - Washington State University

PURPOSE

Sport officials must work as a team to optimally perform. Effective officiating requires mastery of rules and recognition of penalties (Mascarenhas, Collins, & Mortimer, 2005). A positively perceived team climate was shown to make groups work more effectively by decreasing role ambiguity and social loafing (Beauchamp, Bray, Eys, & Carron, 2005). The purpose of this study was to compare the perception of team climate between inexperienced and experienced high school football officials. **Null Hypothesis:** There was no difference in perception of team climate between inexperienced and experienced officials.

METHODS

This study included discussion of subjects, instrumentation, procedures, and statistics. **Subjects.** High school football officials from the Washington Official's Association District 12 were the population of interest. Twenty-nine officials were used in this study ($N=29$). Subjects were divided into inexperienced and experienced officials. Inexperienced officials, Group One ($n_e < 8$), had eight or fewer seasons of experience officiating. Experienced officials, Group Two ($n_e > 12$), had 12 or more seasons experience. **Instrumentation.** A revised questionnaire, modeled from Weinberg and Gould's (2011) original team climate questionnaire was used. Questions were modified to be specific for football officials. The questionnaire contained ten questions, which

subjects responded to on a four point Lickert scale. **Procedure.** The association director was contacted via email for permission to carry out this study. Data was obtained through an online questionnaire that was sent out on a Monday in early Spring. The questionnaire was open to responses for three weeks there after. Each official was informed of the confidentiality of responses and were asked to read an implied consent form before participating. Emails containing the questionnaire were sent to each of the 41 officials in the association. An information sheet was included with the questionnaire and contained questions about participant's personal experiences and background in officiating. **Statistics.** Collected information was compiled on a data sheet (see Table 1). A mean score was calculated for the responses for each group. A two tale independent t-test was performed to compare mean group scores. Significance level of $\alpha=0.05$ was used.

SCORE			Sample Data		Compilation Sheet					
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
GI S1	4	3	4	3	4	4	3	3	4	4
GI S2	3	4	2	2	3	4	1	3	3	3
GI S3	4	4	4	4	3	3	2	3	3	4
GI S4	3	3	4	3	3	4	1	4	2	4

Table 1. The data sheet included responses from all subjects.

RESULTS

Twenty-nine of the 41 (No=29) officials responded to the questionnaire. Ten officials were grouped as inexperienced and 13 were considered experienced. Inexperienced officials averaged 3.2 seasons officiated, while the experienced group averaged 21.7 seasons. An α -level of .05 was used for this study. The scores between inexperienced and experienced officials were not significantly different. The null hypothesis for this study could not be rejected.

DISCUSSION

The hypothesis stated there was no difference in team climate perception between inexperienced and experienced officials. The hypothesis could not be rejected with the data collected. No difference was found.

Multiple factors played a role in team climate perception. Factors such as familiarity with the sport, personal role on the field, and training prior to the start of the season effect an officials experience with the group (see Figure 1). Responses from both groups indicated high comfortability with the role of official.

Factors Influencing Personal Experience

Personal Experience

Pre-season training
Familiarity with sport
Position on field

Figure 1. Many factors play a role in an individual's personal experience.

In the future, changes could be made to improve the overall quality of this study. Increased sample size and randomization would increase practical value. Larger groups could also help form a more inexperienced group, possibly entirely composed of rookie officials. Surveying before and after the season to see if perception changed throughout the season could help strengthen this study. Surveying the association in person, on a single day could prove beneficial. Reliability and validity of the instrument also should be checked in the future prior to conducting the study.

REFERENCES

- Beauchamp, M.R., Bray, S.R., Eys, M.A., & Carron, A.V. (2005). Leadership behaviors and multidimensional role ambiguity perceptions in team sports. *Small Group Research, 36*(5), 5-20. Mascarenhas, D.R. Collins, D., & Mortimer, P. (2005). The accuracy, agreement, and coherence of decision-making in rugby union officials. *Journal of Sport Behavior, 28*(3), 253-271. Weinberg, R.S. & Gould, D. (2011). Group and Team Dynamics. *Foundations of sport and exercise psychology* (5 ed.). Champaign, IL: Human Kinetics (p.171).

CONFIDENCE IN RESISTANCE TRAINING

T. J. Lee - tjlee@wsu.edu - Washington State University

PURPOSE

Outstanding performances resulted from weight lifting experience. Strength and girth improved satisfaction. Satisfaction strengthened confidence (Tucker, 1982). Confidence while lifting was influenced by perception of self. Athletes with confidence evaluated performance more highly than athletes with no confidence (Weinberg & Gould, 2011). Does the instructor level of participation impact confidence/performance? Does experience play a role in resistance training confidence? How do others affect the level of performance? The purpose of the study was to compare confidence between experienced and inexperienced collegiate weight trainers. **Null Hypothesis:** There was no difference in confidence between experienced and inexperienced weight lifters.

METHODS

Components of the pilot study included subjects, instrumentation, procedures, and statistics.

Subjects. The population consisted of a convenience sample of experienced and inexperienced collegiate weight lifters from a weight training class. The experienced weight lifters had more than one year of weight training. The inexperienced weight lifters possessed no experience. Students ranged from 18-24 years of age. Twenty students were used (N=20). Group one consisted of ten experienced weight lifters ($n_e = 10$). Group two consisted of ten inexperienced weight lifters ($n_i = 10$). **Instrumentation.** A revised questionnaire was used and modeled from

Vealey's (1986) original survey of confidence. Survey questions were performance specific and focused on confidence. Subjects were asked to rank each question on a ten point Likert scale.

Procedures. Data was collected spring semester at a division 1 university. In an attempt to prevent misunderstandings among the participants, a script was followed to present and explain the study accurately and efficiently. Each student was informed of the confidentiality of the study. Packets were distributed. Each packet contained the confidence questionnaire and a sheet to gather demographic information. Once completed, students were asked to return the packets.

Statistics. Information was collected in a data compilation sheet (see Table 1). Upon completion, a mean score was determined. A two-tailed independent t-test was used to compare experienced and inexperienced weight lifters. The level of significance was $\alpha = 0.05$.

Sample Data Compilation Sheet

SCORE	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
G1 S1										
G1 S2										
G1 S3										
G1 S4										

Table 1. The scores to assess confidence for weight lifters were placed in a data compilation sheet. The table was used in the calculation of the two-tailed independent t-test to find differences in the data.

RESULTS

Experienced subjects recorded a mean confidence score of 86.4 ± 1.66 . The high score indicated a high level of confidence and resulting positive performance. Inexperienced weight lifters recorded a mean confidence of 80.2 ± 1.73 . The lower score illustrated lower level of confidence and resulted in less positive performance. There was a significant difference in confidence between

experienced and inexperienced subjects in the pilot study ($p=0.272$). The hypothesis was rejected.

DISCUSSION

The Null hypothesis stated no difference in confidence between experienced and inexperienced weight lifters. Social support influenced the confidence for many athletes (Wilson, Sullivan, Myers, & Feltz, 2004). Many of the experienced weight lifters used weight training as a form of conditioning which was supported by family and friends. Also, experienced weight lifters were aware of positive performance states. Most of the inexperienced weight lifters typically were not competitively oriented individuals. Factors associated with subjects' experience played a role in determining confidence during performances.

The strength of the study was understanding that confidence level was influenced by weight training. For future studies, the population should include participants in weight training class as well as participants from 'Weight Training Club'. Recording data before, during, and after a weight training routine would be a great addition to future studies (see Figure 2). Another option was to replicate this study using different forms of conditioning: jogging, rowing, or dancing.

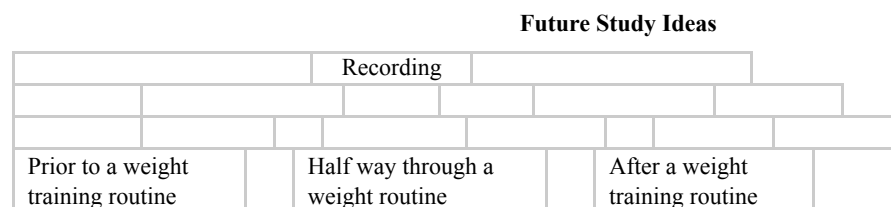


Figure 2. Recording confidence at different times could decrease the probability of false-positive results.

REFERENCES

- Tucker, L. A. (1982). Effect of a weight-training program on the self-concepts of college males. *Perceptual and Motor Skills*, 54, 1055-1061.
- Vealey, R. S. (1986). Conceptualization of sport confidence and competitive orientation: Preliminary investigation and instrument development. *Journal of Sport Psychology*, 8(3), 221-246.
- Weinberg, R., & Gould, D. (2011). *Foundation of sport and exercise psychology* (5 ed.). Champaign, IL: Human Kinetics, p. 329.
- Wilson, R., Sullivan, P., Myers, N., & Feltz, D. (2004). Sources of sport confidence of master athletes. *Journal of Sport and Exercise Psychology*, 26, 369-384.

ANXIETY IN WOMEN SOCCER PLAYERS

K. McCaffrey- kaitlinwsu@comcast.net - Washington State University

PURPOSE

Positive arousal and negative anxiety was common among many soccer players during games and/or practice (Haneishi, Fry, Moore, Schilling, Li, & Fry, 2007). Soccer players realized anxiety levels must be minimized to increase performance. Anxiety formed a barrier that made it difficult for the player to focus on the game. Anxiety caused an overall decrease in performance (Ffanton, Mellalieu, & Hall, 2002; Maynard, Hemmings, & Warwick-Evans, 1995). The purpose of the study was to determine if a relationship between anxiety and level of experience was present in woman soccer players.

Null Hypothesis: There was no difference in anxiety levels between inexperienced and experienced woman soccer players.

METHODS

Methods for the study included discussion of subjects, instrumentation, procedures, and statistics.

Subjects. The subjects for the study were women intramural soccer players from a division 1 university. Twenty-two athletes were used ($N=22$). Subjects were divided into inexperienced and experienced soccer players. Group 1, inexperienced athletes participated in five or fewer years in

soccer ($n_1=11$). Group 2, experienced players participated in soccer six or more years ($n_2=11$).

Instrumentation. A revised questionnaire, derived from Weinberg and Gould (2011), was used for the survey. Questions were modified to be sport-specific and focused on anxiety levels in specific soccer situations. Ten questions were based on different situations. Participants were asked to score each question on a Likert scale of 1-4 that reflected the anxiety felt during the specific situation. **Procedures.** Through a meeting scheduled with the team captain everyone was given the chance to participate at the same time. Data was collected on the practice field during spring of 2012. A script was used to avoid confusion and to ensure clear and efficient presentation. Each athlete was informed of confidentiality and read a consent form before participating. Each participant received a packet that included a questionnaire and logistics sheet which consisted of each individual's competition history. Once completed, athletes were asked to return the packet. **Statistics.** Collected information was compiled on a data sheet (see Table 1). A mean score was determined. A two tailed independent t-test was used to compare inexperienced to experienced soccer players, with the alpha level set at 0.05.

Sample Data Compilation Sheet

Score:	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Totals:
G1,S1	3	2	4	2	1	2	2	4	3	2	25
G1,S2	2	2	1	2	4	1	2	2	2	1	19
G1,S3	2	3	1	2	1	2	3	2	2	2	20

Table 1. The data compilation sheet consisted of two tables, one for inexperienced players and another for experienced players.

RESULTS

Group one, inexperienced players, had a mean of 24.2 on the anxiety questionnaire with a standard deviation of 3.2. Group two, experienced players, recorded a mean score of 24.6 on the questionnaire with a standard deviation of 5.4. The alpha level for the study was set at 0.05. The p-value equaled 0.69.

DISCUSSION

The null hypothesis stated no difference in anxiety levels between inexperienced and experienced woman soccer players. The null hypothesis failed to be rejected. Multiple factors affected anxiety levels in different situations. Past experience was the biggest factor in questions that involved confidence in skills, self-doubts about performance, and ease while playing soccer (see Figure 1). Players with more experience demonstrated increased confidence with fewer self-doubts and greater ease. In other situations inexperienced players produced little difference compared to the experienced players.

Factors Affecting Anxiety Levels

Past experience

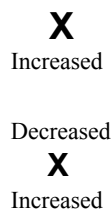


Figure 1. Various factors affected anxiety in soccer players. Past experience impacted confidence, self-doubt, and ease.

Competitive experience outside of college varied. The average competitive experience for inexperienced players was 4.2 years. The experienced players averaged 11 years. Data was not

consistent with the findings of Haneishi et al. (2007) who discovered that anxiety was slightly greater among inexperienced athletes who played for fewer than 2 years. Inexperienced athletes showed no difference in the anxiety felt compared to experienced soccer players. The strength of the study was the finding that anxiety was not present in less competitive situations. For coaches this would mean replicating situations during practice in which arousal was increased to prepare for anticipated similar feelings in game settings (arousal). In the future, modifications could improve the study. Ensuring homogeneity of subjects could help by including similar and increased number of participants. A clearer statement of competitive soccer should be used. This would make the difference between inexperienced and experienced soccer players more definitive. Instrument question selection should be linked more closely to research in the literature. Instrument validity and reliability should be established.

REFERENCES

- Haneishi, K., Fry, A. C., Moore, C.A., Schilling, B.K., Li, Y., & Fry, M.D. (2007). Cortisol and stress response during game and practice in female collegiate soccer players. *Journal of Strength and Conditioning Research*, 21(2), 583-588.
- Hanton, S., Mellalieu, S. D., & Hall, R. (2002). Re-examining the competitive anxiety trait-state relationship. *Personality and Individual Differences*, 33(1), 1125-1136.
- Maynard, I. W., Hemmings, B., & Warick-Evans, L. (1995). The effects of a somatic intervention strategy on competitive state anxiety and performance in semiprofessional soccer players. *The Sport Psychologists*, 9(1), 51-64.
- Weinberg, R. S. & Gould, D. (2011). *Foundations of sport and exercise psychology* (5 ed). Champaign, IL: Human Kinetics.

COMPARISON OF REHYDRATION EFFECTS OF COCONUT WATER VS. G2 ON REHYDRATION

T. M. Norton, C. Curtis, and R. Rockefeller - tnorton13@my.whitworth.edu - Whitworth University

PURPOSE

Hypohydration can impair exercise performance and cause adverse health effects (Maughn, Shirreffs, & Leiper, 2007; Murray, 2007). Compared to plain water (PW) researchers reported coconut water (CW) and carbohydrate electrolyte beverage (CEB) to be more effective at rehydration (Ismail, Singh, & Sirisinghe, 2007; Kalman, Feldman, Krieger, & Bloomer, 2012; Saat, Singh, Sirisinghe, & Nawai, 2002). The purpose of this study was to compare the rehydration effects of CW and a low calorie CEB (Gatorade G2) after exercise induced hypohydration. The research hypotheses were that both beverages would effectively rehydrate and that CW will rehydrate more effectively than G2.

METHODS

Participants: A convenience sample of thirteen college-age students volunteered for participation ($n_{\text{male}}=6$, $n_{\text{female}}=7$). All participants were defined as moderately active (i.e. 30-min of moderate intensity exercise 3-5-dwk¹). **Equipment:** Hydration was measured using Multistix 10 SG reagent strips for urine specific gravity. Participants ran on a Woodway treadmill. **Procedure:** Experimental procedures were identical for each variable. Upon arrival a baseline weight and urine specimen were collected (SG_i). The participants were then placed on a treadmill in a temperature controlled chamber and asked to run until 2% of their initial body weight had been lost. The participants were then asked to provide another urine sample to determine a hypohydrated specific gravity (SG₂). The participants were then allotted 1 hour to drink 120% of the weight lost during exercise with either CW or G2. After the full amount of liquid had been consumed they were asked to sit in a neutral environment for 1 hour. After this hour another urine sample was taken for the final rehydrated specific gravity (SG₃). This Protocol is outlined in Figure 1. Roughly one week was established between tests. For the first test, participants consumed CW and for the second G2. **Statistics:** Means and standard deviations were utilized to describe central tendency and variance of the specific gravity data. A factorial analysis of variance (FANOVA) with repeated measures was used to determine whether each beverage affected

rehydration and to compare the difference in rehydration outcomes between the two beverages. Statistical significance was set at an alpha level of $p < 0.05$.

Urine Specific Gravity Testing Timelines

Weight Assessed

Run
 Drink
 Wait

SG_j
 SG_i
 SG_k

Figure 1. The urine specific gravity testing timelines are illustrated in the figure above.

RESULTS

Means and standard deviations of specific gravities for each condition are presented in Table 1. For the multivariate FANOVA comparison there was a statistical difference ($p = 0.007$). Pairwise comparisons within beverages ($p = 0.003$) indicated a significant difference between the SG₂ and SG₃ values. Pairwise comparisons between beverages ($p = 0.902$) indicated no significant difference between G2 and CW. Therefore, the first research hypothesis, which states both beverages will effectively will rehydrate, was accepted and the second research hypothesis which states that CW will actively rehydrate more effectively than G2, was rejected.

	Specific Gravity Results	
	CW	G2
SG _x	1.014 ±0.013	1.008 ±0.005
SG ₂	1.014 ±0.008	1.015 ±0.007
SG ₃	1.006 ±0.005	1.011 ±0.008

Table 1. Specific gravity results for vitacoco and G2 are shown for each condition.

DISCUSSION

The observed increases in hydration following rehydration via CW and G2 were consistent with literature comparing CW and CEB (Ismail et al, 2007; Kalman et al., 2012; Saat et al, 2002). Currently, there is no literature that quantifies the rehydration capabilities of lower calorie CEBs like G2. However, the lack of a statistical difference between CEB and CW was consistent with previous reported comparisons between CEB and CW. A limitation of the present study was the lack of control over participants' hydration status prior to arrival for testing sessions. Consequently, some participants showed up for their second testing session "overhydrated," to facilitate weight loss during the session. However, since the beverage condition was randomly assigned between testing sessions, the tactics of these participants did not appear to affect the statistical outcomes presented. Regardless, future research should integrate a higher level of control over hydration prior to testing. Lastly, despite the low statistical power of the present study, it can be a foundation for further research in the area for both low calorie carbohydrate electrolyte beverages and coconut water.

REFERENCES

Ismail, I., Singh, R., & Sirisinghe, R.G. (2007). Rehydration with sodium-enriched coconut water after exercise-induced

dehydration. *Southeast Asian Journal of Tropical Medicine and Public Health*, 38(4), 769-785.

Kalman, D.S., Feldman, S., Krieger, D.R., & Bloomer, R.J. (2012). Comparison of coconut water and a carbohydrate-electrolyte sport drink on measures of hydration and physical performance in exercise-trained men. *Journal of the International Society of Sports Nutrition*, 9(1), 1-29.

Saat, M., Singh, R., Sirisinghe, R.G., & Nawai, M. (2002). Rehydration after exercise with fresh young coconut water, carbohydrate-electrolyte beverage and plain water. *Journal of Physiological Anthropology and Applied Human Science*, 2, 93-104.

Maughn, R.J., Shirreffs, S.M. & Leiper, J.B. (2007). Errors in the estimation of hydration status from changes in body mass. *Journal of Sports Sciences*, 25(1), 797-804.

Murray, B. (2007). Hydration and physical performance. *Journal of the American College of Nutrition*, 26, 542S-548S.

CONFIDENCE LEVELS IN TRACK AND FIELD ATHLETES

H. E. Parent - holly.parent@email.wsu.edu - Washington State University

PURPOSE

Self-confidence was a requirement and directly related to performance levels of athletes (Solomon, 2002; Weinberg & Gould, 2007). Track and field jumpers required confidence in order to be successful in competition. It was hypothesized that horizontal jumpers would have the same levels of self-confidence as vertical jumpers. The purpose of this study was to determine how self-confidence levels affected performance levels among track and field athletes. The null hypothesis for this study was:

Null Hypothesis: There was no difference in level of self-confidence between horizontal and vertical jumpers.

METHODS

Participants. Participants in this study were male and female horizontal and vertical jumpers from two division one universities located within eight miles of each other. The total subject population was N=32. Group one consisted of 14 horizontal jumpers ($n_h=14$). Group two consisted of 18 vertical jumpers ($n_e=18$). **Instrument.** A questionnaire revised from one outlined in Weinberg and Gould (2007) was used to collect data. A Likert scale allowed participants to rank answers from a low of one to a high of four. Questions were made sport specific and emphasized confidence levels in association with performance. **Procedures.** Separate meetings were scheduled with track and field jump squads from each university. A script was followed at both meetings to ensure consistency of presentation. Athletes were read a human consent form approved by the university institutional review board. Packets of test materials were distributed, completed, and returned by each subject (packets included: 1) subject number, 2) information sheet, 3) use of human subjects form, and 4) the assessment instrument). **Statistics.** A compilation sheet was used to organize data collected in this study (see Table 1). A two-tailed t-test was used to compare the groups.

Sample of Data Compilation Sheet

Subject	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Mean
G1 S1	3	2	2	1	1	3	3	3	4	3	2.50
G1 S2	4	2	4	2	4	1	4	4	4	4	3.30
G1 S14	3	3	4	2	4	3	4	4	2	3	3.20
Mean											2.86
G2S1	4	3	3	1	2	3	3	4	4	3	3.00
G2S2	3	2	2	3	3	2	3	4	3	3	2.78
G2S18	4	3	3	2	4	2	3	4	4	2	3.10
Mean											3.10

Table 1. Mean scores were calculated and compared for variance.

RESULTS

Group one produced a mean value of 2.86. Group two produced a mean value of 3.10. The alpha level was pre-set to $\alpha=0.05$. The p-value was 0.025 (see Table 2). The null hypothesis was

rejected.

Confidence Levels of Jumpers

Group	n	Mean	Significance
Horizontal	14	2.86	0.025
Vertical	18	3.10	

Table 2. Horizontal jumpers displayed significantly lower levels of self-confidence than vertical jumpers.

DISCUSSION

There were multiple factors that played a role in confidence levels. Chamberlain and Hale (2007) argued that athletes with higher levels of anxiety report lower levels of self-confidence. Vertical jumpers displayed higher levels of self-confidence and displayed lower levels of anxiety. Researchers who considered athlete optimism, found increased optimism aided self-confidence levels in athletes (Mullen, Lane, & Hanton, 2009). Vertical jumpers reported higher levels of self-confidence and felt more optimistic. Both these factors aided vertical jumpers to be successful in competition.

In addition, athletes with greater trust and confidence in coaches, despite event practiced, presented higher levels of mental strength and consequently increased self-confidence. However, vertical jumpers were arguably more consistent with the findings of Tzetzis, Votsis, and Kourtessis (2008) in this regard.

Future studies should consider a broader spectrum of subjects across track and field. While the null hypothesis was rejected, a more diverse population would allow findings that could be generalized across a larger group of athletes. Also, anxiety levels and optimism related to confidence should be considered for future study.

REFERENCES

- Chamberlain, S. T., & Hale, B. D. (2007). Competitive state anxiety and self-confidence: Intensity and direction as relative predictors of performance on a golf putting task. *Anxiety, Stress and Coping*, 20(2), 197-207.
- Mullen, R., Lane, A., & Hanton, S. (2009). Anxiety symptoms interpretation in high-anxious, defensive high-anxious, low-anxious and repressor sport performers. *Anxiety, Stress and Coping*, 22(1), 91-100.
- Solomon, G. B. (2002). Confidence as a source of expectancy information: A follow-up investigation. *International Sports Journal*, 6(2), 119-127.
- Tzetzis, G., Votsis, E., & Kourtessis, T. (2008). The effect of different corrective feedback methods on the outcome and self-confidence of young athletes. *Journal of Sports Science and Medicine*, 7(3), 371-378.
- Weinberg, R. S., & Gould, D. (2007). *Foundations of sport & exercise psychology* (5th ed.). Champaign, IL: Human Kinetics.

TABATA VS. CIRCUIT TRAINING HEART RATES

B.L. Shumate, J. N. Dronen - bree.shumate@gmail.com - Washington State University

PURPOSE

Athletes typically used traditional circuit training methods during workout routines. Long-term studies on high intensity interval training (HUT) showed increased V02max, sprint performance, O2 pulse, and power output. Tabata was characterized as a HUT method with 20 seconds of work and 10 seconds of rest, repeating for four minutes (Astorino, Allen, Roberson, & Juranich, 2012). The purpose of this study was to compare heart rate response in circuit training and Tabata training in athletes. **Null Hypothesis:** There was no difference in heart rate response between circuit training and Tabata training in athletes.

METHODS

Subjects. Nine subjects were involved in this study (N=9). Subjects were members of a men's division 1 university hockey team. The subjects were all highly trained and appeared to be in excellent physical condition. Each subject was tested during two different sessions. The subjects had a mean age of 20.88 (o=92796), a mean weight of 87.39kg (o=7.4046), and a mean height of 180.06 cm (o=7.45).

Equipment. Heart rate data was collected using Polar FT7 Heart Rate Monitors. Exercise equipment utilized 15lb medicine balls (MB), and resistance bands. **Procedures.** The study was explained to members of the hockey team. Nine players were interested in participating. Consent forms and confidentiality were explained. Players understood, complied, and signed consent forms. Height, weight, and age were recorded for all athletes. Prior to beginning workouts for both sessions, heart rate values were evaluated prior to exercise (PE). A five minute warm-up jog and dynamic stretching period followed. Heart rate was recorded during exercise (DE), and post-exercise (Post-E). The first session was a Tabata workout on a Monday. Subjects were taken through five separate Tabata bouts. Between each bout, the subjects rested for two minutes. Tabata exercises included were body weight squats, pushups, squat thrusts, band bicep curls, and squat jumps. The subjects returned on Wednesday for the circuit training workout. Four circuit bouts with three exercises each were performed. Each bout had a one minute exercise interval for each exercise. A one minute rest followed each bout and then was repeated. Circuits consisted of multiple different exercises (see Table 1).

Circuit Training Exercises

Circuit One	Circuit Two	Circuit Three	Circuit Four
Pushups	Band shoulder press	Renegade pushups	Squat jumps
V-ups	Plank pushups	Russian twists	MB slams
Planks	V-sits	Wall balls	Split lunge jumps

Table 1. Each circuit was comprised of body weight or medicine ball exercises.

A cool down period followed both sessions after final heart rate was recorded. The cool down period entailed a slow lap around a track, and a full body static stretch. **Statistics.** Mean heart rate values were evaluated for each recording (see Table 2). A two-tailed independent test was utilized to compare means between the workouts. The t-test alpha level was 0.05 ($\alpha=0.05$).

Mean Heart Rates in Tabata and Circuit Training

Training Type	PEHR	DEHR	Post-E HR
Tabata Training	72 bpm	141.3 bpm	151.2 bpm
Circuit Training	72.2 bpm	134.1 bpm	143.9 bpm

Table 2. Hockey players' heart rates were higher in Tabata training than during a traditional circuit training workout.

RESULTS

Mean, standard deviation, and significance were calculated (see Table 3). For pre-exercise heart rate, the two-tailed P value was 0.9537. This difference was not statistically significant. An insignificant difference in pre-exercise heart rate was essential. This allowed following heart rate measures to be evaluated without having to account for differences in initial heart rates. For heart rates recorded during exercise, the two-tailed P value was 0.0392 ($p=0.0392$). The difference in heart rates during exercise proved to be statistically significant. The null hypothesis was rejected. Finally, the post exercise heart rate had a two-tailed P value of 0.0006 ($p=0.0006$). The difference was statistically significant. The null hypothesis was rejected.

Comparison of Statistical Data

Training	PE Mean	PE SD	PE Significance	DE Mean	DE SD	DE Significance	Post-E Mean	Post-E SD	Post-E Significance
Tabata	72	10.55	0.9537	141.3	21.1	0.0392	151.2	15.4	0.0006
Circuit	72.2		6.59	134.1	15.77		143.9	11.99	

Table 3. The p-value was significant during exercise and post-exercise. The null hypothesis was rejected.

DISCUSSION

The null hypothesis stated there was no difference in heart rate response between circuit training and Tabata training in athletes. Both during and post-exercise, significant differences were noted. The null hypothesis was rejected. The significant difference in post-exercise heart rate was explained by longer recovery due to the alternation of low and high intensity of Tabata. The alternating intensity required involvement of the sympathetic system (Mourot, Bouhaddi, Tordi, Rouillon, & Regnard, 2004). x

Future studies should expand sample size to at least 30 subjects. Workloads should be standardized between Tabata and circuit training. Different populations also could provide additional valuable insight. This population demonstrated that utilization of Tabata training can be an option for individuals looking to intensify cardiovascular workouts.

REFERENCES

- Astorino, T. A., Allen, R. P., Roberson, D. W., & Jurancich, M. (2012). Effect of high-intensity interval training on cardiovascular function, $\dot{V}O_{2\max}$, and muscular force. *Journal of Strength and Conditioning Research*, 26(1), 138-145. Retrieved from <http://washingtonstate.worldcat.org/oclc/2330776443509> in April 2012.
- Mourot, L., Bouhaddi, M., Tordi, N., Rouillon, J. D., & Regnard, J. (2004). Short- and long-term effects of a single bout of exercise on heart rate variability: comparison between constant and interval training exercises. *European Journal of Applied Physiology*, 92(4-5), 508-517. Retrieved from <http://washingtonstate.worldcat.org/oclc/2330110496866> in April 2012.

TESTER EXPERIENCE WHEN MEASURING BODY FAT USING SKINFOLDS IN COLLEGE-AGED ADULTS

A. Vyakhk - annikavahk@yahoo.com - Eastern Washington University

PURPOSE

Skinfolds are a safe and simple technique for obtaining percent body fat (%BF) (Brook, 1971). Measurement error may be a result of an inexperienced tester and/or poor technique (American College of Sports Medicine [ACSM], 2010). The objective was to determine the difference between an experienced (EX) and inexperienced (IX) tester while measuring %BF using skinfold calipers. Secondly, the difference between the EX and IX testers for early (E) and late (L) measurements of %BF was tested. The null hypothesis of this study was that no significant difference would be observed between the two testers. As for the null hypothesis regarding the effect over time, there would also be no significant difference.

METHODS

Forty-six healthy, college-aged subjects participated in this study. Subjects were required to come to the lab hydrated, obtain a restful night's sleep, eat a typical meal earlier that day, have not exercised or consumed alcohol within 24 hours, and have not eaten or drunk two hours prior to the testing. Height and weight were measured using a stadiometer. Subjects were measured by the IX tester with a Lange skinfold caliper followed by the EX tester, according to the ACSM guidelines for taking skinfolds (p. 67) (see Figure 1). Our EX tester was an exercise science professor with 30 years of experience and the IX tester was a student with no prior experience of administering skinfolds. Sites used for males were the chest, abdomen, and thigh; the females were measured at the triceps, suprailiac, and thigh. The measurements gathered were input into the equations by Jackson and Pollock (1978) for men or Jackson, Pollock, and Ward (1980) for women to calculate body density. The Siri equation (Siri, 1993) was used to translate body density to %BF. The subjects were divided into early ($n = 23$) and late ($n = 23$) groups for both IX and EX testers. A repeated measures analysis of variance was used to compare the group means. Significance was set at $p < 0.05$.

Example of Skinfold Technique

Figure 1. A depiction of the skinfold technique for measuring %BF.

RESULTS

There was a significant difference ($p = 0.000$) between testers (EX = $25.6 \pm 10.5\%$ BF & IX = $24.3 \pm 9.7\%$ BF; see Figure 2). No significant difference ($p = 0.363$) was found between early and late trials. Pertaining to the difference between the EX and IX tester, the null hypothesis was rejected. Yet, the null hypothesis for the effect over time was accepted, with the early stage at a mean of 23.5% BF ± 9.32 and the late stage being set at a mean of 26.3% BF ± 10.69 . The mean

for the EX tester in the early stage was 23.96 %BF \pm 9.80 (SD) and for the late stage it was 27.19 %BF \pm 11.13 (SD). In the early trial, the mean for the IX tester was 23.11 %BF \pm 9.01 (SD) which was less than the mean of the late trial [25.41 %BF \pm 10.40 (SD)]. Demographics for the subjects that participated are presented in Table 1.

Subject Demographics

Age (years) 23.6 \pm 5.3 Height (m) 1.70 \pm 0.13 Weight (kg) 73.0 \pm 16.1 Table 1. Subject demographics were collected prior to the skinfold measurements.

%BF Measurements for Experienced and Inexperienced Testers for the Early and Late Trials

IX-E

IX-L

EX-E EX-L

Figure 2. A comparison of experienced and inexperienced testers for early and late trials when measuring %BF using skinfold calipers.

DISCUSSION

Results indicate that one must administer skinfolds on more than 46 subjects to be deemed experienced. According to the ACSM, increasing participation in workshops, utilizing video media for educating on correct technique, working with a skilled technician, and accumulating experience in a supervised clinical environment are all ways to improve the accuracy of taking skinfolds (p. 66). Finding a way to quantify the amount of skinfolds required to achieve enough skill to be considered an experienced evaluator is of great importance in the fitness world. Further studies should have more than one experienced and non-experienced tester to ensure validity and variability in experienced testers for comparability between professional. Although ACSM offers a descriptive set of procedures on the correct locations and ways to take skinfolds, it doesn't imply that every professional has the same techniques. Administration of the skinfolds, in the present study, was done using the same Fange caliper for both the testers during all of the skinfold measurements. This couldn't have been a limitation in the study, but because consistent calibration wasn't acquired the data could have been inaccurate. This study concluded that the experienced and inexperienced tester had a significant difference between them, so the effect over time didn't change. When looking at the goal of the skinfold technique and its application in the fitness realm a consistent tester is a necessity when monitoring %BF throughout a specific program (Kispert & Merrifield, 1987).

REFERENCES

American College of Sports Medicine. (2010). *ACSM's guidelines for exercise testing and prescription*.

Philadelphia, PA: Lippincott Williams & Wilkins. Brook, C. G. D. (1971). Determination of body composition of children from skinfold measurements. *Archives of*

Disease in Childhood, 46, 182-184. Jackson, A. S. & Pollock, M. L. (1978). Generalized equations for predicting body density of men. *British Journal*

of Nutrition, 91(1), 161-168. Jackson, A. S., Pollock, M. L., & Ward (1980). Generalized equations for predicting body density of women.

Medicine and Science in Sports and Exercise. 12(3), 175-181. Kispert, C. P., & Merrifield, H. H. (1987).

Interrater reliability of skinfold fat measurements. *Journal of the*

American Physical Therapy Association, 67(6), 917-920. Siri, W. E. (1993). Body composition from fluid spaces and density: Analysis of methods. *Nutrition/Metabolism*

Classic, 9(5), 223-244.

SELF-MONITORING AND ATHLETES

J. D Wiggs -justin.wiggs@email.wsu.edu - Washington State University

PURPOSE

Athletes often use positive self-monitoring to help reflect on performances during practice and competition (Behncke, 2002). Also, positive self-monitoring was used in rehabilitation (Kazuhiro,

Satoshi, Kazuto, Yasuyuki, Koichiro, Nahiko, & Setsu, 2005). The purpose of this study was to examine self-monitoring levels in recovering and healthy athletes. **Null Hypothesis:** There was no difference in use of self-monitoring for recovering injured athletes versus healthy athletes.

METHODS

Subjects, instrumentation, procedures, and statistics were methods for this study. **Subjects.** The population for this study consisted of male and female collegiate athletes. Subjects ranged in age from 18 to 22 years. A total of 20 subjects (N=20) were used. Subjects were divided into two groups related to injury status (see Figure 1). Group one consisted of ten subjects and was composed of athletes who had sought physical therapy within the previous six months. Group two consisted of ten healthy subjects who did not seek physical therapy.

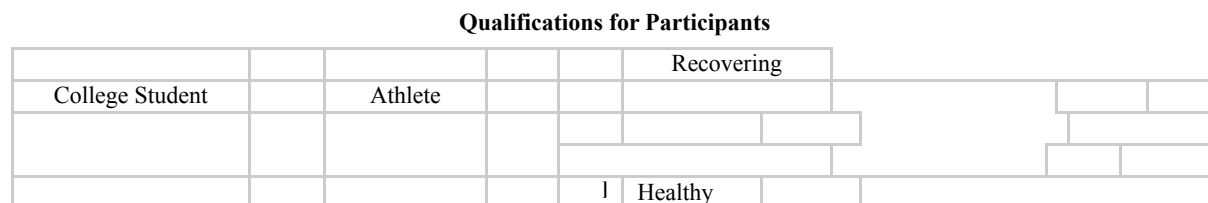


Figure 1. Three qualifications were met for an individual to participate in this study. Participants were a college student, an athlete, and were either recovering from injury or currently healthy.

Instrumentation. The instrument used in this study was a revised edition of the self-monitoring questionnaire used by Kirschenbaum (1997). The ten items were specific to recovering and healthy athletes. Subjects chose how true the statements were based on a four point Likert scale. Each statement was rated twice on a perceived and desired scale and related to a specific self-monitoring situation. **Procedures.** The assessment process was completed over the course of one week. A script was used by the physical therapist to avoid confusion and maintain consistency across sessions. The same procedure was followed when presenting information to coaches of the healthy athletes. Each athlete was informed of confidentiality and was asked to read an implied consent form before participating. Participants were reminded to respond carefully and thoughtfully. Assessment packets, which included an information sheet and the questionnaire, were distributed. **Statistics.** The difference score for each assessment response was entered into a data compilation sheet. A mean score was determined for each of the groups. Means between the groups were compared using a two-tailed independent t-test. The alpha level was set at $\alpha=0.05$.

RESULTS

Group one scored a mean of 5.6 ± 1.17 on the questionnaire. Group two scored a mean of 6.7 ± 0.95 . Results from the t-test provided p-value of 0.03 (see Table 1).

Self-monitoring Levels in Athletes

GROUP	N	S.D.	Significance
Recovering	10	1.17	0.03
Healthy	10	0.95	

Table 1. The null hypothesis was rejected.

DISCUSSION

The null hypothesis stated no difference in self-monitoring use between recovering and healthy collegiate athletes. This hypothesis was rejected. The use of self-monitoring techniques was different for recovering and healthy athletes. Self-monitoring was influenced by multiple factors (i.e. goal setting, self regulation, and past experiences; Baker, Marshak, Rice, & Zimmerman, 2001; Behncke, 2002). To sort these factors modifications should be made in the future.

First, a larger sample size should be used. If groups of 30 or more were used, results would be more generalizable. Second, a larger demography would improve generalizability. Recovering athletes should be sampled from more than one physical therapy practice. Additionally, a more

sophisticated method other than a difference score, t-test would improve accuracy in the future. Future studies should not only investigate recovering versus healthy self-monitoring levels, but monitoring levels before, during, and after physical therapy treatment. Studies also should investigate types of injuries and effects of self-monitoring on recoveries (Kazuhiro, Satoshi, Kazuto, Yasuyuki, Koichiro, Nahiko, & Setsu, 2005; Kennedy & Yorkston, 2004;).

The strength of this study was embodied in the self-monitoring process as a part of a physical therapy session. With improvements, future studies could discover if physical therapy treatment increases not only self-monitoring skills, but other self-regulatory skills. Discovering a relationship between self-monitoring and physical therapy treatment could prove valuable for recovering patients.

REFERENCES

- Baker, S. M., Marshak, H. H., Rice, G. T., & Zimmerman, G. J. (2001) Patient participation in physical therapy goal setting. *Journal of Physical Therapy, 81(5)*, 1118-1126. Behncke, L. (2002). Self-regulation: A brief review. *The Online Journal of Sport Psychology, 27*, 321-336. Kazuhiro, I. P., Satoshi, W., Kazuto, O., Yasuyuki, H., Koichiro, O., Nahiko, O., & Setsu, I. (2005). Effect of the self-monitoring approach on exercise maintenance during cardiac rehabilitation: A randomized, controlled trial. *American Journal of Physical Medicine & Rehabilitation, 84(5)*, 313-321. Kennedy, M. R., & Yorkston, K. M. (2004) The effects of frontal injury on "on-line" self-monitoring during verbal learning by adults with diffuse brain injury. *Journal of Neuropsychological Rehabilitation, 14(4)*, 449-465. Kirschenbaum, D. (1997). Positive self-monitoring in basketball. *Mind matters: Seven steps to smarter sport performance* (pp. 119). Carmel, IN: Cooper Publishing Group.

ASSESSMENT OF FOODS AND EFFECTS OF REVENUE FROM VENDING MACHINES IN HIGH SCHOOLS

C. Worthen, C.K. Hansen, N. S. Davis, B. H. Boyer D.PT. - cworth32@gmail.com - Utah Valley University

PURPOSE

Unhealthy food options in schools is a frequent topic of discussion for the increasing trend in childhood obesity. Vending machines in the schools, filled with snack foods are suspect as one of the primary players in this trend (Strong KA). Finding out the types of foods offered by school vending machines in Utah schools may help us to understand a variable as to why more people are not taking advantage of the opportunity to be healthy eaters at a young age (Hart, Melanie). The purpose of this study is to assess the effect on revenue that different types of foods in school vending machines have on school programs.

Our hypothesis is that schools that have vending machines are more likely to fill them with unhealthy food than they are healthier options in order to obtain more revenue for their school programs. If our hypothesis is found to be true, then we can target unhealthy vending machine foods as one of the possible variables for the increasing trend of childhood obesity (Jacobs, Wayne).

METHODS

Having IRB approval and having completed a literature review targeting the topic of interest, we formulated a survey tool with 10 specific questions as well as a consent form to inform the participants (school principals) of the purpose of the survey, and how the data collected will be used. Having obtained a list of every district, school, and principal (as well as their e-mail) in the state of Utah (exceeding 800 schools) from the Utah Department of Education website, we sent a consent form and the survey tool via email to all public school principals. This study addressed the survey questions that dealt with the effect on revenue that different types of foods in school vending machines have of school programs.

The data was analyzed using percentages to identify trends in the types of foods and where the revenue was delegated. See Figure 1 for a portrayal of youth selecting food from a school vending machine.



Figure 1. Photo of youth selecting food from a school vending machine.

RESULTS

Analysis of the data revealed that our hypothesis is accepted. There is a trend to keep more unhealthy foods in school vending machines, as they tend to bring in more money for school programs. For a representation of the responses to survey questions as represented in percentages, refer to Table 1.

Vending machine contents	Healthy foods 4.72%	"Snacks/Treats" 6.15%	Even Mixture of Both 13.85% (other schools have no vending machines)
Vending Machine Revenue	Clubs 7.69%	Academics 4.62%	Infrastructure 6.15% (9.23% selected other; please see results)
If changed from snacks/treats to healthy	Revenue would decrease 13.64%	Revenue would increase 4.55%	The rest do not have vending machines

Table 1. Percentages Gathered for the Data Collected on the Types of Food in Vending Machines and the allocation of the Collected Revenue

DISCUSSION

Of the schools that responded to the survey, 75.38% of the principals reported that they do not have vending machines. Of those who do, 4.72% of principals reported that their vending machines had primarily healthy foods while 6.15% are filled primarily with snacks/treats. 13.85% reported that they have an even mixture of both types of food. When it came to revenue from the vending machines, 7.69% reported the revenue was used for clubs, 4.62% for academics, 6.15% for infrastructure. 9.23% are using it for other school related purposes. If vending machines contents were changed to hold primarily healthy foods, 13.64% of principals believed that revenue would decrease, while 4.55% believed it would increase. It is true that there are primarily more unhealthy options in vending machines than healthy ones, but the difference is smaller than anticipated. Although our percentage of healthy foods is only slightly smaller than snacks/treats, the even mixtures off 13.85% could be relative to those taking the survey. The next two questions regarding vending machine revenue and providing healthier options, give us an idea of what some of the possible incentives could be for keeping unhealthy options inside vending machines. Our results were not as expected as the revenue went primarily towards students' direct benefits. However, one principal did comment that the revenue went to the "faculty social committee." When principals were asked if they thought their revenue would decrease if they changed their vending machines to have healthier options, 13.64% said yes. One specific principal stated: "We used to have other snacks available, but as of late, we have less than 10% of the revenue from the vending machines that we used to. The students bring their own treats now." This study confirms our hypothesis that students tend to pursue more tasty and less healthy foods from vending machines and school principles perceive that replacing the snacks with more healthy foods would likely lead to a reduction of needed dollars for various school programs. One limitation of this study is the small sample size. Only 70 of the 800+ schools in Utah responded to our survey. We would recommend that the principles be approached at a time other than the weeks immediately preceding or following the end of the academic school year, recognizing that this is a very busy time for school administrators. We also recommend that high school students be survey to determine their perception of the types of foods they would prefer.

REFERENCES

- Strong, K. A., Parks, S. L., Anderson, E., Winnett, R., & Davy, B. M. (2008). Weight gain prevention: identifying theory-based targets for health behavior change in young adults. *Journal of the American Dietetic Association, 108*, 1708-1715.
- Hart, M. A. (2005). Influence of a physical education methods course on elementary education majors' knowledge of fundamental movement skills. 00318981, 20051201, Vol. 52, Issue 4.
- Jacobs, W. *The Childhood Obesity Epidemic: What We Can Do*. LeTourneau University.