

Research

in
Health,
Physical Education,
Recreation, Sport &
Dance



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*Special Inclusion: 2009 Olympic Congress
Regulations & Call for Contributions*

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The Mission of the ICHPER•SD Journal of Research

The mission of the journal is to meet the needs of the academic community from both a national and an international perspective. Thus, academicians and professionals engaged in or studying HPER•SD, and related activities, at all levels, are encouraged to contribute to the professional literature by submitting research-oriented manuscripts that will contribute and expand the knowledge base of the disciplines within our profession. The *ICHPER•SD Journal of Research* is exclusively what is termed a "research journal" and invites data based manuscripts representing cutting edge research.

Manuscript Guidelines for Authors

Articles are invited in the areas of health, physical education, adapted physical education, recreation, dance, sport, human performance, coaching, sports medicine, and sport management. *This journal is international in scope in the sense that authors/researchers and topics can originate from any part of the world.*

All manuscripts must be submitted in English. An original hard copy of the manuscript plus a computer CD (virus free) containing the article and any tables and/or figures (as separate files, in Microsoft Word®), should be submitted to:

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1900 Association Drive, Reston, Virginia 20191-1598, USA

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**National Institute of Fitness and Sports in Kanoya
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May 9 - 12, 2008**

THEME

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Education: A Renewed Commitment for the Second 50 Years"***

The 4th ICHPER·SD Middle East Regional Congress

**Faculty of Sport Education for Men
Alexandria University, Alexandria, Egypt
October 16 - 18, 2008**

THEME

"Toward a Better Future for Sport in Arab Countries and the Middle East"

The 4th ICHPER·SD Africa Regional Congress

**University of Botswana, Gaborone, Botswana
October 14 - 17, 2008**

THEME

***"Optimizing Performance Excellence and Wellness through the Changing Phase
of Sport, Recreation, Medicine and Exercise Science"***

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1900 Association Drive, Reston, Virginia 20191-1598, U.S.A.
(Phone: 703-476-3462; Fax: 703-476-9527; E-mail: ichper@aahperd.org; Website: www.ichpersd.org).





Dong Ja Yang, Ph.D.

Message from the President:

The ICHPER•SD Vice-Presidents and Sustained Development of the Regions

ICHPER•SD is an international organization of HPERSD professionals engaged in teaching, coaching, research, and administration in the areas of health, physical education, recreation, sport and the Olympic movement, and dance. It is a **volunteer, membership-based** not-for-profit and non-governmental organization. ICHPER•SD is indeed one of the oldest, largest and most prestigious global alliances in our fields.

ICHPER•SD is administered by its governing rules (i.e., the Bylaws, Operating Code, Standard Policies and Guidelines). The ICHPER•SD President serves as its Chief Administrative Officer (CAO) and the Secretary General serves as Chief Executive Officer (CEO). It consists of 7 geographic regional organizations (i.e., Africa, Asia, Europe, Latin America, the Middle East, North America and Caribbean, and Oceania) that are all organizational sub-structures or regional units of ICHPER•SD, not independent organizational entities (Bylaws, Article X, Section 4). All elected officers (i.e., President, Secretary General, Regional Vice Presidents) serve a 4-year term and are expected to faithfully perform their duties and responsibilities as stipulated in the governing rules of the Council. The Vice Presidents must execute their duties and work closely with the CAO and CEO in all matters pertaining to their regions and ICHPER•SD as a whole. The effectiveness of a Vice President's performance is crucial to the **sustainable development** of their region.

We believe that every ICHPER•SD officer must have certain personal and professional attributes and qualifications. They should (a) understand thoroughly the governing rules of the Council; (b) commit themselves faithfully to our organization's mission; (c) be a **Life** member of ICHPER•SD and preferably hold a terminal degree (e.g., Ph.D., Ed. D. or doctorate in HPERSD areas); (d) have the personal and professional commitment, integrity and skill to perform the mandate of the Council; (e) not be an officer of another international organization with a mission similar to ours; (f) be able to work with and honor the governing and operational rules of the Council; (g) be prepared to execute their duties and responsibilities in accordance with the governing rules; and (h) understand that the position requires a high degree of professional volunteerism and be willing to spend some personal funds for the Council's mission and projects.

While the next issue of the ICHPER•SD Journal of Research will discuss the role of the CAO and CEO, this message will exclusively highlight the duties and responsibilities of the Regional Vice Presidents.

A. Staging the ICHPER•SD Regional Congress

Staging the ICHPER•SD Regional Congresses in our 7 geographic regional organizations during even numbered years (e.g., 2008, 2010, 2012) has been the major strategy for regional development and the sustainable delivery of our mission in the regions and worldwide. All ICHPER•SD Regional Congresses must be organized in accordance with the relevant operating code (i.e., Conditions and Guidelines for the ICHPER•SD Regional Congress Organizing Committee). The sponsoring organization and its officers must be current members of ICHPER•SD or register prior to the submission of a bidding application to sponsor a regional congress.

The Operating Code for the Regional Congress serves as the standard conditions, guidelines, rules and policies. ***The conditions may be revised or modified where necessary in order to accommodate all relevant situations (e.g., socio-economic status of the country and/or the region and any special circumstances of the sponsoring HPERSD organization).*** The regional vice president and regional secretary general are **delegated to negotiate** all conditions stipulated in the Code with the interested parties, organizations or institutions applying to host a congress. Upon the completion of these negotiation processes, the vice president shall submit the revised or modified conditions of the Operating Code with the bidding application for approval by the ICHPER•SD Executive Committee through the Office of the President and of the Secretary General. The Offices of the President and of the Secretary General must receive copies of the communications concerning all matters pertaining to ICHPER•SD regional business and especially the regional congresses. The CAO and CEO have the official responsibilities of overseeing, monitoring, assisting and/or intervening when necessary in all regional activities of the Council in order to coordinate and consolidate the programs and strategies of ICHPER•SD as a whole.

B. ICHPER•SD Membership Recruitment Program Initiatives

As stipulated in the Bylaws, one of the major duties and responsibilities of an ICHPER•SD Vice President is to mobilize a sustainable mechanism for increasing our membership in the region. They must create strategies to recruit members, especially in their own country

and the region. It is true that no other HPERSD international organization provides as many membership benefits as ICHPER·SD does, including 6 peer-reviewed journals per year, discounted annual membership (e.g., US\$40 group A countries; \$30 group B; \$20 group C) and congress registration fees for countries in need (groups B & C), a certificate of membership, certificate of appointment to the member's preferred ICHPER·SD commission, and more. ***Life*** membership (\$1,500.00) is for those who wish to champion the mission of ICHPER·SD through a lifelong commitment to the organization.

C. Promote the 50th ICHPER·SD Anniversary World Congress
& Scheduled ICHPER·SD Regional Congresses in the Regions

All Vice Presidents are responsible for promoting and maximizing attendance at the World Congresses from the geographic region that they represent. They must attend and present the regional report at the meetings of the ICHPER·SD Executive Committee and the Board of Governors.

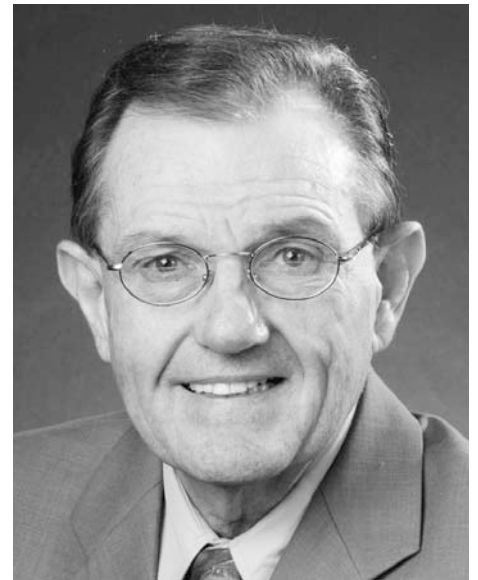
The 50th ICHPER·SD Anniversary World Congress will be organized by the National Institute of Sports and Fitness in Kanoya, Kagoshima, Japan. The World Congress is scheduled from May 9 – 12, 2008. The 4th ICHPER·SD Middle East Regional Congress will be held at Alexandria University, Alexandria, Egypt, October 16 – 18, 2008. The 4th ICHPER·SD Africa Regional Congress will be staged at the University of Botswana, Gaborone, Botswana, October 14 – 17, 2008.

May we all take the necessary steps now to participate in the ***50th ICHPER·SD Anniversary World Congress*** in Japan, May 9 – 12, 2008!!! ICHPER·SD is also extending the highest encouragement to our members to actively participate in the 2009 Olympic Congress in Copenhagen, Denmark, October 3 – 5, 2009 in response to the ***IOC President's Call for Contributions***. Thank you.

Dong Ja Yang, Ph.D., President, ICHPER·SD

Comments from the editor . . .

*Dr. William F. Stier, Jr.,
Distinguished Service Professor and Graduate Director,
Physical Education and Sport,
State University of New York, Brockport.*



The issue you are holding in your hand is the first issue of Volume III No. 1 and contains the largest collection of scholarly, research articles that this journal has ever produced — 18 in all. A special thanks goes to the many authors, reviewers and assistant editors who all played a large part in the continued success of this journal. **And, most significantly, thanks and appreciation goes to Dr. Dong Ja Yang, President of ICHPER-SD, who had the vision and who took bold action to initiate and create this research based, scholarly (peer reviewed) journal.**

Next fall, with the second issue of volume 3, I will have served for three full years as the founding editor of the *ICHPER•SD Journal of Research*. Before that, I served as editor for two years of the *Journal of ICHPER•SD* before handing that journal over to Dr. Chris Williams. Now, after having served as editor of this peer-reviewed journal for a significant length of time, it is appropriate to hand over the reins to someone else.

Hence, I have resigned as editor of the *ICHPER•SD Journal of Research* effective with the publication of Volume III No. 2, Fall & Winter 2008. I have greatly enjoyed the relationship with all of my colleagues within ICHPER•SD and with everyone associated with the *ICHPER•SD Journal of Research*.

Naturally, I will remain active within ICHPER•SD as a member and as ICHPER•SD's *Vice President for North America and the Caribbean*. I will also help the new editor during this transition period.

Members need to remain committed to supporting this journal (by contributing worthy research manuscripts; serving as reviewers and assistant editors) as well as playing an active role in the organization itself (attending and planning conferences, etc.). An organization is only as strong as its members, and it is my sincere hope that you all will make the commitment to become and remain active within the ICHPER•SD community.

Individuals who wish to be considered as a candidate for the position of editor for *ICHPER•SD Journal of Research* should contact the international office of ICHPER•SD at: CGilpinx@AAHPERD.org

Sincerely,

William F. Stier, Jr., Ed. D., Editor
ICHPER•SD Journal of Research
Distinguished Service Professor and Graduate Director
State University of New York, Brockport

**International Council for Health, Physical Education, Recreation, Sport, and Dance
(ICHPER•SD)**

**ICHPER•SD Journal of Research
Volume III, No. 1, Spring & Summer 2008**

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Effect of a School-Based Intervention Program on Physical Fitness of Chinese Children with Obesity: The Fun-And-Fit Project

by Stanley Sai-chuen HUI, Patrick LAU Wing-chung, Gary WONG Wing-kin, Pak Y. Yuen, and Christopher LAM Wai-kei

Abstract

To evaluate the training effects of a school-based intervention program in obese Chinese children with respect to fat reduction and fitness improvement. A total of 183 obese Chinese children (mean age=9.63 yrs \pm 1.35 yrs) were randomly assigned into either an intervention group (n=120) or a control group (n=63). A six-month school-based Fun-and-Fit (FAF) program was provided for the intervention group. Both groups received health-related fitness assessments before and after intervention period. Results revealed that the intervention group demonstrated better improvement in body composition ($p < .001$) and physical fitness measures ($p < .001$) than the control group. Blood lipid profiles of intervention group also improved significantly ($p < .05$). The FAF program was considered effective for combating children obesity and may be encouraged in schools as a health promotion strategy.

Key words: Childhood Obesity, Health Promotion, Exercise, Intervention, Physical Fitness.

Childhood obesity is a major health problem that has drawn international attention in recent years due to increasing prevalence in many countries (Ho et al., 1983; Lehungue, 1999; Leung, Ng, & Lau, 1995; Maffei et al., 1993; Malina, 1993; Reilly, Dorosty, & Emmett, 1999). Studies document that extreme levels of obesity are detrimental to health. Obesity is shown to be positively related to morbidity and mortality (Pi-Sunyer, 1993). Health related problems thought to be associated with obesity include gallbladder disease (Bray, 1985), glucose intolerance and non-insulin-dependent diabetes (Knowler et al., 1991; Kriska et al., 1993), cardiovascular disease risk factors (Denke, Sempos, & Grundy, 1993; Manson et al., 1990), cancer (Giovannucci et al., 1995; Lee & Paffenbarger, 1992), and all-cause mortality (Garrison & Castelli, 1985; Lew, 1985).

It has been reported over the last decade that the incidence of childhood obesity in Hong Kong is steadily increasing. The 1993 Hong Kong Growth Survey reported that 10 to 13% of children (ages 6 -18 years) were obese (Leung, 1995; Leung et al., 1995). Similarly, reported in 1998, from a cross-sectional lifestyle survey of Hong Kong children (ages 9 -12 years) found 23% of boys and 10% of girls were obese, using the criterion for obesity: $>120\%$ weight- for- height for local references (Guldan, Cheung, & Chui, 1998).

The causes of childhood obesity have been attributed to improper diet and sedentary lifestyle. It has been reported that children in Hong Kong exhibit lifestyles characterized by preferences for animal foods (particularly sausages and chicken wings) and sugary products (e.g. soft drinks and ice-cream) and vegetables

were generally disliked (Guldan et al., 1998; Leung, 1995; Leung, Ng, & Tam, 1994). Obese children were, reportedly, also reluctant to exercise (Au & Leung, 1995).

Several weight loss intervention programs have been initiated in Hong Kong but the effects were minimal, potentially due to failure to combine medical care with diet monitoring and appropriate exercise training (Au & Leung, 1995). Moreover, these programs were mainly hospital-based, the compliance rate was very low. Twenty-seven obese children participated in hospital-based circuit training for eight-weeks, with three sessions per week. Au and Leung (1995) reported that only 44% of children could complete an eight-week hospital-based program. An eight-week intervention program is considered relatively short for producing significant weight and fitness changes. Diet consultation and parental involvement were not reported in the study. Since children spend most of their time at school, it may be effective if a school-based weight control program that integrate enjoyable exercise experience, medical care and proper diet education, as well as parental involvement into the school curriculum. School environment would be an ideal venue to launch a weight control program, which is able to maximize rate of compliance. Tanofskyff, Hayden-Wade, Cavazos, and Wilfley (2003) summarized from recent studies on childhood obesity management programs and concluded that the primary components should include dietary change, increase in physical activity, and parental involvement. For these reasons, educators, exercise specialists, dietitians and pediatricians, and parents were called together to develop a school-based Fun-and-Fit Intervention Program (FAF) with a view to providing an effective program for obese Chinese children in Hong Kong. The purpose of the study was to evaluate the effects of a school-based FAF program in obese children living in Hong Kong. Emphasis was placed on evaluating the training effects of the six-month exercise program.

Method

Experimental Design

This study employed a randomized control group experimental design. A total of 183 obese Chinese children (133 boys, 50 girls, ages 8-12 years) recruited from 5 local elementary schools in Hong Kong participated in the study. Obese children were defined as those whose weight was above 120% median weight- for- height among the population of Hong Kong children (Leung, 1995; 1997). The sample was further divided into either intervention (n=120) and control groups (n=63) randomly by schools. To avoid contamination of the control by the intervention program, students of the same school were assigned either the intervention or the control. As a result, students of three schools were assigned intervention group and two other schools the control. In other words, children of intervention groups and those of control groups were studying in different schools so that contamination between intervention and control groups was not possible. Body composition of both groups was similar as reported in result section. Children in the intervention

group participated in the FAF project, which included two doctor's visits (before and after exercise training), a four-day educational camp and a six-month exercise-training program. Parents of the intervention group were also asked to attend two educational seminars and diet consultations. Children of the control group did not participate in the FAF program and they were instructed to live as they were accustomed to doing. Both groups of children were given an initial health-related physical fitness assessments, this was repeated after six-months. Doctor's visits with medical advice and blood chemistry analysis were given only to the intervention group (pre- and post-test). All children and parents had signed an informed consent document. Children included in the study had neither musculo-skeletal disorders nor indications of heart disease, as revealed from completion of a health history questionnaire. In order to ensure that all children were physically fit to participate in exercise and fitness testing, the Physical Activity Readiness Questionnaire [PAR-Q, (American College of Sports Medicine, 2005)] was administered to all children.

The Fun-and-Fit Project

As described earlier, the school-based intervention program consisted of a four-day educational camp, two educational seminars for parents on diet and physical activity, diet and medical consultations for intervention children, and low-impact aerobic exercise training and games with incentives strategies.

Educational camp. Prior to exercise training, a four-day educational camp was organized in a suburban campsite for children for the intervention group and their parents. Fun, physical activities and group discussions were undertaken by participants. It is reported that the parent-child relationship is a crucial dimension, which influences the dietary habits and physical activity levels of children (Fogelholm et al., 1999). In the educational camp, parents were encouraged to discuss with their children about their home diet and to review their lifestyle. The educational camp provided an opportunity for parents and children to avoid busy city life and to enjoy close communication. Activities in the camp included morning walks, fun aerobic games, lectures on physical activity and healthy diet, healthy cooking workshops, individual diet consultations, and group discussions. All meals were provided by the organizer in this educational camp.

Educational seminars. Two additional educational seminars were offered to parents of the children in the intervention groups. The first was provided at the beginning of the FAF project, the second was delivered after three months of exercise training. The first seminar included discussion on the roles of the parents in childhood obesity and health and information strategies to modify dietary habits and physical activity levels. In the second seminar the focus was on sharing experiences of the difficulties in adhering to a healthy diet and regular physical activity. Recommendations and encouragement were given to parents by the FAF project team leaders. At the completion of the FAF project, a program evaluation survey was given to participants in which questions about changes in diet habit were asked.

Diet and medical consultation. Children of intervention group were arranged visits to pediatrician before and after the 6-month intervention. During the visits, blood sample was drawn and advices on diet and physical activity were given to children by the

peditrician.

Exercise training. Children in the intervention groups were required to exercise five times per week for six months. Two sessions per week were provided by certified fitness instructors after school and three sessions of self-exercise were to be done at home (weekly). The exercise time per session lasted 60 minutes. For the school exercise sessions, children gathered at the indoor playground after school and were instructed on exercise. Children were required to perform 10 minutes of warm-up stretching, 15 minutes of low impact walk-aerobics, 15 minutes of step-aerobics, 15 minutes of fun, activity games and 5 minutes of cool-down activities. Walk-aerobics and step-aerobics were similar to those used conventionally at adult aerobics exercises but were led by experienced, child-fitness instructors. Movement patterns and verbal cues were modified to accommodate the children's ability and interests. The fun activity games adopted in this study were similar to those reported by Gutin, Riggs, Ferguson, and Owens (1999). Games included: modified basketball, tag, flag-tag and bean bags battle games. The games were low impact and aerobic in nature. Variations and modifications of these games were used to maintain interest and motivation.

For self-practice home exercise, children were encouraged to participate in any kind of physical activity that they enjoyed, such as cycling, swimming, hide-and-seek or they could complete the low impact walk-aerobics videotapes, which were prepared by the project team leaders. Children were required to follow specific guidelines: a). the physical activity must last for 60 minutes per session, including warm-up and cool-down exercise; b). the exercise intensity should be moderate (i.e. not too hard but not too easy and be sufficient to induce rapid breathing); c). the exercise must be low impact and aerobic in nature; d). three sessions per week were required; and e). parents were encouraged to exercise with the children at home acting as positive role models. An exercise log-book was also provided for children to record their home activities.

Incentives. To encourage compliance, various incentives were provided. The first placed, ten children who had the most significant reduction in body fat were awarded a gift certificate valued at US\$65. The next best placed ten children were awarded a gift certificate valued at US\$40. Those who had any degree of fat reduction or those who had 80% or above attendance were awarded a gift certificate valued at US\$20. In addition, a certificate of appreciation was presented to children who achieved 80% or above attendance.

Data collection

A health-related physical fitness assessment was administered to both the intervention group and the control group before and after the FAF program period, to evaluate the training effects of the FAF program. Specific items included in the assessment were:

Blood chemistry analysis. Serum total cholesterol (TC) was assayed enzymatically (Hitachi 911 analyzer, Boeringer Mannheim GmbH, Mannheim, Germany). High-density lipoprotein cholesterol (HDL-C) was measured after precipitation of apo B containing lipoproteins with phosphotungstate. Low-density lipoprotein cholesterol (LDL-C) was calculated using the Friedewald formula (Friedewald, Levy, & Fredrickson, 1972).

The interassay coefficients of variation for the measurements were: TC, <1.40% at 3.2 and 7.8 mmol/L; triglycerides, 2.69% at 0.92 mmol/L; and HDL-C, 5.40% at 0.86 mmol/L.

Cardiorespiratory endurance. The Rockport 1-mile walk test was administered to estimate maximal oxygen consumption. The test was originally developed for adults, ages 20–69 years (Kline et al., 1987) and was recently validated for adolescents, ages 14–18 years (McSwegin, Plowman, Wolff, & Guttenberg, 1998). The walking test was selected, as the exercise mode was particularly suitable for obese children who were not accustomed to jogging or running. Children were required to walk as fast as possible over the 1-mile distance on a flat, outdoor walking track. Walking time was recorded using a stop-watch to the nearest second, and heart rate was recorded immediately after the walking exercise using a Polar Heart Rate Monitor (Polar Beat, Kempele, Finland). The maximal oxygen consumption (VO_{2max}) was then computed according to the Rockport Walk equation (McSwegin et al., 1998).

Body composition. Percentage body fat was measured using bioelectrical impedance analysis (TANITA Body Composition Analyzer, Model TBF-401, Tokyo, Japan). When measuring the body fat level, children were requested to stand on the TANITA analyzer, without footwear during a rest time and with normal hydration levels. The body height was measured using a physician balance beam scale (DETECTO Model 339, Webb City, Missouri, USA) to the nearest cm and body weight was determined using the TANITA analyzer (to the nearest 0.1kg).

Low back and hamstring flexibility. The CUHK sit-and-reach test (i.e. modified back-saver sit-and-reach test) was adopted to assess the low back and hamstring flexibility (Hui & Yuen, 2000). Children were requested to sit on a 30 cm high bench with one leg extended and resting on the bench, whilst the foot of the other leg was placed on the floor. Both arms were stretched out in front of the body with hands held together and fingers pointing forward. A meter rule was placed on the bench between the legs so that the heel of the extended leg was in line with the 50 cm level on the meter rule. Then children were instructed to reach as far forward as possible with their hands, toward the extended leg. The maximum distance (that the tips of the middle fingers) reached, as read from the meter rule, was noted as the score of low back and hamstring flexibility. Three trials were conducted with each leg and the maximum score for each leg (to the nearest mm) was recorded and entered for analysis.

Muscular strength. A handgrip isometric strength test was employed to measure the muscular strength of children (Heyward, 2002). Instructions were given to stand erect, with feet shoulder wide apart and hands hanging down naturally at both sides of the body. The children were then asked to squeeze the digital handgrip dynamometer (Takei TTK#5101, Tokyo, Japan) as hard as possible with one hand, without producing any other body movement. Readings observed from the digital display of the dynamometer were used to score muscular strength. Three trials were conducted with each hand and the maximum score for each was used for analysis.

Muscular endurance. The GT cadence curl-up test was selected as a measure of abdominal muscular endurance (Sparling, 1997). The test required children to perform the curl-up test in a supine position. The child's thighs were perpendicular to the floor; knees

bent at 90° and the legs were rested on a 30 cm high bench. The arms were folded with hands gripping the opposite upper arm, at the biceps level and the chin was tucked in towards the chest. A metronome was set at 25 repetitions per minute, to assist in the control of movement rhythm. One repetition was completed when the extended elbows touched mid-thigh during forward trunk flexion. The maximum number of repetitions that the children achieved was the score assigned for muscular endurance.

Statistical analysis

The descriptive statistics of the sample, including mean and standard deviation (SD) of the physical characteristics, and the dependent variables were computed. MANOVA was employed to compare differences in body composition between the intervention and control group prior to intervention. Repeated measures MANOVA followed by subsequent univariate ANOVA tests were used to identify differences in changes of body composition and physical fitness parameters between the intervention and control groups after the 6-month intervention. Repeated measures MANOVA was also used to test the differences in blood chemistry of the intervention group. Changes in lifestyles after the intervention such as the proportion of sample who maintained healthy eating habits and regular exercise were presented by percentage of the participants. The Statistical Package for the Social Sciences 12.0 (SPSS) was used for all data analysis. Statistical significance was set at a alpha level of 0.05.

Results

The average body mass index (BMI) for the intervention group was 24.47 kg/m² (± 3.43), and for the control was 23.30 kg/m² (± 1.75). MANOVA test revealed that the age and body composition (weight, height, BMI, and %fat) between the intervention and control groups were not significantly different ($p > .05$). In order to examine the training effects of FAF project, only children of the intervention group who achieved 70% attendance over the six-month exercise-training period and those children who completed all fitness assessments both before and after the training period were included in data analysis. Out of the 120 obese children of the intervention group, 71 children achieved 70% or above attendance, and only 55 children (18 girls, 37 boys) completed both the pre- and post-tests. For children of the control group, 40 (9 girls and 31 boys) out of 63 children completed the pre- and post-fitness tests. Descriptive statistics of the sample and fitness test results are presented in Table 1.

As shown in Table 1, the initial body composition between the intervention and control groups was similar. Although the initial mean %fat of control group was 2.5% lower than the intervention group, MANOVA test revealed that there was no significant difference ($F=2.49$; $df=3, 891$; $p > .05$) between the two groups in terms of initial mean body weight, BMI and %fat.

After six months of exercise training, mean body weight increased slightly for both intervention and control groups, however, BMI decreased slightly for the intervention group and increased slightly for the control group. Table 1 also illustrates that mean %fat of intervention group decreased 6.54% which was much greater than the reduction in control group (-1.14%). Overall physical fitness parameters for the intervention group improved

but only subtle changes were observed for the control group.

In Table 2, two-way (test x groups) repeated measure MANOVA revealed that changes in body composition of the intervention group was significantly different from the changes in control group ($\Lambda = .596$, $p < 0.001$). Subsequent univariate two-way ANOVA demonstrated that the reduction in %fat of the intervention group was significantly different from the control group ($F = 58.54$, $p < 0.001$). Similar result was found for BMI ($F = 4.91$, $p < 0.05$). However, body weight increased slightly in a similar fashion in both groups ($p > .05$).

Changes in health-related physical fitness parameters are summarized in Table 3. A two-way (test x groups) repeated measure MANOVA showed significant interaction effect ($\Lambda = .644$; $p < 0.001$) which means that the overall fitness parameters were significantly different between the intervention and control groups. Subsequent univariate two-way ANOVA testing found significant interaction effects for VO_{2max} and sit-and-reach (left) at $p < .10$ level, and significant interaction effects for sit-and-reach (right) ($F = 9.04$, $p < .01$) and curl-up performance ($F = 31.36$, $p < 0.001$). No difference was found for the handgrip performance, although both groups improved.

In those obese children who completed the FAF program, mean serum levels of total cholesterol, high density lipoprotein (HDL) cholesterol and low density lipoprotein (LDL) cholesterol prior to the program were: 4.91, 1.42, and 3.03 mmol/L respectively. On completion of the program, mean levels were 4.60, 1.42 and 2.67 mmol/L respectively. There was a significant decrease in the total cholesterol level (mean decrease 0.21 mmol/L, $p < 0.001$) and the LDL cholesterol level (mean decrease 0.34 mmol/L, $p < 0.001$). The control group did not participate in the blood chemistry analysis due to low motivation.

From the post program evaluation survey, 87% of children in the intervention group indicated changes in eating habit. There were 72% of parents indicated increase in knowledge of healthy eating and exercise. More importantly, 74% of the participating families indicated that they would continue to maintain healthy diet and regular exercise habits.

Discussion

The etiology of obesity is multi-factorial. Hereditary aspects, parental influence, improper diet, physical inactivity and metabolic disorders are all major factors contributing to obesity. This study attempted to design an intervention program for obese children that took into the consideration of multiple factors that could be controlled. The present study demonstrated that a six-month school-based intervention program for obese children effectively reduced body fat by 6.54%. Children who did not participate in the program had little change in body fat. The average body weights of both groups of children increased slightly and were probably due to normal growth, which would occur in children of this age (8 to 12 years). Other health-related fitness parameters improved over the six-month intervention period for both groups. When pre- and post-test fitness parameters were compared for each group, it was noted that participants in the exercise training showed greater improvement in body composition, flexibility and muscular endurance than their counterparts in control group (Table 3). These results suggest that the FAF program is particularly

effective for obese children in terms of fat reduction and fitness improvement. Although difference in change of aerobic fitness was only significant at $p < .10$ level, children in the intervention group showed improve in aerobic fitness whereas the control group showed decrease. One possible reason for this is that the mode of exercise training emphasized low to moderate intensity aerobic activities (which the children could sustain for a long duration). This mode of exercise (i.e., fun aerobic activities) was enjoyed by the children and could be sustained for 40 to 50 minutes, however, the exercise intensity was not high enough to produce significant changes in aerobic fitness but was sufficient to utilize fat as an energy source during exercise. Perhaps more importantly, the FAF program improved serum cholesterol profiles, which is known to greatly reduce the risk of cardiovascular disease (Harrell et al., 1998; Manson et al., 1990). However, it is unknown if the blood profiles of control group would have changed somewhat also since they did not involve in the blood test. It is also noted that the control group demonstrated greater increase in handgrip strength. Reason for such increase is unknown and may simply due to random error.

It is accepted that the best way to control weight is to combine exercise and diet. However, the most important issue is how participants can be helped to maintain a lifestyle that incorporates exercise and healthy eating. In children, it is believed that parental influence is important (Fogelholm et al., 1999). The distinct feature of the FAF program is that it adopted the concept of combined exercise and diet intervention and involved parents. Encouragement and support provided by parents for their children is a crucial factor for compliance with the program. Fogelholm and associates found that most parents of inactive children were also inactive (Fogelholm et al., 1999). Usually parents control the diet of their children and their activities. The educational camp and seminars in this study provided valuable information for parents on how and why they should maintain an active lifestyle and promote healthy eating for their whole family. According to the program evaluation conducted after the project, 87% of children in the intervention group indicated changes in eating habit and 72% of parents indicated increase in knowledge of healthy eating and exercise. More importantly, 74% of the participating families indicated that they would continue to maintain healthy diet and regular exercise habits.

The program was school-based, children were encouraged to participate in exercise training at school which reinforces exercise adherence. Structured exercise programs can be provided easily in the school environment, which is also convenient for students. In Hong Kong, most primary school students receive limited opportunities to exercise at school, other than two physical education classes per week (35 minutes per class). Exercise experiences in physical education classes are primarily sports skills-related. There are few health promotion programs provided in schools that utilize physical activity as an intervention strategy. In a school based intervention program aimed at reducing heart disease risk factors in children, Harrell and colleagues commented that such an approach was easy to implement, used few resources and should be considered as a useful means for disease prevention and health promotion in children (Harrell et al., 1998).

It should be noted that the incentive strategy adopted in this

study might not be possible in other school settings, especially where funding is limited. However, every effort should be made to design a suitable incentive program to enhance motivation. In this study walk-aerobic and step-aerobic exercises were led by certified fitness instructors. These aerobic exercises may be unfamiliar to some physical education teachers. When conducting a similar program other types of activity can be used such as rope skipping, slow jogging, circuit training and obstacle course racing. A limitation of this study was that information on diet was not sufficient to allow quantitative analysis. Little information can be derived from this study regarding the impact of diet control. More accurate diet recording is recommended for future studies.

In conclusion, a six-month school-based intervention program for obese Chinese children which incorporated diet modification, low impact aerobic exercise, fun activity games, educational camp and seminars was successful in producing significant reductions in body fat and improvement in physical fitness in obese Chinese children. Educators, school administrators and the Government are encouraged to implement similar intervention programs at schools to improve the health status of children in Hong Kong.

Drs. Stanley Sai-chuen HUI, Gary WONG Wing-kin, and Christopher LAM Wai-kei teach at The Chinese University of Hong Kong, where Pak Y. Yuen teaches in the physical education unit, and Dr. Patrick LAU Wing-chung is on the faculty at Baptist University.

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Table 1. Descriptive Statistics of the Intervention and Control Groups

	Intervention (N=55)			Control (N=40)		
	Pre-test (mean + sd)	Post-test (mean + sd)	Changes (post – pre)	Pre-test (mean + sd)	Post-test (mean + sd)	Changes (post – pre)
Age		9.65 + 1.41			9.61 + 1.28	
Height (cm)	140.32 + 9.20	144.08 + 9.09	3.76	142.24 + 8.84	145.57 + 8.99	3.33
Weight (kg)	48.77 + 11.34	50.42 + 11.97	1.65	47.34 + 7.62	50.12 + 7.72	2.78
BMI	24.47 + 3.43	24.04 + 3.81	-0.43	23.30 + 1.75	23.55 + 1.94	.25
Body fat (%)	32.33 + 5.51	25.79 + 5.33	- 6.54	29.83 + 5.83	28.69 + 5.09	-1.14
Curl-up (reps.)	6.54 + 6.14	16.24 + 11.64	9.70	6.87 + 7.72	6.42 + 8.07	-0.45
Sit-reach - right (cm)	48.24 + 10.84	55.08 + 7.08	6.84	42.60 + 8.42	43.00 + 9.09	0.40
Sit-reach - left (cm)	50.27 + 9.22	53.88 + 7.33	3.61	41.76 + 8.26	42.14 + 9.47	0.38
Handgrip (kg)	17.16 + 10.03	23.56 + 13.86	6.40	22.62 + 8.59	34.00 + 8.40	11.38
VO2max (ml/kg/min)	39.32 + 5.28	40.45 + 5.19	1.13	42.24 + 4.72	41.38 + 5.69	-0.86

Table 2. Comparisons of Changes in Body Composition Between Intervention and Control Groups

	Differences†		F §	p
	Intervention	Control		
Weight (kg)	+ 1.65	+ 2.78	1.21	.27
%Fat (%)	- 6.54	-1.14	58.54	.000***
BMI (kg/m2)	- .43	+ .25	4.91	.029*
Overall ‡: $\Lambda = .596$, $p = 0.000***$				
Note: † : Differences between the pre-test and post-test results; ‡ : Multivariate test result derived from a two-way (test x groups) MANOVA; § : F and corresponding p values for interaction effects derived from two-way (test x groups) ANOVA; * : $p < .05$; *** : $p < .001$				

Table 3. Comparisons of Changes in Physical Fitness Parameters Between Intervention and Control Groups

	Differences†		F §	p
	Intervention	Control		
VO2max (ml•kg ⁻¹ •min ⁻¹)	+ 1.13	- .86	2.97	.089°
SR-right (cm)	+ 6.84	+ .40	9.04	.004**
SR-left (cm)	+ 3.61	+ .38	3.54	.064°
Handgrip (kg)	+ 6.40	+ 11.38	1.38	.244
Curl-up (reps)	+ 9.70	- .45	31.36	.000***
Overall ‡: $\Lambda = .644$, $p = 0.000***$				
Note: † : Differences between the pre-test and post-test results; ‡ : Multivariate test result derived from a two-way (test x groups) MANOVA; § : F and corresponding p values for interaction effects derived from two-way (test x groups) ANOVA; ° : $p < .10$; ** : $p < .01$; *** : $p < .001$				

Factors Influencing the Sport Participation Patterns of African American Females

Jennifer E. Bruening, Donna L. Pastore, and
Ketra L. Armstrong

Abstract

While Tiger Woods and the Williams sisters are breaking the stereotype of what constitutes “White sports” and “Black sports,” most African Americans are still found in the traditional “Black sports.” In examining why the majority of Black women participate in basketball and track and field, the researchers studied twelve African American female collegiate athletes through the use of four focus groups and four subsequent individual interviews with selected focus group participants. The researchers present data from the focus groups and the individual interviews in the form of quotations from the participants on their views of the influence of societal systems (geographic region, socioeconomic status, neighborhood, school), influential others (e.g., family members, coaches, teachers, peers), and expectations in terms of choice of sports. The participants also share their opinions on the current state of Black female sport participation leading to the discussion and implications of the study.

N.B. While many scholars do not view African American and Black as one in the same, the women in the study referred to themselves as both African American and Black. As a result, the terms are used interchangeably throughout the article.

From the mid 1980's to the mid 1990's an exchange of ideas and criticisms concerning socialization theory and method took place among sport sociologists (Greendorfer, 1987; Greendorfer & Bruce, 1991; Fishwick & Greendorfer, 1987; McPherson, 1986; Theberge, 1984). This exchange called into question the theoretical validity of past studies on sport socialization and the application of theory to methodology. Scholars connected the conceptual shortcomings in linking theory and inquiry to explain why after “a plethora of studies dealing with sport socialization over the past 20 years” the field was suffering from “malaise” (Greendorfer & Bruce, 1991, p.129). This debate among sport sociologists and their claims of malaise caught our attention. We noticed that although the published exchange of opinions and criticisms has slowed, little published evidence of research on sport socialization has materialized.

In addition to a lack of empirical investigations of sport socialization, we also have observed a phenomenon calling out for just such analysis. Although the “Black presence” can be observed at the elite level with the examples of Woods and the Williams, “the masses . . . have not been so fortunate” (King, 2001, p. 9). When one examines the collegiate ranks, gender and racial representation in sport is skewed. The National Collegiate Athletic Association reported that African American women compose 14.9% of all NCAA Division I female student-athletes in 2003-2004. While overall this percentage reflects a number similar to

the latest census data, (according to the 2000 census 13.5% of the population is composed of Black women (<http://www.census.gov/population/socdemo/gender/ppl-121/tab01.txt>), representation issues become apparent when the percentage is broken down by sport. The 14.8% reflects 41.6% of basketball participants, 27.9% of indoor track and field participants and 28.1% of outdoor track and field participants with just 4.1% in other sports (http://www.ncaa.org/library/research/ethnicity_report/2003-04/2003-04-ethnicity_report.pdf)

Previous research has shown that these numbers are not simply the result of preference toward certain sports, but rather an intricately woven set of social circumstances (Greendorfer, 1993). The socialization process, and how young African American females experience it, affects the likelihood of them becoming involved in sport as well as which sports they choose.

The NCAA numbers suggest a problem exists: Why are African American females overrepresented in basketball and track and field and underrepresented in all other sports? The complexity of the socialization process, in Greendorfer's words, suggests that a solution is not easily found. The significance of the current study then lies not in attempting to find a solution, but in bringing the problem to light. We attempted to do this by first paying attention to a previously overlooked population, African American females. Secondly, the methods we employed provided first-hand data from the women themselves. In answering the questions of who influenced them to become involved in sport in general or in their chosen sport in college in particular, these women provided insight into their experience. By sharing their interpretation of what socioeconomic factors influenced their sport involvement and specific sport choice, they delved even deeper into the influence of their social environment. The researchers looked to the participants in analyzing the current state of sport participation for African American females and the factors affecting it.

In the following study, we have revisited the theory used to examine the socialization process in sport adopting a paradigm drawing on family, peers, teachers, and coaches as influences. Social systems theory, as evident in environmental and economic influences, has also been included in our analysis. However, we attempted to take the next theoretical step in acknowledging the need to address power and hegemony and how they affect the socialization process in sport, as Greendorfer and Bruce (1991) suggested. We included an emphasis on social and political forces such as racism in an effort to more completely explore the position of the “outsider within” (Collins 1988, 1990, 1998, 2000). By being both female and Black, the participants in this study shared partial membership in their gender group (minority representation compared to White women) and partial membership in their racial/ethnic group (minority membership to Black men). Their “outsider within” status was one that informed our interpretation of previous research that had primarily focused on all women without any consideration of race/ethnicity or all African Americans without

any consideration of gender. The “intersectionality” (Smith, 1998) of race/ethnicity and gender has been missing in sport research. We also had a heightened awareness when analyzing and interpreting the data that there truly was an intersection. The women could not share their experiences just as women or just as African Americans. Their experiences were all based on their shared membership in each group.

By weaving a Black Feminist perspective with sport socialization, we “focus[ed] our energies on developing a critical understanding of the power structure that frames and shapes” the lives of African American women specifically in the sport socialization process (Messner, 1992, p. 143). It was not enough to simply examine the socialization agents and the social systems that influence the sport experiences of African American females. We had to move to a level of analysis that acknowledged and dissected the social power exerted by those agents and systems as they shape and direct African American girls and women in sport (Bruening, 2005).

Lastly, socialization theory must allow for the exertion of influence by both the individual and the system (Fishwick & Greendorfer, 1987). In examining the socialization of African American female student-athletes, we borrow from symbolic interactionist theory as we viewed the athletes as active participants in their own socialization while understanding the “asymmetrical power relationship” (Greendorfer & Bruce, 1991, p. 132) that exists between American society and these individuals. The women in this study were “value-transmitting, value-receiving . . . [and] value-creating” (Fishwick & Greendorfer, 1987, p. 2), and most importantly, they possessed intimate knowledge of their own experiences. They represented multiple voices which conveyed that although there might have been overlapping experiences, there was not always commonality of interpretation. That is, there is no “African American female” sport experience. The experiences are “always in negotiation . . . never complete, always in process” (Smith, 1998, pp. xvi-xvii). Socialization is “a mutual and emergent process because it leaves the way open for self-autonomy, interpretation of social meanings, and some degree of negotiation” (Greendorfer & Bruce, 1991, p. 136). Only by exploring individual sport socialization experiences with African American women can a better understanding be reached of the multiple and shifting possibilities (Smith, 1998) of gender, race/ethnicity, and social class converging with sport, the individual, and the power represented in the social structure. Many African American women have “strong self-definitions and self-valuations [offering] serious challenges to [the] oppressive situations” presented to them throughout the socialization process, but Black women also often feel they must socialize for survival (Collins, 2000, pp. 183-84), or strive to fit into the dominant politics of White male society. These competing forces, strong sense of self and the struggle for survival within the White male power structure, explain the complexity of the socialization process.

The current study’s purpose was to shed light on African American women’s socialization experiences, and in particular their socialization experiences as they relate to sport, and was structured around the following research questions:

1. What is the socialization process for African American women? Is there one experience or multiple experiences?
- 2 a. Who influences the socialization of African American

women in regard to sport? How is this different based on family structure, and/or school system?

2 b. What influences the socialization of African American women in regard to sport? How can this differ by geographic region, neighborhood, and/or socioeconomic status?

3. How does the socialization process affect sport participation patterns in African American women?

Review of the Literature

Socialization into Sport for African American Women

Yvonne Smith stated that the “socialization of African American and other women of color historically has been different from Anglo American women” (Smith, 1992, p. 234). African American women have a different experience from both other women and from African American men. The sport socialization process for males is “extremely consistent or institutionalized” (Greendorfer & Ewing, 1981, p. 303). The irregularity in the process is considerable for women and is compounded when race, social class, and geographical location are added as factors (Greendorfer & Ewing, 1981). An African American woman has “to be very determined to be a full-time participant in sport, because for the most part heritage and birth culture speak loudly and forcefully against involvement with most forms of sport” (Acosta, 1993, p. 208). Gender, race, and social class add to the complex sport socialization process and yield a variety of experiences for these women (Bruening, 2005b).

Sport Choice

The issue of whether or not women will participate in sport is the focus of Greendorfer’s work in sport socialization. However, when focusing on African American women specifically, the issue expands to what sports participants choose. Through socialization women in American society are taught “how to behave in accordance with the expectations of others in the social order” (Greendorfer, 1993, p. 4). For African American women who participate in sports, that social order includes the labeling of the sports that are deemed desirable for them to play. From a young age, many African American women are told what their role in sport will be. They are not typically asked their opinions about what they enjoy or what experiences they want to have (Bruening, Armstrong, & Pastore, 2005). They are exposed to stereotypes about their intellectual and physical capacities (Bruening, 2005a). And these contribute to a socialization process that leads most African American women to participate in basketball and track and field. They are taught the importance of their group identity and togetherness making it a difficult decision to be a “token” participant in other sports, and one that often leads to diminishing self-esteem (Jackson, McCullough, & Gurin, 1997). For “who wants to be an alien . . .?” (King, 2001, p. 11).

Societal/ Structural Factors

In further distinguishing the sport experiences of White and Black girls, Greendorfer and Ewing (1981) found that specific agents of socialization such as parents or teachers had more influence on White children’s involvement in sport. African American children’s participation was guided more by the actual structure of society and certain contextual factors. African

American children's sport decisions were more affected than White children's by access to facilities, equipment, programming, and instruction, or their opportunity set (Greendorfer & Ewing, 1981), than by the guidance of any influential people in their lives. Smith agreed that most African American families cannot afford "elite sporting experiences" and that socioeconomic status affects girls and women of color "disproportionately such that their children must participate in stereotypical, 'popular' sports such as basketball and track and field or not participate in at all in organized sports" (Smith, 1992, p. 236). But she did not discount the influence of individuals on the sport participation of African American girls and women (Bruening, 2004b).

Also contrary to Greendorfer and Ewing (1981), it has been argued that African American women have not participated or excelled in certain due to a combination of factors including both structural constraints such as: a lack of money for lessons and equipment; lack of affirmative action on the part of colleges and universities; and lack of available opportunities in geographical areas of minority population concentration and socialization agents such as role models (Corbett & Johnson, 2000). Role models for African American girls and women can include both individuals inside and outside sport. It is true that African American women lack opportunities for careers in sport, leading to a scarcity of sporting role models for young African American females.

Socialization Agents

In the mid 1970's role models for African American women athletes were considered "almost non-existent" (Houzer, 1974, p. 208). Bruening (2004a) found that African American women in sport were still "more likely to be on [their] own . . . because of the scarcity of minority females . . ." (Smith, 1995, p.32). Today, women who choose coaching as a career following completion of intercollegiate competition account for 10.2% of assistant coaches (24.8% in basketball, 10% in outdoor track, and 10.7% in indoor track) 5.4 % of head coaches (11.8% in basketball, 10.1% in outdoor track, and 10.9% in indoor track). As African American women continue on in athletic administration, they represent 4.2% of athletic administrators, and only 3.4% when administrative assistants are removed from the calculations. All percentages have decreased since the 2001-2002 numbers were reported. (Available at http://www.ncaa.org/library/research/race_demographics/2003-04/2003-04_race_demographics_athletics_personnel.pdf).

But beyond the athletic arena, African American girls find role models in their families and their social circles (e.g., school, church, peers). (Collins 1988, 1990, 1998, 2000). In examining the socialization experiences of African American females, then, it is crucial to look at both the people who influence their sport experience as a point of comparison to their White counterparts, and at the structural or societal influences, as they might differ significantly for African Americans.

Methods

Participants

Document analysis of the NCAA Certification Study for the university was first conducted as "an unobtrusive method [by which to] develop an understanding of the setting [and] group studied" (Marshall & Rossman, 1995, p. 85). Analyzing the certification

study provided empirical data on the number of minority women student-athletes and coaches in each sport the university offered. In 1998-1999, X University reported that of a total of 336 female student-athletes 21 (6.3%) were African American. These 21 women were distributed as follows: 11 (3.3%) in track and field and field, 6 (1.8%) in basketball, and the combination of 2 in crew, and 1 each in volleyball and fencing accounting for 1.2% in all other sports. Twelve of the 21 African American women athletes agreed to participate in this study (Bruening, 2004). Of those twelve, three identified themselves as bi-racial (Caucasian and African American) although the institution counted them as African American. Additionally three other women were born outside the United States (two in Canada and one in South America), but were raised in the United States. Again, the institution counted them as African American.

Data Collection

Data collection was also informed by Black Feminism as we acknowledged that the participants' lived experiences reflected "the totality of [their] . . . of [the] "multiple jeopardies" including race, class, and gender" (Bruening, et al., 2005, p. 85). As Bruening, et al. (2005) claim, African American women have been noticeably absent in mainstream, traditional research in sport. We were also aware of the tendency to then reduce the experiences of all Black women to a "common denominator" (Smith, 1998, p. xvi) thus constricting those experiences. With this in mind, our data collection methods were triangulated through the use of the voices of the participants (Reinharz, 1992) through background questionnaires, focus groups, individual interviews, transcription and computer-assisted data analysis, grounded surveys, and member checks. Each step of data collection and analysis is outlined in more detail and according to the chronology of its use in the sections that follow.

Background Questionnaires.

All participants were first given a background questionnaire to gather demographic information (e.g., age, year in school, sport played) and facts pertinent to the socialization theme (e.g., parental occupations, past and/or current sport involvement of parents, number, gender, and ages of siblings, past and/or current sport involvement of siblings). This valuable personal assisted in the preparation and personalization the interview guides and provided demographic information needed to assist in data analysis. The information on each participant is presented in Appendices A, B and C.

Focus Groups.

Focus group sessions were conducted over three dates with groups of three, four, and five. By design, the semi-structured nature and group format contributed to the establishment of rapport between the interviewer and the participants. The connection that usually forms between an interviewer and a participant was enhanced by the interface of the participants (Berg, 1998; Kvale, 1996). Granting the athletes respect as well-informed observers allowed them to experience a sense of empowerment in the research process (Lunt & Livingstone, 1996). The focus groups each began by moving from one participant to the next as each

of the women answered the initial question. As the focus groups continued, both questions and answers flowed from one participant to the next asystematically. The focus group interview guide was composed of the following groups of questions:

1. When did you first begin your involvement in sports? Can you recall your first sport experience? How did that experience shape the role of sport in your life?
2. Who or what would you credit with getting you started in sports? How influential has this event or person remained in your life? Do you think you would have gotten involved if it weren't for this event or person?
3. What do you believe is the current state of African American females in sport? What/who is affecting that situation?

The first group of questions focused on the initial sport involvement of the participants in an attempt to establish the commonality or the varying of experiences of the individual women. This question was also intended to assist with establishing rapport as the women felt comfortable telling stories about themselves as children. Every woman also had a story to tell, so no individual monopolized the conversation. The next series of questions was aimed at identifying social systems that affected the women. The final sequence of questions were intended to identify if the participants believed that any societal or structural factors played a role in their decisions about sport participation as well as to establish any perceived resistance to these influences on their parts. Did they believe that African American females were well represented in sport and what did they see as the issues at the root of participation patterns (i.e. Who or what held the power of responsibility for African American women being participants in sport?) (Bruening, Armstrong, & Pastore, 2005).

Grounded Survey.

After completing the data analysis from the focus groups sessions, a grounded survey was developed incorporating the themes that emerged from the data as well as the participation statistics gathered through the document analysis. Grounded theory incorporates data from various sources in an attempt to identify a fundamental process and thus develop theory (Creswell, 1998; Morse, 1994; Strauss & Corbin, 1990). The surveys were administered to selected participants (4), representing all of the focus groups in order to test for accuracy in data interpretation. Selection was also based on family make-up, geographic origin, their sport, and their year in school in order to have the most diverse group of women possible. These decisions were made based the multiple black feminist perspectives (Collins, 1988, 1990, 1998, 2000; Hernandez & Rehman, 2002; Smith, 1998) which acknowledge that while these women might share commonalities of gender and race, they also might have unique experiences due to their family background (single parent, two parent, extended family involvement), growing up in an urban or suburban environment, and their particular sport's culture. Preference was also given to the student-athletes who had more experience both in sport and at the university; juniors, seniors, or fifth year seniors. Two participated in track and field and field (one a middle distance runner and one a heptathlete), one in crew, and one in volleyball. These were the same women who participated in the individual interviews. The participants responded on a five point Likert scale

to questions developed in each of several theme-based categories (See Appendix D for items).

Individual Interviews.

Individual interviews were conducted with four of the athletes (See Appendix E for interview guide example) selected by the same criteria as those who completed the grounded surveys. The individual interview guides were personalized to each participant based on their responses in the focus group and the collective responses to the grounded survey. The questions were designed to probe the sport experiences of these women. All were asked the same questions regarding their experience in their sport, how the athletic department treated them, and their opinion of current participation rates, sport distribution, and representation in leadership positions African American females in sport. Other individualized questions served as follow-ups to comments made in the focus groups.

Data Analysis

All focus group and individual interview sessions were recorded on audio tape and the interviewer also took notes during the sessions. Data was transcribed by the interviewer then coded, organized, and analyzed primarily by the interviewer with the use of NUD*IST (Non numerical Unstructured Data Indexing Searching and Theory-building). The comments and corrections of the other two researchers were then incorporated. The data were coded and organized into themes and then expanded into multiple sub-themes. Socialization was the major theme grouped into the following sub-themes: socialization agents- parents, siblings, peers, and teachers/coaches; environment- neighborhood and economic; racism- childhood experiences and college experiences.

Member Checks.

Member checks were conducted by providing all participants with the transcripts of their focus group session. They were also provided with the emerging themes and coding. Focus group and individual interview participants were mailed their particular group or their individual transcripts and the researchers' index of emerging themes, as well as how the participants' comments were coded in that index. Those women who had corrections and comments submitted them to the researchers by returning the transcripts with their comments to the researchers in the envelope provided. The member checks assisted in clarifying statements made in the focus groups and individual interviews and gaining insight from the participants on the coding schemes, thus functioning as an additional method of triangulating the data (Janesick, 1994) and is consistent with feminist research methods emphasizing the crucial nature of "giving voice" to participants (Reinharz, 1992)

Description of Research Setting.

Selecting a major Division I university with more than thirty varsity sports increased the chances of finding potential participants (i.e., African American female student-athletes). This choice of institution also increased the likelihood that the women who participated would be from diverse backgrounds, have a broad range of hometown locations, and have a variety of lived experiences. The academic support network for student-athletes

was the site of entry for this study. The Athlete Academic Services office provided the necessary and relevant statistics about the racial makeup of the athletic program, information needed to contact potential participants, assistance in gaining consent to participate from the students, and facility access for conducting the focus groups and individual interviews.

The following data was gathered through the administration of the background questionnaire and from the context of the focus group and individual interviews. Each participant selected a pseudonym when completing the background questionnaire and was referred to using that name.

Results and Discussion

In addressing the research questions for this study, the data has been organized into two primary sections. The first focuses on socialization agents (parents, siblings, peers, teachers/coaches), or the “who,” and then presents the social systems or structures that influence the socialization process. These include opportunity set/environment, neighborhood, economics, and examples of racist attitudes (as demonstrated through both childhood and collegiate experiences) or the “what.” The second section provides an in-depth look at two of the women who participated in the study and how they did or did not exercise their personal agency in the socialization process. Lastly, the effects of the socialization process are covered in the discussion. Not all twelve women who participated are quoted in the results that follow. Quotes that best represented the themes discussed were selected and come from both the focus groups and individual interviews.

Socialization Agents

Parents.

Several of the participants in the study identified both their mothers and fathers as powerful socialization influences in their athletic careers. But context is important to consider here. Neither of Lolita’s and Essence’s parents participated in sports. Vanessa’s and Gabby’s mothers had no sport background. While, as Gabby will speak to below, having played sports is not a prerequisite to being an influential socialization agent, those parents who had a sport background tended to provide more sport-related mentoring.

Dianne, Princess, and Vanessa, who grew up in two-parent, dual-income homes, strongly believed that their fathers served as their primary socialization influence. Their fathers performed a variety of tasks that led them to play sports, including teaching them how to play, signing them up for teams, and even serving as their coach. The women demonstrated their love for their fathers and their appreciation for the time, support, and admiration their fathers gave them:

. . . My dad . . . was always the one who played sports. I always followed him. I just loved being around him and he encouraged me to play. He supported me. All through high school he came to every practice. He was so supportive. He still supports my team to this day. . (Dianne)

Vanessa’s father had a big impact on her sport participation: “my very first sports memory would have to be my dad putting a basketball in my hands because that was his sport experience. He bought me a little hoop and everything when I was like five.” He had an extensive sport participation background, including

professional basketball.

The women who identified their mothers as the central influence in their sport involvement did so with the same type of appreciation and love the other women showed for their fathers. Gabby’s mom, who never played sports, wanted her to be that “pink and purple” type of little girl with a dress on and bows in her hair. But Gabby’s mom realized after arriving one too many times to pick her up at school and finding that her “stockings were torn, [her] pretty sweater was all ripped, and [her] hair . . . everywhere” (Gabby) that Gabby was going to be an athlete:

My mom is not a big sports fan, but . . . she signed me up to play on team sports. So I have to credit her because she’s the one who got over the expectations that she had. . . If she wouldn’t have been in my life, I don’t doubt that I would have gotten involved . . . (Gabby)

Kay’s mother was just the opposite of Gabby’s as far as her gender role expectations and her previous sport experience, having played volleyball and participated in track and field. When asked who the most influential person was for her becoming involved in sports, Kay answered:

I didn’t like to do the so-called girl things. My mom always told me that was all right, that I didn’t have to do that. That kept me going. I did it because she told me I could. (Kay)

Kay’s relationship with her mother and her mother’s beliefs about women being involved in sport were strong influences on Kay’s early and continued participation. Kay’s mother attended all of her high school sporting events and college basketball games. However, it is important to note that Kay’s father was not an option as a role model, since her mother raised Kay on her own.

Siblings.

The guidance given to the women in the study by their siblings was not as prevalent as the parental guidance the women experienced. All of the participants had at least one sibling, however both Gabby and Dianne only had younger siblings so the likelihood of them being influential was slight. The other women had older siblings, and in some cases (Essence, November, Princess, Vanessa, and Chyna) multiple older siblings, who played sports and could have potentially been influential socialization agents.

November remembered being only six years old and a little intimidated by the situation of filling in on her sister’s relay team. “I always used to practice with my sister outside. We would use twigs. She always needed someone to practice with so I did it. So I knew how to do it.” However, November viewed actually running in a meet as a completely different challenge. November’s desire to emulate her sister led her to be in attendance at that track and field meet, which led her to participate that day and remain involved in track and field.

Peers.

Few of the women addressed how their friends and peers had influenced their decision to become involved in sport, and helped them continue to be involved. Gabby did share an experience about how she came to college as a student only. Luckily for Gabby, her university had a rowing club. Gabby had been exposed to crew in the short time she spent in Canada while her father played for a Canadian Football League team and had always been interested in

the sport. She joined the club and experienced success immediately. Her sophomore year when crew became a varsity sport, Gabby was able to realize her dream of being a college athlete. Gabby was excited to be a part of the team, but experienced some difficulties fitting in with the other women on the team:

I found a friend because I really didn't know anybody. She was another Black girl and we just got along very well. We would get a kick out of it because we would always be paired up together. She just made it a lot of fun and that's what kept me coming. (Gabby)

Teachers/Coaches.

Teachers and coaches proved to be influential. Many of the women remembered a physical education teacher or a coach from elementary or middle school playing an important role in their initial sport experiences. The teachers and coaches were also instrumental in the encouragement that kept the women involved. Some of the women remained in contact with those teachers and coaches and continued to appreciate their influence many years later.

Lolita and Taz recalled their teachers and coaches from middle school spotting their talent. Both women welcomed the praise and attention received from the teachers as a result of this athletic ability. Lolita enjoyed this attention that she was not receiving from any other source as neither her sibling nor parents had any sport background or interest.

I remember my sixth-grade teacher. We used to have fitness tests. There was a 60-meter dash and he thought I was the best. If I had to pick somebody, it would probably be my teacher. (Lolita)

Taz remembers:

In middle school . . . I was playing flag football for gym class and the first time I got the ball I ran for a touchdown. The teacher said you gotta come out and run track and field . . . So I went and I've been running even since then. If he wouldn't have challenged me I would have done nothing. (Taz)

Taz still remained in contact with this coach and gave him a great deal of credit for her continuing to compete and succeed at a level that gained a full scholarship to college for her.

Environment

Neighborhood.

The student-athletes in the study hailed from neighborhoods as different as the Bronx to suburban areas of Colorado. Despite the differences found in those neighborhoods, all of the women agreed that the surroundings in which a person grows up have a tremendous effect on the sport choices young athletes make. The women described what type of sports they saw being played outside their homes and what types of courts, fields, and other athletic spaces were available to them near where they lived.

What do you see in the inner cities? Basketball and track and field. You don't see any volleyball or swimming pools. You don't see golf courses. (Princess)

There aren't a lot of tracks where I'm from just basketball courts, everywhere. . . . It doesn't take much to run. You can run anywhere. . . . What led me to basketball? I think it was just more opportunities. (Kay)

You won't see a lot of girls play tennis or ice-skating. Did you guys ever see anyone ice-skating? We are supposed to drive all the way in the suburbs to go skate somewhere? (November)

Kay made her decision to play basketball based on what she was exposed to as a young girl in a major metropolitan area. Lacrosse and field hockey were not even options, not to mention crew. She believed her environment had everything to do with her sport choice:

It's how you grew up . . . We didn't even have a lacrosse team in high school. I didn't even know what lacrosse was until I got to college. Field hockey? We didn't do that and I'm sure those girls had to play in high school to get to the point to do it in college . . . I think it's your environment. (Kay)

Economic.

Environment was also a financial agent of socialization. Again the women varied as far as their socioeconomic status was concerned from Taz whose mother was a college professor and father owned an auto detailing shop to Babeahgirl whose mother and step-father owned and operated their own hair salon to Kay who lived only with her mother, a legal assistant. The women in the study expressed how the physical environment of the surrounding neighborhood influenced how people become acquainted with sport and society, and they elaborated on how the economic environment a person grows up in plays a role as well. It is impossible to separate the two components:

You have to pay money and these inner city kids don't have any money. (Kay)

. . . people say well we don't have the money. (November)

Kay had no trouble playing basketball in her neighborhood and it cost nothing to go down the street and shoot. And November ran in the street in front of her house with her sister using a twig as a relay baton.

Taz and Vanessa had experiences that differed quite a bit from many of their peers. Taz grew up in a smaller town in the suburbs of a major metropolitan area and Vanessa grew up in an affluent section of a mid-size city. Neither of their families had any trouble providing their daughters with the necessary training and equipment to play sports. Taz participated in field hockey, soccer, as well as her college sport of track and field. Vanessa played basketball and soccer before she decided to focus her efforts on volleyball and join an elite club program. While Taz and Vanessa were thankful for the opportunities they were afforded growing up, they realized that not all children were as fortunate. Taz remembered when she played field hockey and soccer:

When I asked my girlfriends why they didn't play it was because they couldn't buy a hockey stick or cleats. I don't think people are really that bad off but the parents are afraid to lay out \$60 or \$100 max to have their daughter step out of her comfort zone to play that sport and then not like it. (Taz)

Vanessa elaborated on the specifics of her club volleyball experience:

My parents paid \$2500 in dues each year just for me to play on that team. Then we went to Vegas, California, junior Olympics, and another qualifier. If you don't have \$5000 per year just for volleyball then you are going to play for a lesser club. That club is not as well known and makes it harder for you to get seen by colleges. (Vanessa)

Vanessa appreciated the chance she had to play club and the scholarship to play volleyball in college she earned as a result, but she understood the problems the club system created and perpetuated:

I never really saw any of the other clubs because they wouldn't go to the same tournaments that we would because the entry fees for the tournaments we went to were high. Now I go back and look at them though and I see athletes who could be really good volleyball players and just don't have the money to do it. They go and play basketball or something that's more accessible. It's kind of sad that good athletes are being passed up because they don't have enough money to play. (Vanessa)

Racist Attitudes.

Racism affected the women from an early age, and it continued to affect them as college students. Both the past and present incidents spoke to racial climate and how that has affected the socialization process and continues to play a role in their lives. Taz recalled the first time she remembered being singled out because she was African American. The situation involved racial slurs on the part of other children and their parents. Her father explained to her why the slur was so degrading and took action with the soccer league because of the incident.

I was playing soccer and I was the only Black girl who ever played in that league and I was really called some names. (Taz)

Following Taz's recollection of her youth soccer experiences, the women then discussed how finding themselves in similar situations. Attending a predominantly White university had been difficult for them. They described the type of "culture shock" experienced by African American students. They felt this sense of isolation in their dorms, as they walked to class or practice, and in the Student Union. There was no denying that they were in the minority on campus. Princess, Kay, Essence, and November expressed their initial reactions to the complexion their university's student body:

Princess-I didn't know what I was getting myself into when I came to college.

Kay-Me neither.

Princess-It was a culture shock.

Essence-When I came here it was not only culture shock, but I had never seen so many White people in all my life. It was like 90% White.

November- There were White people at my high school and on my teams. But the White people here they seem like they come from rural areas. Like they've never been around Blacks at all! . . . there's only four Blacks on our whole [residence hall] floor,

maybe in our whole building.

In addition to the climate in the dorms and on campus, the women also noticed a racial segregation that took place at one of the central meeting places on campus, the student union:

Dianne -When you walk into the union, when I first walked in here . . .

Gabby-It's like the United Nations.

Dianne-One part has a section full of Black people. Little Africa.

Lolita-All the Black sororities and fraternities are there.

Gabby-There's always little Africa, little Asia, little India, and little Britain. And little Britain is scattered.

Gabby went into more detail about the seating patterns in the union:

There's not a sign, it's just like that. It's funny though because I've gone in with some of my teammates and of course they're White. They tend not to see it. They just get their food and go to this area. They'll go wherever they want to sit. I'll be thinking well, my people are over there. I don't think all people do it consciously but a lot of people do.

Implications

Patricia Hill Collins opened the 1988 edition of *Black Feminist Thought* with a childhood memory of performing in a school play. She, like the participants in this study, found herself on stage. And, like the participants in this study, she was the first, the only, or at least one of the few African American women in the circles within which she traveled. Through others pointing out to her that she did not belong, Collins felt herself becoming quieter and "virtually silenced" (Collins, 2000, p. vi). African American women have been silenced by not being given the opportunity to speak, by not being listened to when they do speak, or by having to speak the language of and adopt the ideas of the dominant group in order to be heard (Bruening, Armstrong, & Pastore, 2005). This study is significant in the development of a body of knowledge concerning African American women's experiences in sport. The focus group and individual interview processes brought together women who were "undergoing similar journeys" (Collins, 2000, p. x) and provided the women a chance to speak freely, to be listened to both by the researchers and their peers, and to speak their own language and voice their own ideas among fellow African American female student-athletes (Reinharz, 1992). In addition, they shared examples of how they interacted with their environment and responded to the expectations other individuals and structural forces exerted on them. The dialogue that took place was significant in that a dialogue about African American female student-athletes took place, African American female student-athletes were involved in that dialogue, and the dialogue has been shared with a larger audience—other African American women who currently serve as athletic role models or those who potentially could in the future, administrators who make decisions that affect African American female student-athletes, and educators who are in daily contact with these women. Beyond that significance, specific aspects of the socialization process for African American women were also illuminated.

Parents, as Jackson, et al. (1997) reported, marked the initial source of ideas about what it means to be Black and female in society and how to respond to those expectations. The empowerment some of the women felt to fight hegemonic dictates that they “act womanish” (Hill, 1999, p. 103) or to refuse to let peers use racial slurs to define them came from their parents as “society makes the socialization of children the primary responsibility of families [teaching] statuses, social roles, and prescribed behavior [as well as] prepar[ing] them to recognize their position in larger society” in regard to racism and discrimination (Taylor, Jackson, & Chatters, 1997, p. 3). Beyond this aspect of parental involvement, the women in this study were not influenced by socialization agents (parent, siblings) in considerably different ways than their White female counterparts (Brustad, 1996; Miller & Levy, 1996).

Teachers and coaches, as additional agents, served the dual role of recruiting some of the women to initially become involved and encouraging them to remain as participants. In the cases of the women who identified coaches as influential in their sport involvement (Lolita and Taz), those coaches steered the women toward the stereotypical Black sport of track and field. Particularly in Taz’s case given her exposure to multiple sports as a youth and her apparent athletic ability, her coach could have encouraged her toward field hockey or soccer just as easily as track and field.

The opportunity set (Greendorfer & Ewing, 1981) of the women in this study proved equally if not more influential than socialization agents. Race, gender, and social class create a “matrix of domination that women of color experience on three levels: the level of personal biography, the group level of the cultural contexts created by race, class, and gender, and the systemic level of social institutions” (Zinn & Dill, 1994, p. 6). When asked who or what influenced their involvement in sport, their personal biography, all of the women responded with who—a person who was crucial in their becoming involved. But when the conversation turned toward the societal forces at work in the environments (the what) of these women, every one of them agreed that the neighborhood in which they grew up and the socioeconomic status of their family played a determining role in their athletic career. To Kay, Princess, and November opportunities were limited as they had access to only certain sports. They then pursued basketball and track and field. Socialization led them to participate in the stereotypical “Black” sports, although Princess also participated in cross country in preparation for the track and field season. To others, like Vanessa, Babeahgirl, and Taz, their neighborhood or family income enhanced their opportunities and exposure to a variety of sports beyond their peers. Not so coincidentally, these are the three women who were bi-racial. Their socialization led them to participate in stereotypical “White” sports. Perhaps because each of them had one Caucasian parent they did not feel the isolation other African American women would have felt on a team of Caucasians. For instance, in reference to the sections of the Student Union at their university, the bi-racial women who participated in this study by virtue of their appearance sat in “Little Africa.” But by virtue of their socialization “Little Britain” was within their comfort zone. They could operate within with either group, but again like Collins’s “outsider within,” never achieving full membership in either. At one point, Vanessa expressed her difficulty in not knowing who she was or who she should be spending her time with because of

her bi-racial background.

The inability to generalize experiences by gender or race or even gender and race became apparent through the duration of the current study. Being African American, female, and an athlete are the “intersecting oppressions” (Collins, 2000, p. 69) that shape these women’s experiences. Social class was also a factor for both the women who came from lower socioeconomic situations and those who did not. Socialization into sport for these women represented a “diversity of experiences” (Hill, 1999, p. 12). The findings in this study serve to support the challenge that there is no such thing as “the African American family” or “the African American experience” brought by Black Feminist thinkers, a “challenge to the myth of the monolithic [African American] family experience” (Hill, 1999, p. 12). The data demonstrated that each woman followed a slightly unique path to becoming a college student-athlete. They could not be conceptualized as inherently “disadvantaged” as opposed to the “White middle-class norm” (King, 2001, p. 10). But instead they needed to be treated as individuals coming from backgrounds that vary in some regards and were similar in others.

The participants in this study demonstrated that not all African American females are destined to play basketball or run track and field. But that “issues of power and agency” (King, 2001, p. 8) affect the socialization process for African American females creating a perception of limited options in sport. Socialization agents and social structures influence their sport participation decisions. However, they can be interactive, like Gabby, in making decisions and shaping their own experience. More often than not, though, African American women like Kay follow the crowd. They socialize for survival (Collins, 2000). Taz, Vanessa, and Princess also indicated their plans to mentor young women as they pursued careers in coaching and youth sport. They have learned from their experiences and from each other that African American females student-athletes can possess a strong sense of self whether they participate in basketball and track and field or not. By bringing these women together to discuss issues that were central to their identities as African American female student-athletes, they were able to share their experiences with each other and comment on how they will take an active role in encouraging the next generation of African American girls to become involved in sport. They also learned that through role modeling they can affect change. The NCAA participation, coaching, and administrative statistics can improve to reflect more diversity. Lastly, this study illuminated how the participant’s sport socialization experiences were and pointed to the areas of socialization agents, environment (neighborhood and economic), and the social power structure as avenues for continued research.

Dr. Jennifer E. Bruening teaches at the University of Connecticut, Dr. Donna L. Pastore is both an administrator and on the faculty at The Ohio State University and Dr. Ketra L. Armstrong teaches at California State University at Long Beach.

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Appendix A: Background Information-Participant

* participated in an individual interview

Pseudonym	Focus Group	Age/Yr	College Sport	Other sports played prior to college
*Gabby	1	22/SR	crew	tennis basketball track swimming volleyball
Dianne	1	18/FR	track	volleyball basketball track
Lolita	1	22/SR	track	volleyball basketball track gymnastics
Essence	2	23/SR	track	Track
November	2	19/FR	track	volleyball basketball track
Kay	2	22/SR	basketball	basketball softball track bowling
*Princess	2	22/SR	XC/track	track X country basketball

Babeahgirl	3	19/FR	fencing	basketball fencing
*Vanessa	3	20/JR	volleyball	volleyball basketball soccer
Madison	3	21/SR	track	Track
Chyna	3	20/JR	track	Track
*Taz	3	23/SR	track	field hockey soccer track

Taz	Brothers-30, 21, 17, & 15
	B(30)-swimming; B(21)- track and field
Sisters-17 &10	B(17)-wrestling; B(15)-none S(17)-track and field, tennis, basketball, baseball S(10)-soccer

Appendix B: Background Information-Parents of Participants

F-Father; M-Mother

Pseudonym	Parents' occupations	Parents' Sport Backgrounds
Gabby	F-Supervisor	F-football basketball track and field
	M-Accountant	M-none
Dianne	F-bank customer service	F-baseball football basketball
	M-medical lab technician	M-bowling softball
Lolita	F-nurse	None
	M-nurse	
Essence	F-retired	None
	M-nurse	
November	F-school administrator	F-football basketball
	M-school administrator	M-bowling
Kay	M-legal assistant	volleyball track and field
Princess	F-bus driver	Both track and field
	M-home health care	
Babeahgirl	StepF-hairdresser	StepF-football
	M-hairdresser	M-softball
Vanessa	F-shipping manager	F-basketball
	M-administrative assistant	M-none
Madison	F-radiologist	track and field
Chyna	F-teacher/coach	F-baseball
	M-seamstress	M-cheerleading gymnastics
Taz	F-auto detailer	F-football baseball track and field
	M-professor	M-tennis swimming

Appendix C: Background Information-Siblings of Participants

B-Brother; S-Sister

Pseudonym	Siblings-Ages	Siblings' Sport Backgrounds
Gabby	Brother-15	swimming, soccer, track and field
Dianne	Brother-13	baseball, football, soccer
Lolita	Brother- 24	None
	Sister-21	
Essence	Brothers-26 & 24	Both basketball
November	Brother-25	B-football, basketball, track and field
	Sister-22	S-basketball, track and field
Kay	Sister-23	track and field , cheerleading
Princess	Brothers-26 & 25	B (26)-boxing; S-track and field
	Sister-23	
Babeahgirl	Brothers 21 &-20	Both basketball and tennis
Vanessa	Brothers 22 & 15	Both B- basketball
	Sisters 26 & 23	S(26)-soccer, cheerleading; S(23)-soccer
Madison	Brother-26	football, basketball
Chyna	Sisters-28, 26	Both-track and field, soccer, gymnastics, cheerleading

Appendix D: Grounded Survey Items

I. Early Socialization Influences

1. My mother was the most significant influence on my becoming involved in sports.
2. My father was the most significant influence on my becoming involved in sports.
3. My brother (s) was/were the most significant influence on my becoming involved in sports.
4. My sister (s) was/were the most significant influence on my becoming involved in sports.
5. My peers were the most significant influence on my becoming involved in sports.
6. My teacher (s) was/were the most significant influence on my becoming involved in sports.
7. My coach (es) was/were the most significant influence on my becoming involved in sports.
8. My relatives were the most significant influence on my becoming involved in sports.

II. Choice of Sport

1. I chose to play the sport I play in college because I was good at it.
2. I chose to play the sport I play in college because I enjoyed it.
3. I chose to play the sport I play in college due to the most significant influence I listed in the previous section.
4. I chose the sport I play in college due to the availability of a scholarship.
5. I chose the sport I play in college for the opportunities it will afford me after graduation.
6. I feel a stereotype exists that African-American women are supposed to play a certain sport or sports.
7. I believe this sport is basketball.
8. I believe this sport is track and field.

Appendix E: Example of an Individual Interview Guide

Gabby

1. Why did you choose crew? What influenced you to become and to stay involved?
2. What has your experience been as a participant in crew?
3. What stereotypes have you been exposed to as an African American woman? As an African American female athlete? Talk about the racial seating arrangement at the Student Union.
4. How do you feel about the treatment of women by the athletic department?
5. Culture/Race/Ethnicity. Talk about the intricacies and differences among African Americans.
6. What is the current state of participation for African American women in sport? ■

Instructional Practice of Hong Kong Primary Physical Education Student Teachers

by Alberto CRUZ and Chung LI

Abstract

This study aimed at examining the instructional practice of Hong Kong primary physical education student teachers. Twenty student teachers were videotaped teaching two lessons during their practicum. They were coded using the Physical Education Teacher Assessment Instrument. Data generated were comprehensively described. Three randomly selected student teachers participated in the second phase of the study. They were observed teaching two lessons and attended two pre-lesson and post-lesson interviews. Results indicated that the student teachers spent 73.18% of their time in instructional behaviours and 26.82% of their time in managerial behaviours. They held common features in instructional practice during teaching.

The major task of the teacher education institute is to produce competent teachers. Teacher education institute usually offers campus training programmes and student teaching experiences for their students to acquire the basic pedagogical principles and reflective skills in learning to teach. Throughout the teacher education process, student teachers are aimed to be prepared to teach competently and effectively before they graduate.

Recently, Whipple and Ammah (2001) have suggested that managerial and instructional competencies are the two major teaching effectiveness criteria for physical education beginning teachers. In practice, managerial strategies are the prerequisite procedures that teachers adopt to create an environment where instruction and learning can take place, while instructional strategies refer to actions that promote student learning. Rink (1996) also added that effective teachers can create a total learning environment for their students. From a synthesis of these research findings, Schempp (1992) pointed out that effective teaching is related to student achievement and effective teacher is ultimately defined by what students learn. In short, effective physical education teaching is highly related to proper managerial strategies, a positive learning environment, good instructional strategies and student achievements.

Teaching practice and student teaching have long been recognized as the most important elements within the teacher education programme that help student teachers learning to teach (Coulon, 1991; Paese, 1984a; Siedentop, 1981; Tannehill & Zakrajsek, 1988). Student teaching has provided opportunities for student teachers to work in real school situations. With these opportunities, student teachers can critically examine whether theories learned in the coursework fit into the actual teaching environment. They are also expected to develop their basic teaching skills during these experiences. However, student teachers may not capture expected pedagogical skills within student teaching experience. Research evidence stresses the problems for developing pedagogical skills in student teachers (Paese, 1984b; Rikard, 1990; Stones, 1983).

Some student teachers gained little benefit and negligible change in the development of their pedagogical skills.

From the experience of the authors who work as physical education teacher educators in a Hong Kong institute of education, they find that some primary physical education student teachers also have teaching problems during their practicum. These student teachers cannot manage the class and deliver the teaching content properly in relation to the student learning objectives stated in the lessons. How they are prepared in the coursework before the practicum seems to have little effect on their instructional practice. This aroused the authors' interest to study the instructional practice of the student teachers as to understand what is happening during their practicum.

Understanding more about the practice of student teachers will help the teacher educators to improve their students' teaching effectiveness. Besides, it also holds implications for the planning of the institute teacher education programme. Are the student teachers well prepared for their practicum? However, there have been limited studies investigating the teaching of primary physical education student teachers in Hong Kong. Therefore, the purpose of the study was to examine the instructional practice of Hong Kong primary physical education student teachers during their practicum. It is hoped that data generated in the study would give a better picture of the practice of student teachers and, in turn, assist the teacher educators to help them during their practicum. In addition, these also help the teacher educators to review their physical education teacher education programme in preparing the student teachers for the practicum. The information generated will add to the physical education student teacher's effectiveness research during their practicum. This has shed light on the process of student teacher development and on the quality of the instructional practice in physical education.

Methods

Subjects

The participants were students seeking teacher certification in primary physical education at a Hong Kong institution of education. They were engaged in the final year of a two-year full time programme and had limited teaching experience, having only six weeks of teaching practice experience in general subjects in the first year. They age ranged from 22 to 24 (mean = 22.45) and had no teaching experience in physical education.

Procedures

During their methods classes in physical education, as the subject lecturer, the first author briefly introduced the outline of the proposed study. Twenty primary physical education student teachers were randomly selected and invited to participate in the study. They were asked to videotape their teaching of two ball games lessons in their assigned schools during the last three weeks of their final practicum. This ensured that they have attended the

methodology and didactic courses as well as gained full advantage of the student teaching experience in real school settings. The activities taught in the lessons were limited to team ball games activities. These include football, basketball and volleyball activities. It was hypothesized that this kind of arrangement would minimize possible variation of their instructional practice in the lessons. The participants were also assured that all data collected would be confidential and in no way affect their grade assessment for the student teaching performance. To insure protection and to gain the trust of the participants, confidentiality and anonymity were guaranteed concerning the collection of data and the report of the study. Pseudonyms were used throughout the study to protect the participants' identities.

Each videotaped lesson was coded using the Physical Education Teacher Assessment Instrument (PETAI) (Phillips, Carlisle, Steffen, & Stroot, 1986). The PETAI allows for a continuous temporal recording of two categories of teaching behaviours, the instructional and the managerial, which meets the purpose of the study. There are five teacher instructional behaviours categories and five teacher managerial behaviours categories within the PETAI (see Table 1). Forty lessons were videotaped and taught to pupils from primary three to primary six. Quantitative data generated by the PETAI were comprehensively analyzed. Three student teachers were randomly selected and consented to take part in the second phase of the study by allowing the first author to observe their videotaped lessons, conduct two pre-lesson in-depth interviews, as well as engage them in two stimulated recall sessions. One male and two female student teachers participated in the second stage and they are named as Kei, Sze and Ling in the later part of this paper.

Qualitative data were collected through lesson observations and interviews. These helped to provide information about the effects of participants' perception, thinking and knowledge on teaching ball games activities, as these underlying factors may influence the student teachers' teaching. Data generated supplement and give a better picture of the teaching process of the participants. All coding of the videotapes was done by two research assistants. In order to establish the reliability of the quantitative data, both intra- and inter-observer agreement measures were made by using the methods suggested by Van der Mars (1989). Intra- and inter-observer reliability ranging from 94.1 % to 100% and 83.4% to 100% were respectively recorded. Both surpassed the accepted limit 80% suggested by Van der Mars.

Data Analysis

Data generated by the PETAI coding procedure entered into a SPSS programme for statistical analysis. Descriptive statistics including the mean and standard deviation were calculated for all behaviour category of the observation instrument. These descriptive data allowed comparing with the results of other studies in this area.

Qualitative data for this study consisted of interview tapes, stimulated recall records and field notes of the observed lesson. The analysis of data was based upon the methods of inductive analysis and constant comparison and coding procedures (Glaser & Strauss, 1967; Strauss & Corbin, 1990). Initially, all interviews, stimulated recall sessions and field notes of lesson observation were fully

transcribed. Through inspection and careful reading of the data, interesting or surprising themes were identified within data. This allowed categories to emerge from the data which were separated according to each theme. Lastly, the investigator searched for the dominant trends and patterns within the study. The resulting data, developed from the inductive process, included the summaries of what was said and observed. Participants' direct quotations were used to provide data validity. A number of strategies were utilized to establish the trustworthiness of results: triangulation, peer debriefing, and member checks. Findings from interviews, stimulated recall sessions, and lesson observations were compared and contrasted to cross-check data and interpretations. Consistent findings from different sources coupled with good explanations for differences in data from divergent sources enhanced the overall credibility of the study results. In addition, the second author was asked to read and comment on the preliminary analyses and data interpretation. Meetings were held and discussed until both authors came to an agreement. Finally, all the interviews and stimulated recall record transcripts were returned to the participants and they were asked to correct errors or inaccuracies in the transcripts. Only minor changes were made before the data analysis.

Results

Both quantitative and qualitative data generated reflect the instructional practice of the student teachers in the practicum. The systematic observation instrument employed helped the authors understand what the student teachers were doing in their physical education lessons. The mean percentages and standard deviations of time spent in different instructional and managerial behaviours of the PETAI by the 20 student teachers across 40 lessons are shown in Table 2. Results indicated that the student teachers spent 73.18% of their time in instructional behaviours and 26.82% of their time in managerial behaviours. Monitoring behaviours received the highest percentages with 38.29% whilst motivational feedback had the lowest percentage with 0.23% within the instructional behaviours categories. The student teachers spent the most time on activities organization with 13.04%, whilst the least time on beginning and ending class with 0.25% within the managerial behaviours categories.

With help from the analysis of the field notes data, we have a better understanding of how the student teachers teach their lessons. In regard to the instructional and managerial behavioural aspects and teaching strategies, several major categories emerged from the analysis.

Teaching Behaviours

1. *Teaching Style.* The student teachers adopted a teacher-directed approach in teaching. The student teachers dominated and initiated most classroom activities. They did most of the talking within the lessons. In this sense, the student teachers adopted the command and practice styles of teaching (Mosston & Ashworth, 2002). They made all the decisions and directed the lessons. It seemed that the student teachers deliberately controlled the classroom activities by adopting this teaching style. However, this direct teaching style requires specific teaching skills to help student learning. These include clear presentation, efficient use of time in learning, good class management and providing feedback.

These teaching characteristics match with those behaviours with relative high percentage time spent exhibited by student teachers in Table two. The following episodes reflected the direct teaching style of the student teachers:

Ling (student teacher) instructed the students to spread out for the stretching exercise...Ling demonstrated the dig technique with two hands in front of the class...she instructed them to follow and practice her introduced skills. (Ling field notes 1)

Kei (student teacher) then demonstrated the dribbling technique and dribbled the ball to the other end of the group. Students started the practice immediately after the demonstration. After 1 minute, Kei stopped the class and emphasized the teaching points of the dribbling and ball receiving techniques. He allocated 20 seconds for the students to practice. (Kei field notes 2)

2. *Collective Behaviours.* The student teachers shared teaching behavioural characteristics in the classroom. These included informing, demonstrating, organizing, observing, providing feedback, or correcting. All these teaching behaviours indeed fall within the behavioural category of the PETAI. They are the “planned presentation”, “response presentation”, “organization”, “monitoring” and giving “performance feedback”. This explains why these instructional behaviours demonstrate relatively high percentage of time spent in the lessons. The actual content of these teaching behaviours appeared to be similar but the proportion of time spent in each category might differ. This collective behaviour may be attributed to the similar routine activities they provided in the lessons. Their lesson activities usually consisted of a warm up, skill instruction and practice, game application and a closing activity. These highly routinized activities made the student teachers produce similar teaching behavioural characteristics. The following excerpts taken from the field notes support this sub-category:

Ling (student teacher) used a whistle to stop the class and asked the students to sit down in front of her (*directing*)...She ordered the students to sit in 4's (*organizing*)...Ling demonstrated the next task with three students (*demonstrating*). She explained the requirements and teaching points in detail (*informing*)...Ling gave feedback and tried to correct their underhand dig technique (*providing feedback and correcting*). (Ling field notes 2)

Sze (student teacher) asked the boys to practice serving in the open area (*directing*)...She then instructed one student to demonstrate the serve and the other students tried to receive the serve at the other end of the playground (*demonstrating*)...She went to the open area and observed the serving performance of the boys (*observing*). After providing feedback, she also walked around and monitored the practice of the students (*monitoring*). (Sze field notes 2)

3. *Presentation.* Providing information about learning activities to the students is one of the essential functions of teaching. Rink (1994) defines this process of providing the information about learning activities to students as task presentation. How the teachers present the learning tasks influences the learning of students. The student teachers in the present study used much time to explain the content of the lesson and in some occasions did not even model the learning tasks for the students.

She [Ling] (student teacher) spent quite a lot of time in the

introduction of the dig technique. In terms of time spent, she talked a little bit more. (Ling field notes 2)

After minutes of practice, Sze (student teacher) stopped the students practice and asked them to watch the demonstration... She did not perform the technique herself...She again did not demonstrate the technique for the class. She only gave verbal instruction and mentioned the teaching points. (Sze field notes 1)

4. *Organization.* Efficient organization of learning activities will maximize the learning time of the students. Since a certain amount of management, organization and transition time is necessary in teaching, it is critical for teachers to keep these times to the lowest possible amount as to maintain optimal amounts of time in those segments that lead directly to learning. The student teachers spent a relatively long time period in organizational detail both prior to and during activity. They seemed to have problems in handling equipment and apparatus.

She [Ling] distributed the volleyball... She took some time for the organization and demonstration. (Ling field notes 2)

...three fourths of the class were standing at the back waiting and watching the practice. It seemed that the organization was not good enough. There were too many students waiting for the practice. (Kei field notes 2)

5. *Supporting.* Giving support to students while they are practicing will facilitate their learning. However, the student teachers were rather passive in monitoring the student practice. They usually stood still and observed with little time supervising student performance. As indicated in Table two, the student teachers spent more than one third of class time monitoring the class. It is likely that the student teachers need to play a more active role in supporting student learning in the classroom. The following episodes reflected the supporting behaviours of the student teachers during the physical education lessons.

Ling (student teacher) stood still and monitored the students' practice. She did not give feedback nor assist the under-performing students. (Ling field notes 1)

Three to four girls always stood around and rarely kicked the ball and seldom took part in the activity. Kei (student teacher) only walked and watched how the students participated in the dribbling relays. (Kei field notes 1)

6. *Pedagogical Setting for Learning.* Physical education teachers always try to maximize the learning opportunities for their students in their lessons. Due to the nature of the ball games teaching, the availability of space and balls are the major considerations of student teachers. Partner and small group practice were the common settings. The student teachers offered station teaching settings for the final game learning activities. Two to three different modified games or related skill practice were usually set up concurrently for their students to apply their learned ball skills. The following vignettes depict typical activities settings used by student teachers in their classes:

...the setting was to practice in pairs using the underhand dig technique...She ordered the students to sit in 4's...The students were required to dig in a square setting and direction...Ling (student teacher) asked half of the class to practice in single line digging practice and other half practiced the [2 vs 2] modified games. (Ling field notes 2)

Kei (student teacher) asked students to sit down in groups of 4...he then spread out the groups to practice...Kei tried to refine the technique by requesting students to run to the opposite side and line up behind the receiver after the pass [in the same setting]...Kei asked two groups to practice the previously learnt activity, inside foot passing. He assigned two groups to play the 'monkey' game... (Kei field notes 1)

Instructional Strategies

To increase student learning, physical education teachers always try to develop high levels of student engagement with the content. Engagement with the content is a necessary condition for learning and it is also a minimum criterion for effective teaching (Rink, 2002). To achieve high levels of student engagement in the learning activities, teachers usually adopt a variety of teaching strategies to ensure the students are able to function within the lesson.

In reality, the teacher will use different strategies for different purposes and in different contexts. A teacher rarely stays with one single strategy in a single lesson. It is expected that the student teachers will adopt a variety of teaching strategies in their teaching. From the analysis of the interviews and field notes, several categories emerged with respect to the managerial and instructional strategies employed:

1. *Preventive Management.* Effective physical education teachers usually introduce certain managerial strategies to prevent or reduce instances of managerial problems in complex physical education settings. Their main purposes are to minimize the likelihood of behavioural problems in class in order to increase time on task and student learning. The student teachers in the present study seemed to recognize the importance of preventing management problems occurring in class. Most student teachers said that they would establish rules and routines for their classes. They claimed that they would present the class rules and their expectations at the first lesson. They trusted that reinforcing routines would help to minimize the opportunity for student misbehaviours. The following quotes from the pre-lesson interviews are examples of the management strategy that student teachers used to prevent classroom discipline problems:

...To let the students know my [Sze] requirements in the first lesson. Otherwise I will punish them if necessary. (Sze Pre-lesson Interview 1)

...To state out my requirements and expectations clearly. I [Kei] also set rules for the students to follow. (Kei Pre-lesson Interview 1)

2. *Equipment Management.* Instructional time can be lost when the teacher is spending much time in arranging equipment during the lesson. Improper equipment arrangement increases management time and loses lesson momentum as students wait for the next activity to be organized (Siedentop & Tannehill, 2000). Field notes data indicated that the student teachers had assigned pupils to assist with equipment dispersal and return. This reduces management time considerably and keeps students involved in the flow of the lesson. The following episodes were the examples:

She [Ling] requested the students to bring the basket of volleyballs out from the equipment room...She also asked one student to bring out ropes and play the 2 vs 2 modified games.

(Ling field notes 2)

Kei (student teacher) asked some students to bring the cones from the equipment room for the setting up of the next activities...He asked the students to put away the cones and line up in the covered playground. (Kei field notes 2)

3. *Task Presentation.* Teachers must provide information about the learning task before students can begin to pursue the task. Physical education teachers usually use different types of strategies for presenting tasks to students. Whatever strategy they use, they aim at providing the clearest task presentation information in the shortest amount of time that facilitates students' learning. Interview data indicated that the student teachers preferred using a more directed type of presentation method, tell and show strategy.

By verbal explanation and demonstrations, I [Kei] will also give them some instructions for what to do. (Kei Pre-lesson Interview 1)

...Mainly by demonstration and explanation. (Ling Pre-Lesson Interview 1)

4. *Learning Tasks.* Appropriate learning tasks designed and chosen for student engagement are essential to student learning. Rink (2006) pointed out that learning games sports skills is different from learning other individual motor skills. As games skills are open skills and they are needed to be applied in the game itself. Teachers should adopt an appropriate teaching strategy to help students capture the ability to use sport skills in a game situation. Macfadyen and Osborne (2000) suggested that contextualized games activities of 2v1, 2v2, 3v2, and 4v4 are relevant for upper primary students to develop their games skills. The tasks selected should match students' abilities so as to give them a sense of competence. Some of the tasks selected by the student teachers in the lessons were inappropriate for games skills learning. The difficulties of their tasks did not match the students' abilities and some did not follow a logical progression extension. Some games chosen did not even relate to the selected games skills.

The students were required to dig in a square setting and direction...The task might be too difficult for the students. Most students could not practice as instructed. The practice was inappropriate to the student abilities. (Ling field notes 2)

Almost half of the class could not receive the serve. In fact, Sze (student teacher) did not prepare any progressive tasks for the learning of serve technique as well as receiving the serve with the dig...The boys were playing the piggy game with two defenders. The game was originated and usually used in the basketball teaching activity. The skills required in the game did not relate to the learning of volleyball. (Sze field notes 2)

Discussion / Conclusions

This study sought to explore the instructional practice of primary physical education student teachers in ball games lessons. Physical educators have realized that proper allocation of time spent in instructional and managerial behaviours will help student learning in physical education lessons. Curtner-Smith (1994) suggested that teachers who spent a relatively large proportion of lesson time in instruction and relatively less time in class management were more successful in terms of enhancing students' skill learning. This was also advocated by Byra and Coulon (1994) and Silverman (1991), teachers could spend a minimum of time in

managerial behaviours would help students to have more time in skill practicing and learning.

When comparing student teachers' behaviours with other research using PETAI to investigate teacher practices (Aicinena, Steffen, & Curtner-Smith, 1992; Curtner-Smith, Kerr & Hencken, 1995; Lacon & Curtner-Smith, 1998; Laker, 1994; Smith, Kerr, & Wang, 1993), the percentages of time spent in both instructional and managerial behaviours by the local student teachers was very similar to the patterns of the instructional practice of the American physical education teachers and British physical education student teachers. They allocated about three quarters of their lesson time to instructional behaviours and one fourth of the lesson time to managerial behaviours. Moreover, the local student teachers spent relative less time in presenting their teaching materials. The normal primary physical education lesson time in Hong Kong ranges from 30 to 35 minutes. The short lesson time restricts the teachers having detailed instructional behaviours and precise presentation is always emphasized in the lesson by the institute supervisors due to this environmental constraint. However, the qualitative data indicated that the student teachers still have room to improve and shorten their presentation time.

On the other hand, the student teachers allocated relatively more time in response presentation and reasonable time in performance feedback. This implied that they kept repeating and reminding the teaching points as well as providing information with response to the skill performance of the students, which was always stressed by the institute supervisors. However, it was discouraging to know that the student teachers did not give more motivational feedback to their students. Motivational feedback is helpful to encourage student learning. The possible explanation may be due to their inadequate teaching experience as they are at the novice stage of teacher development according to the Berliner (1988). At this stage, the teachers were inflexible and labeled every task they had learnt from their teacher training. It is possible that the student teachers in the present study only concentrated on contents presentation and neglected the learning of the individual student. In fact, Ha (1996) also obtained similar feedback patterns when she examined the instructional practice of 40 Hong Kong physical education teachers. The teachers provided low rates of praise and corrective to positive feedback when teaching. It seems that Hong Kong physical education profession needs to take note of this teaching characteristic.

Teachers usually spend some time observing student learning in class. Physical educators defined this kind of instructional behaviours as monitoring (Phillips, Carlisle, Steffen & Stroot, 1986). Boggess, Griffey and Housner (1986) demonstrated that monitoring was a key tool used by physical education teachers in order to maintain class order. It is assumed that the teachers are cognitively functioning to help the pupils while silently observing the learning environment. Recently Aicinena (2000) confirmed that the cognitive behaviours during this observing period were mostly concerned with the student behaviour and performance when he studied a physical education student teacher's thoughts during monitoring in twenty two classes. However, Hastie (1994) showed that the less effective teachers spent more time observing. In the present study, the local sample on average spent 38.29% of lesson time in monitoring. Most monitoring occurred during

game play or the practice of skills. As institute supervisors always encourage student teachers to allocate considerable time for skill application, the student teachers usually reserve over one third of the period time for game play or conditioned games. It is reasonable to find that the local student teachers had allocated almost 40 % of the lesson time to monitoring during games teaching. In addition, the qualitative data also indicated that the student teachers were rather passive in their monitoring practice. They could have made use of this time actively supporting their students in learning.

Physical educators agreed that effective teachers spent less time managing and more time instructing (Harrison, 1987; Phillips & Carlisle, 1983; Siedentop, Herkowitz, & Rink, 1984). Research results also indicated that primary school physical education teachers were ineffective in terms of time management and spent a large percentage of management time in class (Quarterman, 1977; Stewart, 1980). They found that primary physical educators on average allocated 37% of the lesson time to management and some teachers even spent 52% of the lesson time to management in their studies. In the present study, student teachers shared as low a percentage class management time as 26.82%. It seemed that they were managing the classes very well in terms of time spent. However, the field notes data indicated that the student teachers might still have difficulties in organizing activities and handling equipment when teaching.

The findings of the study held several implications for the preparation of the physical education teachers. The quantitative data revealed that student teachers did not give much motivational feedback, while the qualitative data confirmed that they exhibited less supporting behaviours to students. This has implications for the practice in physical education teacher education. Moreover, there is still room for the student teachers to improve their classroom management time. It seems that the student teachers lack of pedagogical skill related to the classroom management. Development of these teaching abilities should be emphasized within the teacher education programme in future. Field notes data also revealed that the student teachers had problems in choosing appropriate learning tasks and skill-applied games in games lessons. The development of competent of student teachers in games teaching and planning should receive much attention in physical education teacher education programmes. Moreover, the investigators in the present study have no intention to favour the adoption of the apprenticeship style "training" of the student teachers and neglect the "education" of the student teachers. Instead, both approaches should receive equal attention during the preparation of student teachers. They understand the improvement of classroom practicum experience will help to master a repertoire of teaching skills but it does not guarantee the student teachers will be able to make proper judgment about what ought to be done in a particular situation. Nevertheless, teacher educators should take note of this and make better planning of the field experience programme. Providing more opportunities for student teachers in practicing teaching or lengthening the practicum period might help the teaching competent of student teachers. With an increase of reflecting opportunities and reflection process during and even prior to the practicum experience, the student teacher may construct their knowledge of teaching.

In terms of limitations, participants of the study came from one

teacher education institute. Data from this sample may have biased the findings. Readers should interpret the results with caution. Studies that expand the sample populations and teacher education institutions to replicate findings are recommended.

As teaching is a complex dynamic activity occurring in a complex environment (Doyle, 1986; Shulman, 1987), combining quantitative and qualitative data together could give a better account of the instructional practice of the student teachers. The findings from these data did provide some information on the practices of student teachers in primary physical education and helped us understand how student teachers teach ball games activities. However, there is still a need for the teacher educators to understand why the student teachers adopted such instructional practice during their practicum period. Besides, the findings also imply that the teacher educators in the present study need to re-think their design of their teacher education programme. Are the student teachers well prepared for the practicum? Therefore, it is advised to conduct more research on this issue and help the teacher educators understand more about their students and how their programmes influence the practice of their students.

Dr. Alberto CRUZ and Dr. Chung LI teach at The Hong Kong Institute of Education

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Table 1. Definitions of the Teacher Instructional and Managerial Behaviours Categories Coded by the Physical Education Teacher Assessment Instrument.

Instructional Behaviours	
Planned Presentation (PP):	The time utilized to present planned instructional material to the pupils.
Response Presentation (RP):	The time utilized to restate, emphasize, or summarize information relative to the aspects of a performance.
Monitoring (M):	The time utilized to observe the learning environment. This may include some incidental talk.
Performance Feedback (PF):	The time utilized to provide information relative to the aspects of a performance that is specific to the immediate execution of a skill.
Motivational Feedback (MF):	The time utilized to provide general responses to a skill attempt.
Teacher Instructional Time (TIT):	The total time the teacher utilizes to present, monitor, and provide feedback to the pupils and the sum of PP, RP, M, PF, and MF.
Managerial Behaviours	
Beginning/Ending Class (BEC):	The time utilized to begin the lesson, record tasks, and to end the lesson.
Organization (O):	The time utilized to organize for skill development or game play.
Equipment Management (EM):	The time utilized to obtain, set up, distribute, or collect equipment.
Behaviour Management (BM):	The time utilized to provide feedback relative to pupil behaviour.
Other Tasks (OT):	The time utilized for purposes other than class management or instruction.
Teacher Management Time (TMT):	The total time the teacher is engaged in class organization, not directly related to teacher instruction time and the sum of BEC, EM, O, BM, and OT.

Table 2. Percentages of Teacher Behaviour Time for the Student Teachers across Forty Lessons

Instructional Behaviours	Mean %	Standard Deviation	Low Score	High Score
Planned Presentation	14.01	5.47	5.5	30.3
Response Presentation	10.32	5.12	3.1	25.6
Monitoring	38.29	8.44	22.2	56.1
Performance Feedback	10.33	4.69	2.7	21.7
Motivational Feedback	0.23	0.37	0	1.4
Teacher Instructional Time	73.18	9.14	52.9	92
Managerial Behaviours				
Beginning/Ending Class	0.25	0.49	0	2.1
Equipment Management	12.29	7.03	0.9	26.1
Organization	13.04	6.25	2.3	26.9
Behaviour Management	0.98	1.53	0	5.7
Other Tasks	0.26	0.76	0	3.5
Teacher Management Time	26.82	9.11	8.0	47.1

Kicking Development by Children in Grades K-8: A Multi-Cohort Longitudinal Study

by Stephen A. Butterfield, E. Michael Loovis and Jaekyung Lee

Abstract

This study examined developmental change associated with mature kicking by children in grades K-8. We tested children (Grades k-8) on the kicking subtest of the Ohio State University Scale of Intra-Gross Motor Assessment (OSU-SIGMA) 5 times over 9 years. Hierarchical nonlinear modeling was used to analyze the data. The principal findings included: a) significant differences in mean initial status (intercept) and growth rate (slope) for the k-8 and 4-8 cohorts; b) no sex differences among any of the cohorts in either initial status or growth rate; and c) a significant association between soccer participation and mature kicking performance.

Kicking Development by Children in Grades K-8: A Multi-Cohort Longitudinal Study

Kicking is essentially a specialized manipulative skill in which the foot strikes an object (Gabbard, 2004). According to Gabbard, place kicking (stationary ball) is the foundational skill upon which other skills such as kicking a moving ball, dribbling, and punting are developed. Given its common application in physical education, sport, and informal play, this investigation focused on the place kick. In place kicking, the child approaches the ball from a run or rapid walk. The final step before ball contact involves an elongated stride by the support leg. At the same time, the kicking leg is flexed at the knee and hyperextended at the hip. Cocking the leg this way permits a powerful application of force to the stationary ball (Gabbard, 2004; Payne & Isaacs, 2002). Additionally, mature kicking requires motor planning, foot-eye coordination, and balance.

In terms of developmental sequence, Gesell (1940) reported that a two-year-old child could actually kick a ball as opposed to the typical 18-month-old who simply walks into it. Sinclair (1973) found that rudimentary kicking (i.e., The ball is kicked a distance at least equal to its circumference) is usually present by age two years, while the basic kicking pattern, including a preparatory back swing of the kicking foot, is usually attained by age 4. Deach (1950) identified four stages of kicking development characterized, in the most advanced stage, by greater extension of the hip and flexion of the knee, a backward lean of the trunk prior to contact, and compensatory adjustments of the arms during follow-through. Similarly, Haubenstricker, Seefeldt, Fountain, and Sapp (1981) observed a sequence of development that included, in the advanced stage, a rapid forward extension of the lower leg, increased arm-leg opposition, and pronounced follow-through with a hop on the support leg. According to Gabbard (2004), most children are physically capable of mature form in the place kick by age 5 or 6. However, Ulrich (2000) reported that only 62% of the children in his Test of Gross Motor Development (TGMD-2) standardization sample actually achieved all the components of mature kicking by

age 8.

The issue of sex differences in kicking development has not yet been resolved. For instance, Haubenstricker et al. (1981) reported that 60% of boys achieved mature kicking patterns by 87 months while 60% of girls had attained mature development in kicking within approximately 100 months. However, in a more recent study of kicking development by children in grades K-8, Butterfield and Loovis (1994) reported generally equal kicking performances between boys and girls; the only significant difference was better performance by sixth grade boys. Butterfield and Loovis further noted that mature kicking was not associated with organized soccer participation by children in their initial cross-sectional sample. Given the importance of mature kicking to sport participation (e.g., soccer, American football) and everyday play, longitudinal data is needed to determine the factors that influence its course of development. This study examined developmental change associated with mature kicking by children in grades K-8. In so doing, we addressed the following specific research questions: a) What are the characteristics of individual growth rates in mature kicking development? b) Are changes in kicking development associated with age, sex, or participation in organized soccer?

Method

Design

The design of this study was multi-cohort longitudinal. Developmental change in kicking performance among three cohorts was studied over 9 years. Specifically, the 1987 birth cohort (grades k-8) was tested in '92, '94, '96, '98, and 2000. The 1985 birth cohort (grades 2-8) was tested in years '94, '96, '98, and 2000; while the 1983 cohort (grades 4-8) was tested in '96, '98, and 2000; see Table 1. NOTE: The 1981 cohort (grades 6-8) was not included in the final statistical analysis as it was limited to two measurement times. At least three data points per participant are required to calculate growth rates. A total of 340 children were tested at least three times. Boy/girl breakdowns at the onset of the study in 1992 were: a) 1987 cohort: b=36, g=40; b) 1985 cohort: b=51, g=30; and c) 1983 cohort: b=38, g=27. Participant mortality was <10%. There was considerable in-migration of children as this community attracted pupils from adjoining small towns. However, only children tested at least 3 times were included in the analysis. During the 9 years of this investigation, there were no major changes in the PE curriculum; and the only PE staff change occurred in year 9, the last year of the investigation.

Data Analysis

Hierarchical (non) linear modeling (HLM) was used to analyze the data. The main concept underlying HLM is that individuals vary in their rate of growth over time. First, individuals will likely differ performance-wise on the first measurement of a repeated measurements investigation. In HLM this is referred to as random intercepts, indicating that initial performance, estimated by the

Table 1. Data Collection Plan (1992-2000)

Birth Cohort	Year Tested								
1979									'92
1980									'92
1981							'92		'94
1982					'92		'94		'96
1983				'92		'94		'96	'98
1984				'92	'94		'96	'98	'00
1985		'92		'94		'96		'98	
1986		'92	'94		'96		'98		
1987	'92		'94		'96		'98		
Age	5	6	7	8	9	10	11	12	13
Grade	K	1	2	3	4	5	6	7	8
Measurement Occasion	1		2		3		4		5

intercept of the model, varies randomly. Initial performance is influenced by events and/or circumstances preceding the initial measurement occasion (e.g., heredity, health, sex, parenting styles, sports experience, etc.). Second, individuals will differ in performance across measurement occasions. This is called random slopes, indicating that growth rates, estimated by the coefficient of the time slope, vary randomly. Consequently, HLM estimates means for intercepts and slopes, and estimates variation around those means (Muthen & Khoo, 1998). In order to more completely

describe growth, the model incorporates time-sensitive explanatory variables. Therefore, children's participation in organized soccer was added to the model at each measurement occasion.

In the present investigation, hierarchical nonlinear modeling was used as a special case of HLM to fit our hierarchical data structure (i.e., repeated measures nested within participants, with binary outcome variables: mature or immature kicking). This model is appropriate for hierarchical data where the outcome variable is non-continuous and the random effects at each level are not normally distributed.

Procedure

Two trained examiners individually administered the Kicking subtest of the Ohio State University Scale of Intra Gross Motor Assessment (OSU SIGMA; Loovis & Ersing, 1979) to each child. The OSU- SIGMA is a criterion-referenced test used to examine fundamental movement skill (FMS) development from a qualitative perspective. The SIGMA identifies four levels of development for each of 11 fundamental movement skills ranging from level 1 (least mature) to level 4 (mature functional pattern). In the present study we used the Kicking subtest. Therefore, three trials (i.e., kicks) were permitted for each child with the most frequently occurring behavior (mature i.e., level 4 = 1, immature i.e., levels 1-3 = 0) recorded for analysis; see Table 2 for descriptions of each SIGMA level for kicking. Inter-observer agreement, which was calculated prior to the initial test occasion in 1992, and recalibrated each year of the study, just prior to testing, ranged from 90 to 94 percent.

Table 2. SIGMA Characteristics for four Kicking Levels.

Level 1	Level 2	Level 3	level 4
Walks up to ball, makes contact w/a stiff leg and continues with walking pattern; and	Uses a stiff-leg swing primarily from the hip with little or no bending of the knee; and	Swings bent leg backwards then forwards with a simultaneous straightening of the leg;	Swings the bent kicking leg backwards and then forward with a simultaneous straightening of the leg;
kick appears as part of walking pattern and shows no attempt to swing kicking leg.	moves arms and trunk only slightly, if at all.	holds arm opposite of kicking leg out to the side at approximately shoulder level; and	uses both arms held out to the sides of the body to maintain balance;
		Returns kicking leg to a position next to the support leg after executing kick.	leans slightly backward As kick is performed;
			maintains balance on non-kicking leg during kicking action and follow-through; and
			steps forward onto kicking leg only after kicking action and follow-through are complete.
Adapted from Loovis & Ersing, 1979.			

In the course of designing the SIGMA, a study was conducted to establish test-retest reliability. Independent (expert) judges rated 12 children's videotaped performances on the SIGMA. Scott's pi (reliability) coefficients for the 13 judges were: -.2232 to .7282 and -.3286 to 1.000 respectively. The median pi for each judge was .1846 and .4095. In the test and retest conditions, scorer reliability was .5000 and .6667 respectively. Intra-judge reliability coefficients for pi ranged from -.1556 to .7160 with a median pi of .4667. Scorer reliability was calculated at .7500 on intra-judge agreement. Face validity was assumed, and descriptors for each SIGMA level were verified by a careful examination of the literature prior to publication (Loovis & Ersing, 1979).

All testing was conducted in the school gymnasias during regularly scheduled physical education. For each of three trials, the child was instructed to kick a 6" stationary ball 'as hard as you can.' The most frequent response (mature = 1, or immature = 0) was recorded for analysis. In addition to kicking performance, we surveyed children in grades 1-8 regarding their participation in organized school or community soccer. The primary school physical education teacher assisted in surveying children in grades 1-3 (ages 6 to 8). Children in kindergarten were not assessed on this variable, as organized sports were generally unavailable to them.

Table 3. Conditional Model for Growth in Kicking Development

Fixed Effect		Coefficient	se	t
Mean Initial Status				
K-8	Base	-1.74	.21	-8.11**
	Sex	.01	.43	.02
2-8	Base	-.17	.20	-.84
	Sex	-.46	.42	-1.08
Model for Growth Rate (Effect of Time)				
K-8	Base	.22	.09	2.62**
	Sex	-.17	.17	-1.01
2-8	Base	-.19	.12	-1.65
	Sex	-.35	.24	-1.48
Model for Effect of Sport Participation				
K-8	Base	1.08	.23	4.59**
	Sex	-.11	.47	-.24
2-8	Base	.59	.26	2.30*
	Sex	.83	.55	1.50

*p<.05

**p<.01

Results

Significant differences in mean initial status (intercept) and growth rate (slope) for the k-8 and 4-8 cohorts were found; see Table 3. Estimated means for initial status and growth rate were -1.74 and .22 respectively. This indicates that the average baseline

Table 4. Base Model for Growth in Kicking Development

Fixed Effect	Coefficient	se	t
Mean Initial Status			
K-8	-1.41	.19	-7.30**
2-8	-.11	.20	-.53
4-8	.93	.24	3.91**
Mean Growth Rate			
K-8	.23	.09	2.46*
2-8	-.09	.10	-.88
4-8	-.74	.16	-4.60**
Random Effects	Variance	df	χ^2
Initial Status			
K-8	.14	80	76.58
2-8	.65	77	83.49
4-8	.47	61	61.28
Growth Rate			
K-8	.04	80	79.05
2-8	.01	77	63.37
4-8	.01	61	54.11

*p<.05

**p<.01

for kicking in 1992 was -1.74 logits and children increased their kicking development by .22 logits per every two-year unit of time; see Table 3. A logit references a participant's performance to the log of the odds of a correct response (e.g., mature kicking). This type of analysis is appropriate for binary outcome measures. In order to assist interpretation, logits were converted to odds and probabilities; see Table 5. For instance, a logit (i.e., coefficient) of -.21 equals odds of .81 (i.e., e to the power of -.21 = .81; see Table 5, 2-8 cohort). Therefore the probability of performing a mature kick is .81 times greater than the probability of not performing a mature kick. When converted to a probability statement, odds of .81 equals a probability of mature kicking of 45 percent.

Children in the k-8 cohort had a 20% chance of exhibiting mature kicking in kindergarten, which increased to 42% by their 8th grade year in 2000. The 2-8 cohort performed better overall, but demonstrated a slightly negative growth trajectory. Children in the 4-8 cohort also demonstrated a negative growth trajectory; see Tables 3 and 5. While these children were more likely to demonstrate mature kicking by 4th grade (72%), the probability of success for this cohort decreased to 37% by grade eight; see Table 5.

We found no sex differences among any of the three cohorts in initial status or growth rate, indicating relative equality of performance between boys and girls; see Table 4. On the other hand, we found significant (k-8, $p < .01$; 2-8, $p < .05$) results for sport participation; that is, boys and girls who played organized soccer at the time of testing were more likely to exhibit mature kicking form; see Table 4.

Discussion

Given the observational nature of the SIGMA, and given the

Table 5. Odds and Probabilities for Growth Rates in Mature Kicking					
Cohort	K	2	4	6	8
K-8	.25(.20)	.31(.24)	.39(.28)	.49(.33)	.72(.42)
2-8		.88(.47)	.81(.45)	.75(.43)	.61(.41)
4-8			2.57(.72)	1.22(.55)	.58(.37)
Note: The number in parentheses represents the probability of performing a mature pattern					

likely variability in soccer instruction received by participants, the following conclusions seem warranted. Initially, a considerable difference among the three cohorts in kicking development was present; see Table 5. While the k-8 cohort exhibited slow, steady growth over 9 years, their overall level of achievement was quite low (i.e., 42% chance of mature performance by grade 8). The 2-8 cohort maintained a slight downward trend with the highest probability of success in 2nd grade (47%). The 4-8 cohort had a probability of success of 72% in 4th grade then began a downward trend to a 37% chance of success in 8th grade. Overall, it appears that kicking development peaked by 4th grade.

Cross-sectional data reported by Butterfield and Loovis (1994) followed a similar trend with peak performance achieved by grade 4 (about age 9) followed by a plateau for both boys and girls. Most physical educational curricula in the USA focus on development of fundamental movement skills in grades k-3, followed by an emphasis on more sophisticated games, sports and rhythmic activities in subsequent grades. This data suggest that many children, who do not develop mature kicking by grade 4, might not do so after 4th grade. As stated by Gabbard (2004), most children are physically capable of mature kicking form by ages 5 or 6. However, only 62% of the children in Ulrich's (2000) standardization sample actually achieved mature kicking form by age 8 (about grade 3). Clearly the children in this study did not develop mature kicking form at either of these rates; and there was considerable variability across cohorts. These findings might possibly be due to a local curriculum biased toward skills such as throwing, striking and catching; or perhaps a lack of emphasis on kicking in the upper grades, resulting in disuse atrophy. The lower rates of development might also be associated with the on going in-migration and out-migration of families in this community. We learned, for instance, that children relocating from surrounding rural communities received less physical education and may have had fewer opportunities for sport participation, thereby contributing to the previously noted cohort effects. In any event, kicking development is more likely a function of environmental (i.e., contextual) variables, than biology, at least among school-age children. Nevertheless, children who do not achieve mature kicking before their entry to organized sport (e.g., soccer) will likely perform poorly and may become discouraged from further participation.

Participation in organized soccer was an important predictor of mature kicking form. However, one must consider the possibility

that some children self-selected into (or away from) organized soccer according to their level of kicking development. The results of this study imply a need for community-based solutions to FMS development. This might mean better cooperation between physical education and school/community sports programs. For example, physical educators may need to conduct workshops for youth soccer coaches on teaching progressions for kicking. Also implied is a need for physical educators to closely monitor children's kicking development in the primary grades, with the goal of establishing mature kicking patterns by all children before entry to 4th grade. Physical educators should also consider using the SIGMA to determine children's baseline-kicking levels. This analysis could be followed, as needed, by specific activities to improve kicking performance. To this purpose, the SIGMA includes a Performance Base Curriculum (PBC) to help practitioners design instruction. Each level of kicking is task analyzed and sequenced so that children systematically advance to higher levels of development. The PBC also includes enhancing activities for children functioning at a mature level. These activities include options for more open environments and increased application of distance and accuracy (Loovis & Ersing, 1979). Further study is needed to more closely examine associations between youth sports and kicking development. Investigations of this nature should examine quality of kicking performance within the context of youth sport, not just physical education class.

Dr. Stephen A. Butterfield teaches at the University of Maine, Dr. E. Michael Loovis is on the faculty at Cleveland State University while Dr. Jaekyung Lee is on faculty at the State University of New York at Buffalo

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Multiethnic Diversity in K-12 U.S. Physical Education: A Synthesis of Literature in Kinesiology-based Journals (1995-2005)

by Jepkorir Rose Chepyator-Thomson, Sunhwi Kim, Furong Xu, Robert Schmidlein, Jaekwon Na, Wonsoek Choi, and Connie Yeo

Abstract

Due to a large immigrant population in the United States in recent years, which has made the country a global multiethnic society, there is a need to research kinesthetic cultures that they have brought with them. Global Multiethnic Kinesthetic Education (GMKE) is of utmost importance in students' learning, understanding, appreciation, and participation in a variety of human kinetics from global-local perspectives. With this in mind, the purpose of the study was to synthesize the literature in physical education journals in context of multiethnic diversity. The following journals were reviewed: *The Physical Educator*, *Journal of Physical Education, Recreation and Dance*, *Journal of Teaching in Physical Education*, *Research Quarterly for Exercise and Sport* and *Quest*. Constant comparison method was used in data analysis. The findings concern understanding racial-ethnic differences, cross-cultural communication and global teaching environments, ethnic-cultural studies, racial discrimination and differences, curricular modifications, urban environments, and physical activity preferences and cultural influences. The rate of publication was about 1.39% for multiethnic education and diversity related articles, with the lowest appearance rate in the *Journal of Physical Education, Recreation and Dance* and highest in the *Quest* journal. These figures support the findings in a study that concerned women and race, which displayed about 4.11% and 1.24% publishing rates on an examination of 2020 articles (Chepyator-Thomson, You, & Hardin, 2000). In light of such low publication rates, it would be important to focus on multicultural and ethnic diversity in future research. The implications for future research include making scholarly works responsive to global-local diversities in education and society.

Due to a large immigrant population in the United States in recent years, which has made the country a global multiethnic society, there is a need to research kinesthetic cultures that the immigrants brought with them. Global Multiethnic Kinesthetic Education (GMKE) is of utmost importance in students' learning, understanding, appreciation, and participation in a variety of human kinetics from global-local perspectives. With this in mind, the purpose of the study was to synthesize the literature in physical education journals in context of multiethnic diversity. Global Multiethnic Kinesthetic Education (GMKE) refers to diverse physical activities and perspectives characteristic of different ethnic groups worldwide. Ethnic groups share cultural beliefs, doctrines, behavioral patterns, customs and a sense of physical place, which all point to how people come to possess a shared identity and behavior. The most important goal of curriculum in GMKE is to have students learn, appreciate, and participate in a

variety of human kinetics from global-local perspectives. Given that people have different ideas about group identity and social and educational understanding of culture, GMKE curriculum and pedagogy foster identity formations and cultural comprehensions that promote health and welfare of groups and individuals in global-local environments. GMKE also supports diversity in programming, particularly the development of bilingual programs and ethnic-based courses, among others such as African-centered curriculum and pedagogy.

Given the ever-changing demographics of the United States, the emphasis on a global perspective in teaching is needed to foster a multiethnic awareness in education and society. Ways to become inclusive of all students in schools and in centers of higher learning is to prepare culturally responsive teacher educators. This is particularly important given the National Center for Educational Statistics' (2005) documentation that 40% of public school students are part of a racial or ethnic minority group or diverse, as for example, in the western region of the United States, 54% of students come from non-dominant ethnic backgrounds. These changes reflect immersing immigrant and national diversity. However, practicing teachers and less than 4% of new teachers come from culturally diverse backgrounds (Cannella & Reiff, 1994) and further, those in teacher education programs are decreasing in number (Nieto, 1994). In fact, Yeo (1997) mentioned the gap between student and teacher demographics to be widening. The American Association of Colleges of Teacher Education (1999) documented the majority of elementary and secondary schoolteachers to be female (74%) and European American (87%). Besides, the National Center for Education Statistics (1999) study revealed that a small number of teachers (20%) feel prepared to work with children from culturally and ethnically diverse backgrounds, particularly students of color (Burden, Hodge, O'Bryant, & Harrison, 2004). Given the aforementioned data and perspectives, it is imperative to examine extant literature on the topic of multiethnic diversity as connected with global-local environment.

Multiplicity of differences, often couched under ethnicity and culture, is becoming global. In reference to multi-ethnic diversity in human kinesthetic education, the focus concerns diverse movements and perspectives representative of different ethnicities in global-local societies, and it is also about how this diversity impacts or influences behavior and curriculum in physical activity and sports environments. According to Binder (2001) multi-ethnic education is "essential for all learners not just students in multicultural situations" (p. 26), which is especially important in the United States where there is an increasing diversity in families and communities, as well as in student population. In the context of extant literature, diversity is understood to mean any characteristic that differentiate one person from another, and this includes not only demographic variables but also other differences such as personality types, thinking styles, and educational backgrounds (Fink, & Pastore, 1999).

Purpose and Theoretical Perspective. The purpose of the study was to synthesize extant literature associated with multiethnic diversity in kinesiology-based journals during an eleven-year period (1995-2005), with the secondary purpose being to provide implications for curriculum and teaching in global-local educational environments. The theoretical perspective that guided this study is critical social theory. This theory helps researchers to make an informed understanding of the world we live for betterment of all persons. Indeed, critical understanding of our contemporary diverse world is paramount to making culturally responsive changes in curriculum and pedagogy, including making delineations of multicultural future possibilities related to policy and practice (Chepyator-Thomson, 1995) and accepting reflective practices as necessary for understanding and changing socio-cultural realities of schooling.

Examination of previous research indicates several foci: diverse teacher educators (Crane & Walker, 1988); theoretical understanding of multicultural education (Sparks & Wayman, 1993); construction of a framework for understanding multicultural issues (Sparks, 1994); fostering of ethnicity in homogenous settings (Wessinger, 1994); and ways to mitigate against racism in educational environments (King, 1994). What is missing is an examination of the extent to which scholars address multiplicity of differences as connected to human movement diversity as couched under culture, multicultural education, and race, among other categories such as African American, Native American, and Asian American.

Methods

This study employed descriptive statistics and qualitative research techniques to determine emergent themes. The specific methods used in this study are explained next. First, all of the articles that appeared in *The Physical Educator*, *Journal of Physical Education, Recreation and Dance*, *Journal of Teaching in Physical Education*, *Research Quarterly for Exercise and Sport* and *Quest* were identified. In the first phase, encyclopedic search was used to find computerized databases, which was accomplished through examination of Galileo, Academic Search Premier at EBSCO host, FACTIVA, and Research Library at ProQuest databases. The following keywords were used: "physical education" physical activity," "culture," "cultural belief," "curriculum," "multicultural," "diversity," "ethnicity," "race/racial difference," "discrimination," "urban," "inner city," "language," "global," "Hispanic," "African-American," "Asian," and "Native-American/Indian." In addition to computerized databases search, contents, titles, and that abstracts appeared in the five journals (1995-2005) were obtained and manually reviewed. Next, the titles and abstracts in the articles were read to ascertain how multiethnic diversity was addressed using constant comparison method (Goetz & LeCompte, 1984). This method was used to identify qualitative themes or categories. In constant comparison method, data are examined and reexamined until general categories or themes emerge (Keener & Bargerhuff, 2006). Five researchers made up the research team and discussed individual findings for purposes of comparison and determination of emergent themes. Negative cases, which did not have a 100 % agreement, called for a re-reading of the articles in question and then a recoding. For example, the keyword "culture"

was found in an article by one of the researchers; however after the research team examined the article again, it was discovered that the article was actually about "teacher's culture" and not about ethnicity, race and culture. After this process, a 100% agreement was reached to exclude the article from the database. Another example is one that examined the difference in physical work capacity among African Americans and European Americans, which was about physical work capacity comparison between African Americans and Caucasian Americans (McMurray, Harrell, Bradley, Deng, & Bangdiwala, 2003). The research team considered articles such as these to be about physiology and outside the realm of culture, race, and ethnicity. Thus the negative cases discovered from this study (indicated above) were either outside the scope of the study or were not considered related to culture, race or ethnicity. In the following paragraphs, descriptions of the journals are presented.

The Physical Educator journal, the Phi Epsilon Kappa fraternity's contribution to the various fields of study related to the make-up of the membership, is published four times per year, and features articles on teaching and curriculum development. The journal is a great resource for teacher educators in physical education.

Quest journal is published four times each year by National Association for Kinesiology and Physical Education in Higher Education, and covers a broad range of physical activity related topics in higher education. This multidisciplinary journal provides the latest scholarly inquiry related to physical activity, and regularly features critical issues facing teacher educators in physical education, research developments in the sport sciences and other sub-disciplines of human movement.

The Journal of Physical Education, Recreation, and Dance is the American Alliance for Health, Physical Education, Recreation and Dance's largest and most frequently published journal. The journal publishes high quality articles on pedagogy, assessment, adapted physical education, physical fitness for older adults, and ethics and gender related issues in sports and physical education.

The Journal of Teaching in Physical Education, supported by the National Association for Sport and Physical Education and the International Association for Physical Education in Higher Education, is a quarterly journal that publishes the latest ideas, issues and research on sports, fitness and physical education related topics.

The Journal Research Quarterly for Exercise and Sport is a comprehensive professional journal published quarterly by the American Alliance for health, Physical Education, Recreation and Dance. The journal publishes high quality data based research studies in the art and science of human movement and pedagogy.

Results

The periodicals selected for this study are five popularly known journals in the area of Kinesiology in the United States. The topics of examination include people's health welfare in terms of fitness, education and human development. In the area of multi-ethnic education and diversity, the rate of publication is about 1.39% (46 identified articles, n=3305) annually during the 11-year period, with the lowest appearance rate being in the *Journal of Physical Education, Recreation and Dance* and the highest rate being in the *Quest* Journal. Specifically, articles related to multi-ethnic education and diversity appeared in *QUEST* (12 articles,

2.89 % n= 415), in *JOPERD* (12 articles, 0.7%, n= 1716), in *Journal of Teaching in Physical Education* (8 articles, 2.92%, n= 274), *The Physical Educator* (6 articles, 1.77%, n= 339) and in *Research Quarterly for Exercise and Sport* (8 articles, 1.43%, n= 561). This study corroborates about similar rates in the study that Chepyatory-Thomson, You, and Hardin (2000) completed (1.24% of 2,020 articles were related to gender in physical activity). The major findings of the present study are discussed in the following sections.

Multiethnic Diversity, Education, and Physical Activity

Multi-ethnic education consists of integration of customs, language and ideas from a variety of ethnic groups, and this education uniquely allows for the inclusion of cultural and social differences in education. However in many mono-cultural educational settings, ethnically responsive education is not taken into account, and therefore the students may not gain an appreciation and respect for, and understanding of, the other ethnic groups. It is important to realize that multi-ethnic education is not a single lesson but infusion of diversity into all aspects of curriculum and teaching. The most important goal of multi-ethnic education is to develop curriculum that permits students to appreciate and participate in a variety of movements from global-local perspectives, thus allowing for opportunities for people to co-exist in harmony even though they come from different ethnic, social and educational backgrounds. Conceptual and practical understandings and perspectives delineated from extant literature are: understanding racial-ethnic differences, cultural-ethnic studies, thoughts on racial discrimination and differences: Euro- and African-Americans, cross-cultural communication and global teaching environment, living in urban environments and curricular modifications, and physical activity preferences and cultural influences.

Understanding Racial-Ethnic Differences

Theoretical understanding of differences and social construction of meaning mark ways we come to comprehend our socio-cultural realities in society. Prevalent understanding of racial categorization of people is based on identifiable differences that appear natural to the human eye. Historically, scientific explanations of racial differences were viewed or understood through comparisons between 'blacks' and 'whites', which were common, but in contemporary times, scientists have exposed few biological differences; however, differences in "human 'races' have continued to be considered biologically distinct, with Europeans being considered 'naturally' superior to Africans" (Barnes, Zieff & Anderson, 1999, p. 331). In the media and popular literature, the few differences between races are largely exaggerated. Pasamanick acknowledges that there are environmental factors such as number of siblings and birth order, quality of housing, and parent's education and occupation that play a role in infant development (Barnes et al., 1999), hence apparent differences. In recent times, ideas about race have continually become more complex and challenging. "Many scholars and laypersons ...consider humans... whether divided by race, gender, class, ... [to be] ... complex, heterogeneous, and variable" (Barnes et al., 1999, p. 340).

Cultural –Ethnic Studies

Scholars have conducted cultural-ethnic studies in physical education. Knowledge of pedagogical strategies appeared in the form of views concerning cultural awareness. Napper-Owen, Kovar, Ermler and Mehrhof (1999) indicated most teachers to possess limited knowledge of people from different ethnic and cultural backgrounds. Furthermore, they expressed that Euro-American teachers and preservice teachers have scarce knowledge about values and characteristics of Native Americans, Hispanics, Asian Americans, and African Americans. Specifically, "20% of schools reported minority populations [to be] greater than 10%" (mostly Native Americans) and 90% of teachers to fail to "integrate the traditional culture of their minority students into physical education units" (Napper-Owen, Kovar, Ermler and Mehrhof, 1999, p. 11).

In addition, Lawson (1998) stated that experienced teachers and youth workers are unprepared for the growing ethnic, cultural, and linguistic diversity of children and their families. Further, Lawson (1998) expressed that new leaders and physical education teachers will need to possess more knowledge, skills, and abilities to develop culturally responsive practices in schools, making good training for pre-service teachers to be necessary in order to achieve this goal. Research indicated that if teachers in training lack the knowledge to effectively plan and implement lesson that facilitates student engagement then management and discipline problems are unavoidable.

Thoughts on Racial Discrimination and Differences: Euro- and African-Americans

In Corbett's (1998) presentation of diverse perspectives concerning Euro-Americans and African-Americans, she quotes Kinder and Sanders (1997) who indicated whites to think that racial discrimination was obsolete while blacks, on the other hand, considered "racial discrimination as ubiquitous and ... prejudice as a plague, and indicated that racial discrimination, not affirmative action [to be] ... the rule in American society (Corbett, 1998, p. 311; Kinder & Sanders, 1997, p. 287). Predominant European American institutions tend to harbor ideological ideas that people of color tend to be less qualified than European Americans and to occupy certain positions based on affirmative action policies (Corbett, 1998). Fink and Pastore (1999) consider privileges afforded to certain groups at the exclusion of others to be problematic; for instance, people of color have faced discrimination and oppression in physical education and sport settings.

Although members of the non-dominant group have a strong racial identity, European Americans don't think of their racial identity (Corbett, 1998). The society of United States is considered diverse—"our cultural and individual differences as mosaic"—(Fink & Pastore, 1999, p. 311). However, the contrary predominates in social institutions. Therefore, instead of valuing diversity, many U.S. institutions tend to avoid diversity (Fink & Pastore, 1999). We need not shun or lessen the cultures of others for we should think important to consider connections with family members of students in order to learn and gain appreciation of their cultures (Torrey & Ashy, 1997).

Cross-cultural communication and global teaching environment

Communication across different cultural terrains is becoming increasingly critical in global-local teaching environments, including multi-ethnic communities. In Bell and Lorenzi's (2004) terminology, teachers need to be made aware of linguistic requirements of students and communities and to build many opportunities for interaction with students from diverse backgrounds. They further indicated that teachers should be aware of their own speech patterns as they try to work with learners from non-English speaking backgrounds.

In U.S. society, among other world societies, people are very diverse. Consequently, teacher educators need to possess multi-ethnic knowledge, have an awareness of social injustices and possess cross-cultural skills in communication. In Washington's (1996) terms, familiarity with ethnic group's cultural expressions, including ethnic foods, festivals, holiday celebrations, as well as values that shape their educational programs, which have been ignored historically, need to be considered paramount. In addition, understanding social injustices and inequities, and development of cross-cultural skills must be addressed in education (Washington, 1996). In higher education, utilization of workshops, consultants, structured discussion groups, panels, guest speakers would help create learner-centered strategies useful in propagating needed changes in educational institutions. Development of appreciation for human diversity can be accomplished through lectures and assignments, and field experiences in school-based settings that have diverse students (Boyce, 1996). Further teachers can use movement education, dance, and rhythmic activities to help students connect written and verbal information in a creative way (Bell & Lorenzi, 2004). Indeed physical activity and sport activities models often allow for incorporation of elements of literacy in lesson implementations, as for example keeping score in bowling or reading rules in a game. Besides, creation of curriculum that allows students to comprehend knowledge about their backgrounds and build corresponding activities is a critical way to respond to diversity in education (McGeevy-Nichols & Scheff, 2000).

Many physical educators' backgrounds are associated with ethnocentric viewpoints, making cultural diversity an excluded, minimized or ignored phenomenon (Burden, Hodge, O'Bryant, & Harrison, 2004). The question then is how to better prepare physical educators for culturally diverse settings. This is quite complex but obvious ways are through Physical Education Teacher Education (PETE) programs and professional development as Burden, et al. (2004) discussed. They contend that "the infusion of multicultural, multiethnic, and disability-related content into the curriculum plus the use of practicum and teaching internships in varied diverse contexts will better prepare PETE students and practicing teachers for working with a diversity of learners (Burden, Hodge, O'Bryant, & Harrison, 2004 p. 184). According to Ennis (1999), "teachers require more extensive training, more meaningful licensing, and more thoughtful professional development" (p. 168). Focusing on multicultural education in the teacher education program is one way to prepare teachers to teach a culturally diverse population, a view many accreditation standards mandate. Scholars consider multicultural education as a necessary prerequisite for developing positive attitudes toward cultural diversity and for holding attitudes that reflect better teaching and have an effect on how well students

socialize with others (Stanley, 1995). Bell and Lorenzi (2004) mentioned an increasing need for teachers to become familiar with ways to make course content accessible to students whose native language is not English, and to actively facilitate language acquisition for those students in educational settings. Some ways to work with non-English speakers include uses of movement activities that facilitate second language acquisition (Bell & Lorenzi, 2004) and physical activity learning that is responsive to the health welfare of all students.

Culturally responsive teaching, from a non-majority socio-cultural perspective, calls for physical educators to learn to accept students' similarities and differences, to explore inclusion issues in order to provide preservice teachers with knowledge to better understand, and to accommodate all learners within the context of diversity (Kozub, Sherblom, & Perry, 1999). Culturally responsive teaching also furthers development and incorporation of socio-cultural perspectives through program or curriculum planning. Furthermore, through deconstruction of beliefs and values, prospective teachers, as well as teacher educators, can benefit from an understanding of the impact their beliefs and values have on the way they teach (Ashy & Solmon, 1995). Essentially, a critical analysis of beliefs acts as a guide to understand how and why decisions are made, and how it influences the students. Clarification of value profiles through reflective activities and opportunities for decision-making is one way to help preservice teachers prepare for diversity (Ashy & Solmon, 1995).

Fundamentally, the preparation of teachers for diversity in teaching needs to consider prior experiences of students as they relate to curriculum and pedagogy. Students' interpretations of past experiences and cultural expectations are assumed to determine their expectancies for success and the value they place on various activities (Lee, 1997) in educational settings. While these attributes and motivational beliefs help to shape students' initial acceptance of, and interactions with, the content and processes they face in different instructional situations, teachers can structure classes that enhance motivational beliefs and the quality of learning of students. Teachers shape the environment by the activities they offer, the methods they select, the choice afforded students, and the assessment and evaluation techniques used (Lee, 1997). A positive learning climate involves both the physical and social environment employed in teaching and learning settings, for it enables students to develop positive self-esteem and respect for others (Torrey & Ashy, 1997). However, teacher knowledge, beliefs, and values influence the kinds of activities they select and the practices they use during instruction (Lee, 1997).

Living in Urban Environments and Curricular Modifications

When people make the United States their home, their place of residence is, for the most part, urban areas, and the largest cities tend to be where they live (Chepyator-Thomson, unpublished work, 2006). In urban environments, as Ennis (1999) pointed out, students from low-income families tend to be of African or Hispanic heritage and come with issues concerning home, health, and language. These students face unique educational challenges associated with their backgrounds and school experiences.

Further, the students in urban environments face a diversity of challenges and barriers that seem to be related to physical

inactivity among children and adolescents, particularly for females, persons of color, and those from low-income families (Ennis, 1999). Additionally, urban settings tend to shape the culture that students become accustomed to being apart of in daily lives (Pope & Sullivan, 2003). The low-income students may have a sort of social hierarchy in their sports structures and with this in mind, physical education teachers need to encourage active participation in each student regardless of “rank” in the gymnasium (Pope & Sullivan, 2003).

Curriculum diversification and modification is critical to meeting the needs of all students (Chepyator-Thomson, Russell, & Wooron, 2000). Considering the “diverse needs and expectations associated with gender, ethnicity, and prior experiences, successful physical educators [have to] modify tasks and activities to accommodate ... ranges of fitness, skill, motivation, and interest” (Ennis, 1999, p. 166) of students. As Ennis’s (1999) study revealed, urban school teachers attempt to create social change through a curriculum that focuses on social responsibility and self-actualization, and rural teachers tried to focus on skill mastery and the learning process. The conclusion drawn was that curricular decisions tend to reflect the opportunities that are present and constraints that the teachers have to work with within the schools (Ennis & Chen, 1995). However, “few researchers have focused upon poor, vulnerable, and minority children and youth. Even fewer have focused upon the relationships among these children, their families, and their local neighborhood communities” (Lawson, 1998, p.7) necessitating the need for the development of physical activities and games consistent with these diversities within and out of school curricular contexts.

Physical activity Preferences and Cultural Influences

In African American communities, some boys consider basketball to incorporate their cultural identities, and which has become a prominent in their school and home lives (Harrison, 1995; Ennis, 1999). These authors explained that this identity informs the development of self-schema and strength, endurance, and skillfulness in basketball, and necessitates the establishment of status and respect within the neighborhood and the school. Many African American girls on the contrary look for the opportunity to dance, “acquire new ways to move creatively, and [to] learn about their own health and physical development” (Ennis, 1999, p.167). Through the use of sports education curricular model the students can choose dance teams and each could present a dance from a region of the world (Richards & Oslin, 2003). Identification of the students’ cultures can be present in form of photographs and signs throughout the gym, and the acceptance of the diverse traditions fosters a positive learning climate for the students, which in turn could make it more comfortable for the students to learn (Torrey & Ashy, 1997).

An important idea when teaching students from various ethnic backgrounds is to attempt to include part of their culture in a lesson (Hallas, 2002). The gymnasium can be a very busy place with lots of students and so the teachers have to watch for bullying and over-emphasizing skills-based competitions (Hallas, 2002). Students that have been under the same teacher for a longer period of time may resist curricular changes (Kichin & O’Sullivan, 2003) and so it is important to make a smooth transition and not to make drastic changes. A key strategy for developing a positive learning

environment for all the students is to incorporate family members and make each student feel accepted in the learning environment (Torrey & Ashy, 1997). Incorporation of physical activities and indigenous games can also improve students’ learning and valuing of other cultures (Ninham, 2002).

Conclusions and Implications for Curriculum and Pedagogy

The synthesis of the literature has indicated scholars in teacher education in physical education, and in the larger field of Kinesiology, to conduct research that augment and extend prior research on diversity as connected to curriculum and pedagogy. Understanding differences, cross-cultural communication, ethnicity and cultural-based studies, perspectives on discrimination, living in urban communities and physical activity preferences are themes that emerged from scholars’ research in the literature. The major outcomes of the synthesis of the literature include the importance of students’ prior knowledge and cultural backgrounds in learning, and teachers’ preparedness for diverse cultures in ways that are respectful of differences. Teachers’ beliefs about education and students make a big difference in a student’s performance and achievement, and teacher education programs should consider this challenge as they prepare pre-service teachers for the teaching profession. PETE programs need to set realistic mechanism for improving teacher-student interaction in the classroom/gymnasium and for advancing academic achievement of all students, including culturally diverse students.

Further PETE programs need to implement a core curriculum that would construct a fundamental knowledge to eliminate stereotypes of ethnic and racial differences, including gender (Stauros, 1999). As multicultural educators, we should implement strategies designed to expand and provide opportunities to reflect multicultural materials in curriculum (Hubbard & Sofras, 1998) and pedagogy. At present, multicultural education is of prime importance in our local and global education because of drastic changes in network communication, involving travel and behavior changes that affect teaching and learning. In this context, physical education teachers in the United States need to change to meet the needs of the on-going influx of non-English speaking students and to develop a curriculum that is dynamic and ever evolving. In addition, the physical education scholars should recognize differences in population to bring new and exciting lessons to the students. As Burden, et al. (2004) discussed, physical education scholars have to come to the understanding that we all need to move from having ethnocentric to ethno-relativistic perspectives in context of intercultural sensitivity. Teacher educators in physical education should train and practice teaching in culturally different contexts, including learners, curriculum, and learning environment. Finally as teacher educators, our responsibilities are to prepare students to meet the demands of our changing world; (Sparks III & Butt, 2000) therefore all of us have to sing to the tune of change as we engage new teachers, and up and coming scholars into the profession.

Dr. Jepkorir Rose Chepyator-Thomson teaches at the University of Georgia, Dr. Sunhwi Kim is on the faculty at Black Hills State University and Dr. Furong Xu is on the faculty at the University of Rhode Island. Robert Schmidlein, Jaekwon Na, and Wonsoek Choi are doctoral students at the

University of Georgia and Connie Yeo (M.Ed.) works at the Ministry of Education, Singapore.

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Does BMI Accurately Reflect the True Prevalence of Obesity in College Students Taking Kinesiology Courses?

by Bryan L. Haddock, Antonia Barrett, Linda D. Wilkin and Hosung So

Abstract

The purpose of this study was to compare the recorded Body Mass Index (BMI) of 301 college students taking Kinesiology courses, with their body composition, as determined by a seven-site skinfold test. BMI and body fat percentage were significantly correlated ($p < 0.001$). Depending on which set of standards were used for body composition, 6-24 subjects were classified as overweight or obese according to body composition analysis, while BMI classified them as healthy. Likewise 55-83 subjects were classified as healthy according to body composition standards, while they were classified as overweight or obese according to BMI standards. These data demonstrate the importance of body composition measures in this population, as well as the need for a consistently agreed upon set of standards.

Obesity is most commonly defined based on a ratio of weight to height, known as the body mass index (BMI), with a BMI of 30 kg/m² or higher being considered obese, while overweight is defined as a BMI of 25 kg/m² – 29.9 kg/m² (Flegal, Carroll, Ogden, & Johnson, 2002; U.S. Department of Health and Human Services, 1998; World Health Organization, 1998). Utilizing these standards, the 1999-2002 National Health and Nutrition Examination Survey (NHANES) estimates that 65.1% of the U.S. adult population is overweight (BMI \geq 25 kg/m²), while 30.4% of the adult population is obese (BMI \geq 30 kg/m²) (Flegal, Carroll, Ogden, & Johnson, 2002; Hedley, Ogden, Johnson, Curtin, & Flegal, 2004). The obesity epidemic is becoming a global problem with the prevalence of obesity increasing dramatically even in developing countries where Social Economic Status is low (Raymond, Leeder, & Greenberg, 2006). However, BMI is simply a ratio of weight to height (kg/m²). Since this ratio gives no indication of the amount of lean tissue and fat mass, it is possible for an individual to have a large muscle mass and be classified as either overweight or obese

based on BMI categories; even though the total fat mass is quite low. Likewise, it is possible for an individual to be classified as healthy by BMI, but have a large percentage of body fat, due to a low muscle mass and a high fat mass.

An analysis of American Football players has demonstrated that these athletes would be classified as overweight or even obese with BMI standards in spite of a relatively low body fat percentage (McArdle, Katch, & Katch, 2007). This type of mis-classification might be common in populations which tend to be more active.

The purpose of this study was to compare the BMI classifications in a group of college students, who were enrolled in Kinesiology courses, to various published percent body fat classifications. This will help determine how often the classification of healthy, overweight, or obese varies between BMI and body composition in this population. It was hypothesized that since these students were interested enough in fitness to sign up for a kinesiology course, that several would be mis-classified based on BMI categories, when body composition is used as the standard. Unfortunately, there are no consistently agreed upon standards for body composition, therefore, three different sets of published norms will be utilized.

Methods:

Three hundred and one students taking Kinesiology classes at California State University, in San Bernardino were recruited for this study. Baseline characteristics of the subjects are presented in Table 1.

All students came to the lab wearing shorts and a t-shirt. Students had their height measured on a stadiometer to the nearest 0.25 inches (0.64 cm), and their weight measured on a standard physician scale to the nearest 0.25 lb (0.55 kg). A 7-site skinfold test (Abdominal, Triceps, Chest/Pectoral, Midaxillary, Subscapular, Suprailiac, and Thigh) was then performed on each subject, following the procedures published by the American College of Sports Medicine (ACSM, 2005). In order to assure consistency the Principle Investigator (P.I.) and a second researcher, who was

trained by the P.I. on the exact technique, performed all skinfold measurements. In order to assure accuracy of measurement each skinfold measure was taken twice, once by the P.I. and once by the second researcher. If the recorded values were more than 2 mm different, an additional measure was taken by the Principle Investigator. The two closest readings (within 2 mm of each other) were averaged for the score. Body composition results were then calculated.

Each subject's BMI was compared to standardized norms for classification purposes ($\text{BMI} < 25.0 \text{ kg/m}^2$ = healthy; $\text{BMI} 25.0 - 29.9 \text{ kg/m}^2$ = overweight; $\text{BMI} \geq 30 \text{ kg/m}^2$ = obese) (Flegal, Carroll, Ogden, & Johnson, 2002; U.S. Department of Health and Human Services, 1998; World Health Organization, 1998). Body composition values were compared to published standards. There are no consistently agreed upon standards for body composition, so for the purposes of this study we compared BMI to three different published standards: the American College of Sports Medicine's (ACSM) age based percentile norms (ACSM, 2005), the American Dietetic Association's (ADA) non age based criterion norms (Williams, 2002), and the National Strength and Conditioning Association's (NSCA) age based criterion norms (Cramer & Coburn, 2004). The ACSM guidelines use a percentile ranking, with anything below the 10th percentile classified as well below average, and anything between the 30th and 10th percentile classified as below average. For purposes of this analysis Overweight was defined as $\leq 30\text{th}$ and $> 10\text{th}$ percentile; while Obesity was defined as $\leq 10\text{th}$ percentile.

All data including height, weight, gender, BMI, percent body fat, and classification category were entered into an SPSS 11.5 file. The BMI and body fat percentage were correlated by Pearson r correlation. The BMI and body fat percentage categories were then compared to determine how often the two methods gave differing results.

Results:

The calculated BMI and body fat percentage were significantly correlated ($p < 0.001$), with a Pearson r correlation of 0.514 for all subjects. Separating males and females prior to the correlation, improved the correlation to 0.733 for males, and 0.750 for females, each being significant ($p < 0.001$). The number of subjects classified as healthy, overweight, or obese varied depending on if categorization was based on BMI or body composition, which set of normative data was used, and if examining males or females (See Table 2).

Out of the total number of subjects (301), 151 were classified as healthy (87 females, 64 males) based on BMI standards ($\text{BMI} < 25 \text{ kg/m}^2$). Table 3 presents the subjects who were classified as healthy by BMI, compared to the number and percentage of these subjects classified as healthy, overweight, or obese according to the three body composition standards.

Of the 151 subjects classified as healthy by BMI standards, 12.6% were classified as either overweight or obese according to the ACSM body composition standards. This compares with 15.9% according to the ADA data, and 4.0% based on NSCA data. Between five and 23 females were classified as overweight or obese according to body composition measurements when their BMI was healthy, compared to one male.

Tables 4 and 5 present the subjects who were classified as overweight ($\text{BMI} 25.0 - 29.9 \text{ kg/m}^2$) and obese ($\text{BMI} \geq 30 \text{ kg/m}^2$) respectively, based on BMI standards. The three different sets of data based on body composition data are presented for these subjects as well.

Of the 105 subjects classified as overweight by BMI standards, 61.9% were classified as either healthy or obese according to the ACSM body composition standards. This compares with 66.6% according to the ADA, and 78.1% based on the NSCA data. Between 43 and 52 males were classified as healthy by body composition when their BMI was considered overweight, whereas eight to 15 females were classified as healthy by body composition when their BMI was considered overweight.

Forty five subjects were classified as obese according to BMI standards, 46.7% were classified as either healthy or overweight according to the ACSM body composition standards. This compares with 28.9% according to the ADA data, and 60.0% based on NSCA data. Depending on the set of body composition standards utilized, between one and nine females were either healthy or overweight, when BMI categorized them as obese. In males, between 12 and 18 of those classified as obese by BMI were either healthy or overweight by the body composition standards.

Discussion:

Skinfold measures have been shown to give an accurate estimate of true body composition (Jackson & Pollock, 1985; Roche, Heymsfield, & Lohman, 1996), correlating with other body composition techniques with an $r \geq 0.80$ (Nieman, 2007). The correlation between body composition and BMI in the current study is similar to that found in other research, as long as men and women are separated (Nieman, 2007). However, even with this significant correlation ($p < 0.001$), it can be seen that many subjects will be mis-classified, if it is assumed that a 7-site skinfold test of body composition more accurately portrays whole body adiposity than does a simple ratio of weight to height as is utilized with BMI.

Determining which set of body composition standards should be utilized in order to determine the accuracy of BMI in classifying individuals can be difficult. For this particular study we used the standards published by three respected organizations: ACSM, ADA, and NSCA (ACSM, 2005; Williams, 2002; Cramer & Coburn, 2004). As can be seen in Table 2, the number of individuals categorized as healthy, overweight, or obese varies dramatically depending on which set of standards are used. The percentage of those who are healthy ranges from 50.2% of subjects according to BMI, to 75.7% of subjects according to the normative data of the NSCA.

As shown in Tables 3-5, males and females differed in the typical direction of discrepancy between BMI and body composition. Table 3 demonstrates that in females who were considered healthy according to BMI, body composition standards classified between five (NSCA standards) and 21 (ADA standards) as either overweight or obese. Therefore, if using the ADA body composition standards, 26.4% of female subjects in which BMI classified them as healthy were actually overweight or obese. In males the situation was quite different. Only one subject (1.6%) was classified as overweight or obese by body composition standards, when BMI categorized

them as healthy. This was the case regardless of which set of body composition standards are utilized.

The situation is different when starting with subjects who are classified as overweight or obese by BMI standards (See Table 4 and 5). If combining the two groups together, a total of 68 females were classified as either overweight or obese according to BMI standards. Body Composition testing categorized eight of these as healthy if utilizing ADA standards, 12 with ACSM standards, and 26 if utilizing the NSCA standards. Therefore, if using the NSCA standards, 38.2% of females who were classified as overweight or obese, were actually healthy. For the men, 82 of the 146 subjects were classified as either overweight or obese by BMI. Of these 82 men, 45, 47, and 57 were classified as healthy according to the standards published by ACSM, ADA, and NSCA respectively. Therefore, if using the NSCA standards, 83.8% of males who were classified as overweight or obese, were actually healthy.

As can be surmised with this discussion, if we assume that body composition standards are a better measure of true adiposity than BMI alone (Nieman, 2007; McArdle, Katch, & Katch, 2007), then a significant number of students who take kinesiology courses would be mis-classified. Males, due to a higher lean body mass are more likely than females to be classified as overweight or even obese by BMI when they actually have a healthy body composition. Whereas females, due to a low lean body weight are more likely to be classified as healthy by BMI, when their body composition would classify them as overweight, or even obese. This is not surprising since males naturally have a greater muscle mass than females, and therefore, would be more likely to have a greater muscle mass relative to their weight. In spite of the obvious differences in males and females in regards to muscle mass, the same BMI cut points are used for both (U.S. Department of Health and Human Services, 1998).

As can be seen, the prevalence of mis-classification varies greatly depending on which set of standards are utilized. The three that were chosen in this analysis are from well respected organizations, however, there are multiple other sets of standards that are often used (Gallagher, Heymsfield, Moonseong, Jebb, Murgatroyd, & Sakamoto, 2000; Lohman, 1982). To date, there has not been a consensus on which set of body composition standards should be used as there is with BMI. It has been suggested that misclassification based on BMI is rare in the general population (Gallagher et. al., 2000; US DHHS, 1998). However, this study of college students taking kinesiology classes indicates that misclassification is common, at least in certain populations.

Conclusion:

Even with a significant correlation between BMI and each of the three sets of body composition standards, there were a significant number of individuals who were classified differently between body composition and BMI. It is apparent that in college students enrolled in Kinesiology courses, measuring body composition would often give a different picture of the individual's adiposity, compared to BMI alone. In addition, because there are no consistently agreed upon standards for body composition, it would be advantageous if some of the major sports medicine and nutrition organizations would collaborate to establish standards that can be agreed upon. With the current variety of standards

(BMI and multiple body composition standards), an individual could be classified quite differently depending on which standards are used.

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Drs. Bryan L. Haddock, Linda D. Wilkin and Hosung So are all faculty at California State University, San Bernardino and Antonia Barrett was a former student at California State University and currently works for Indian Health Services.

Table 1. Baseline Characteristics (N=301)

Variable	Males (n = 146) Mean (± S.E.)	Females (n= 155) Mean (± S.E.)
Age (yrs)	23.02 (0.51)	23.45 (0.62)
Height (cm.)	176.40 (0.74)	163.02 (0.53)
Weight (kg.)	83.68 (1.46)	66.27 (1.11)
Body Fat %	15.71 (0.53)	25.67 (0.48)
BMI (kg/m ²)	26.52 (0.40)	24.89 (0.37)

Table 2. Classification based on BMI and Percent Body Fat Utilizing Norms from the American College of Sports Medicine (ACSM), American Dietetic Association (ADA), and the National Strength and Conditioning Association (NSCA). (n=301)

	BMI	ACSM*	ADA	NSCA
	n / %	n / %	n / %	n / %
All Subjects (n=301)				
Healthy	151 / 50.2%	189 / 62.8%	182 / 60.5%	228 / 75.7%
Overweight	105 / 34.9%	77 / 25.6%	64 / 21.3%	48 / 15.9%
Obese	45 / 15.0%	35 / 11.6%	55 / 18.3%	25 / 8.3%
Males (n=146)				
Healthy	64 / 43.8%	108 / 74%	110 / 75.3%	120 / 82.2%
Overweight	59 / 40.4%	29 / 19.9%	22 / 15.17%	20 / 13.7%
Obese	23 / 15.8%	9 / 6.2%	14 / 9.6%	6 / 4.1%
Females (n=155)				
Healthy	87 / 56.1%	81 / 52.2%	72 / 46.5%	108 / 69.7%
Overweight	46 / 29.7%	48 / 31.0%	42 / 27.1%	28 / 18.1%
Obese	22 / 14.2%	26 / 16.8%	41 / 26.5%	19 / 12.3%

*Overweight= \leq 30th and $>$ 10th percentile; Obesity= \leq 10th percentile

Table 3. Individuals classified as Healthy by BMI compared to Body Composition Standards

	All Subjects (n=151)	Females (n=87)	Males (n=64)
	n / %	n / %	n / %
ACSM			
Healthy	132 / 87.4%	69 / 79.3%	63 / 98.4%
Overweight	18 / 11.9%	18 / 20.7%	NA
Obese	1 / 0.6%	NA	1 / 1.6%
ADA			
Healthy	127 / 84.1%	64 / 73.6%	63 / 98.4%
Overweight	19 / 12.6%	19 / 21.8%	NA
Obese	5 / 3.3%	4 / 4.6%	1 / 1.6%
NSCA			
Healthy	145 / 96.0%	82 / 94.3%	63 / 98.4%
Overweight	4 / 2.6%	4 / 4.6%	NA
Obese	2 / 1.3%	1 / 1.1%	1 / 1.6%

Table 4. Individuals classified as Overweight by BMI compared to Body Composition Standards

	All Subjects (n=105)	Females (n=46)	Males (n=59)
	n / %	n / %	n / %
ACSM			
Healthy	55 / 52.4%	12 / 26.1%	43 / 72.9%
Overweight	40 / 38.1%	24 / 52.2%	16 / 27.1%
Obese	10 / 9.5%	10 / 21.7%	NA
ADA			
Healthy	52 / 49.5%	8 / 17.4%	44 / 74.6%
Overweight	35 / 33.3%	22 / 47.8%	13 / 22.0%
Obese	18 / 17.1%	16 / 34.8%	2 / 3.4%
NSCA			
Healthy	77 / 73.3%	25 / 54.3%	52 / 88.1%
Overweight	23 / 21.9%	16 / 34.8%	7 / 11.9%
Obese	5 / 4.8%	5 / 10.9%	NA

Table 5. Individuals classified as Obese by BMI compared to Body Composition Standards

	All Subjects (n=45)	Females (n=22)	Males (n=23)
	n / %	n / %	n / %
ACSM			
Healthy	2 / 4.4%	NA	2 / 8.7%
Overweight	19 / 42.2%	6 / 27.3%	13 / 56.5%
Obese	24 / 53.3%	16 / 72.7%	8 / 34.8%
ADA			
Healthy	3 / 6.7%	NA	3 / 13.0%
Overweight	10 / 22.2%	1 / 4.5%	9 / 39.1%
Obese	32 / 71.1%	21 / 95.5%	11 / 47.8%
NSCA			
Healthy	6 / 13.3%	1 / 4.5%	5 / 21.7%
Overweight	21 / 46.7%	8 / 36.4%	13 / 56.5%
Obese	18 / 40.0%	13 / 59.1%	5 / 21.7%

Measuring Pedometer Step Counts in Four Curriculum Units in Middle School Physical Education

by David Barney, Lois Mauch and Frank Pleban

Abstract

This study investigated step counts of middle school male and female students in four physical education units (flag football, soccer, volleyball and basketball) in an effort to provide physical educators with a baseline step count to be obtained during similar curriculum unit activities in middle school physical education classes. Step counts were obtained through pedometer measurements in 151 middle school students male (n=51) and female (n=100) throughout North Dakota. Findings revealed that, across all grade levels, males were generally more active than females, particularly in basketball. Additionally, the greatest number of steps was recorded, across grade levels, combining gender, for basketball. Finally, as grade level increased for females, step counts for activity patterns also increased, compared to males at similar grade levels. These data may help in guiding the physical activity teacher's classroom preparation in designing activity units promoting maximum activity patterns in classes by both gender and grade level.

Keywords: Pedometers, Middle School, Physical Education, Curriculum Units

Popular literature has suggested that 10,000 steps a day are a proper number of steps adults should take in a day to receive a health benefit (Hellmich, 1999; Quittner, 2000). Japanese researchers are probably the first to use and promote the pedometer in recording and monitoring the daily step count of 10,000 steps (Hatano, 1993). Yet, it has been suggested that 10,000 steps a day is not for everyone. Literature has alluded that there is limited support for, or against, the step target of 10,000 steps a day (LeMasurier, Sidman, & Corbin, 2003), and that neither appropriateness nor sustainability of a universal and widely accepted goal of 10,000 steps a day has been thoroughly examined (Tudor-Locke, 2002). Regardless, the pedometer has become more prominent in our society. Because of the pedometer's greater visibility, physical educators are using it more frequently in the gymnasium and on the playing fields. A main concern for many middle school physical educators is getting and keeping their student active during the physical education class period. By using pedometers in middle school physical education it can serve as a motivational tool for students (Tudor-Locke, 2002), and assist the physical educator in documenting students' physical activity in the class. Additionally, because of the practicality, ease of use, and cost effectiveness of the pedometer, it is a logical choice for use in physical education (Barfield, Rowe, & Michael, 2004; Beighle, Pangrazi, & Vincent, 2001; Welk, Corbin, & Dale, 2000).

Physical activity has been found to greatly benefit all those that actively pursue it, and can be enjoyed by all ages of the population.

One group in particular that can benefit from physical activity, at a pivotal time in their lives, is the adolescent or middle school population (Sallis & Patrick, 1994). One area that aids the middle schooler in reaching their physical activity goals is their daily participation in physical education classes. Well-planned and appropriate physical education classes can provide the middle school student with skills and knowledge to be physically active. Another method of getting middle school students to reach maximum activity during class time is the curriculum that is offered. The literature has suggested that middle school students prefer to participate in team sport activities. Thus with this preference to team sports, there is a greater possibility of positively affecting middle school students attitudes and interest towards physical activity (Barney, 2002; Browne, 1992; Luke & Cope, 1994; Rice, 1988; Tannehill, Romar, O'Sullivan, England & Rosenberg, 1994; Tannehill & Zakrajsek, 1993). With the assimilation of the pedometer in the physical education curriculum, physical educators can prepare their students to lead healthy, active lives through physical activity.

Physical activity, has been defined as any bodily movement produced by skeletal muscles that result in energy expenditure (Caspersen, Powell, and Christenson, 1985), has been measured in many different ways (LeMasurier, Sidman, & Corbin, 2003; Welk, Corbin, & Dale, 2000; Welk et. al., 2000; Vincent & Pangrazi, 2002). According to this definition this is what should be happening in a physical education classes.

Overview of Literature

Because of the popularity of pedometers, numerous studies have been conducted investigating a number of variables. Kilanowski, Consalvi, and Epstein (1999) compared activity measurements during recreational physical activity and classroom activities in a natural environment of children using pedometers to two previously validated measures, triaxial accelerometers and behavior observations. The researchers found pedometers to be very useful in clinical studies and that they provided an objective measure for activity levels. Schofield, Mummery, and Schofield (2005) investigated daily step counts targets for increasing physical activity of low-active adolescent girls. The researchers had two groups, one with pedometers set daily step count goals, and the other group set daily time-based goals for physical activity without pedometers. The researchers concluded that the group with pedometers had enhanced physical activity compared to the group without the pedometers. However, the researchers feel that both interventions used in their study can help in getting physical activity. Much of the pedometer studies usually have children, adolescences and other groups of people as participants and the setting in which the study takes place have been varied. Many of these pedometer studies look at how pedometers can benefit people or help modify behaviors for the better. Schneider, Crouter,

Lukajic, and Bassett (2003) conducted a study to determine the accuracy and reliability of 10 different pedometer brands. Ten males and ten females wore the different pedometer brands, separately, while walking 400m around a track to track the reliability of each pedometer. The researchers found that 4 of the 10 pedometers brands were within $\pm 3\%$ of actual steps taken. The researchers also cautioned future pedometer researchers to be aware of the pedometers accuracy and reliability that will be used in research. Other pedometer studies have investigated the accuracy of pedometers during physical activity. The literature has found pedometers to be valid in the measurement of physical activity (Barfield, Rowe, & Michael, 2004; Eston, Rowland, & Ingledew, 1998; Scruggs et. al., 2003). Additionally, other studies have found pedometers to be practical, easy of use, and cost effectiveness, thus making them a logical choice for use in physical education classes (Barfield, Rowe, & Michael, 2004; Easton, Rowlands, & Ingeldew, 1998; Tudor-Locke, 2002; Tudor-Locke & Myers, 2001; Welk, Corbin, & Dale, 2000). The purpose of this study was to exam four different curriculum units (flag football, soccer, volleyball, and basketball) to the overall physical activity needs of middle school students. This study can greatly benefit the middle school physical educator for the purpose of planning activities/games in flag football, basketball, soccer, and volleyball that will get middle school students actively involved, or high step counts.

Methods

Participants

Middle school students (n=151) were recruited from a local middle school in a city in an urban, upper Midwestern state. Additionally, parental consent was obtained as well as consent from the middle school principal and physical education teacher, before the study began. All the middle school students were verbally informed of the purpose of the study and were made familiar with the pedometers at the study's onset. Students were assured that nonparticipation or withdrawal from this study would not affect their grade in their physical education class. The teacher that participated in this study has taught physical education for over 20 years. She agreed to allow the researchers to use her classes for this study.

Pedometer Instrument

The Yamax Digi-Walker LS 2525 was the pedometer used to collect student step counts. This pedometer model records the following: step count, distance covered, calories burned, time students were in activity, and a clock.

Procedures

On the days of the data collection, students were instructed to put on their pedometer when they arrived to class, and reset them to zero. Afterwards the teacher would begin her lesson for the day. Her typical lesson plan was an introductory activity that was three to four minutes in length. Darst and Pangrazi (2002) have explained introductory activities to prepare students for activity. In many cases, students have been sitting in classes previous to their physical education class, thus introductory activities get students quickly into activity. The introductory activities require minimal organization and places demands on large muscles movement.

Next is the fitness activity, which lasts six to eight minutes in length. Typically, fitness activities focus on the development of physical fitness. Instruction centers on developing major components of flexibility, muscular strength, and cardiovascular endurance (Darst & Pangrazi, 2002). Lessons typically lasted for 25 minutes, and concluded with a game or activity that lasted for five minutes. When the class period was finished, students would retrieve their student record sheet and record the number of steps they took during the class period. When the students had finished filling out their step counts from the class period, they returned their student record sheet to the teacher. Only the teacher and the researchers had access to the student record sheets.

Middle school class periods were typically 48 minutes in length. For this study the researchers were looking at 35 minutes of actual activity time. Students were given six minutes to change into their gym cloths, took part in 35 minutes of activity, and finally six minutes to change back into their school cloths and prepare for their next class period. Data was collected over eight different class periods. The literature has suggested eight separate times or eight separate class periods are sufficient for gathering data when working with youth in seventh through twelfth grades. (Vincent & Pangrazi, 2002).

Data was analyzed using SPSS 14.0 statistical package. Descriptive statistics, including average steps taken, standard deviations ($M \pm SD$) and Standard Error of Means (SEM), Independent t-test, and One-Way Analysis of Variance were used to explain result.

Results

Participant Demographic Data

One hundred and fifty-one male and female middle school students participated in this study, 51 males and 100 females, respectively. All participants were currently enrolled in either the sixth, seventh or eighth grades at the time of the study. Males and females were similar in regards to academic school standing and ethnicity. All participants self-identified their ethnicity as White, Non-Hispanic. Table 1 presents the gender of male and female students in regards to grade in school. SPSS 10.0 for Windows was used for all data analyses.

Table 1. Gender of Middle School Students By Grade In School

Gender	6th Grade	7th Grade	8th Grade	Total
Males	16	17	18	51
Females	40	38	22	100
<i>Note.</i> Total Number of Study Participants = 151				

Pedometer Data by Type of Physical Activity, Grade in School and Gender

Table 2 presents average steps taken, standard deviations and standard error of means for the four middle school physical education activities (i.e., flag football, soccer, volleyball, and basketball), when compared to gender, collectively. Table 3 presents average steps taken, standard deviations and standard error of means for the four middle school physical education

activities when compared to grade in school, collectively. Grade in school was defined at the grade each student reported to be in (6th, 7th, or 8th grade) at the time of data collection. Average number of steps taken for each activity, incorporating all grade levels and both genders, were: flag football (1544), soccer (1635), volleyball (1446), and basketball (1822), for males and females, respectively.

Table 2. Average Steps Taken, Standard Deviations ($M \pm SD$) and Standard Error of Means (SEM) by Physical Activity and Gender

Physical Activity and Gender	$M \pm SD$	SEM
Males		
Flag Football	1562 \pm 466.25	65.29
Soccer	1488 \pm 415.16	58.14
Volleyball	1588 \pm 474.42	66.43
Basketball	1922 \pm 499.79	70.00
Females		
Flag Football	1535 \pm 519.63	51.96
Soccer	1710 \pm 544.56	54.46
Volleyball	1373 \pm 403.89	40.40
Basketball	1861 \pm 1865.02	186.50
^a Average Number of Steps By Activity Compared To Lender		

Table 3. Average Steps Taken, Standard Deviations ($M \pm SD$) and Standard Error of Means (SEM) by Physical Activity and Grade in School

Physical Activity and Grade in School	$M \pm SD$	SEM
6th Grade		
Flag Football	1628 \pm 540.89	72.28
Soccer	1706 \pm 508.45	67.95
Volleyball	1425 \pm 397.28	53.09
Basketball	1829 \pm 550.74	73.60
7th Grade		
Flag Football	1531 \pm 510.19	68.79
Soccer	1612 \pm 505.07	68.10
Volleyball	1473 \pm 489.67	66.03
Basketball	1658 \pm 513.83	69.28
8th Grade		
Flag Football	1444 \pm 413.84	65.43
Soccer	1566 \pm 534.76	84.55
Volleyball	1437 \pm 431.24	68.19
Basketball	2263 \pm 2852.39	451.00
<i>Note.</i> Total Number of Study Participants = 151 <i>Note.</i> Males (N=51). <i>Note.</i> Females (N=100). ^a Average Number of Steps by Activity Compared to Grade in School		

Pedometer Data by Type of Physical Activity, Grade in School and Gender

Tables 4 and 5 present the average number of steps taken for each physical education activity, standard deviations and standard error of means, by gender, over each of the three grade levels. Table 4 represents data collected from male participants, for each activity; at each grade level. Average of number of steps taken for each activity, for males; incorporating all grade levels, were: flag football (1562), soccer (1487), volleyball (1587) and basketball (1922). Table 5 represents data collected from female participants, for each activity; at each grade level. Average of number of steps taken for each activity, for females; incorporating all grade levels, were: flag football (1534), soccer (1710), volleyball (1373) and basketball (1861).

Table 4. Average Steps Taken, Standard Deviations ($M \pm SD$) and Standard Error of Means (SEM) by Physical Activity and Gender (Males) and Grade in School

Physical Activity, Gender (Males) and Grade in School	$M \pm SD$	SEM
Males		
6th Grade		
Flag Football	1834 \pm 532.22	133.06
Soccer	1433 \pm 409.13	102.28
Volleyball	1670 \pm 414.13	103.54
Basketball	2039 \pm 628.90	157.22
7th Grade		
Flag Football	1458 \pm 407.97	98.95
Soccer	1460 \pm 424.96	103.06
Volleyball	1616 \pm 548.60	133.06
Basketball	1842 \pm 276.28	67.01
Males		
8th Grade		
Flag Football	1417 \pm 360.50	84.79
Soccer	1562 \pm 424.12	99.97
Volleyball	1487 \pm 457.83	107.91
Basketball	1829 \pm 550.74	73.60
<i>Note.</i> Total Number of Study Participants = 151 <i>Note.</i> Males (N=51). <i>Note.</i> Females (N=100). ^a Average Number of Steps by Activity Compared to Gender and Grade in School		

Table 5. Average Steps Taken, Standard Deviations ($M \pm SD$) and Standard Error of Means (SEM) by Physical Activity and Gender (Females) and Grade in School

Physical Activity, Gender (Females) and Grade in School	$M \pm SD$	SEM
6th Grade		
Flag Football	1545 \pm 528.28	83.53
Soccer	1815 \pm 507.28	80.21
Volleyball	1327 \pm 349.61	55.28
Basketball	1745 \pm 500.17	79.09
Females		
7th Grade		
Flag Football	1563 \pm 551.76	89.51
Soccer	1680 \pm 527.96	85.65
Volleyball	1409 \pm 454.14	73.67
Basketball	1576 \pm 574.36	93.17
Females		
8th Grade		
Flag Football	1466 \pm 460.11	98.10
Soccer	1569 \pm 620.83	132.36
Volleyball	1395 \pm 414.37	88.34
Basketball	2566 \pm 3828.61	816.26

Note. Total Number of Study Participants = 151
Note. Males (N=51).
Note. Females (N=100).
*a*Average Number of Steps by Activity Compared to Gender and Grade in School

Independent t-test by Physical Activity and Gender

Table 6 presents degrees of freedom, F tests and p values for the four middle school physical education activities (i.e., flag football, soccer, volleyball, and basketball), when compared to gender, collectively. Only the school physical education activity volleyball was statistically significant $F(1, 149) = 3.84, p = .05$.

Table 6. Independent t-test by Physical Activity and Gender

Source	<i>df</i>	<i>F</i>	<i>p</i>
Flag Football	149	1.94	.16
Soccer	149	2.71	.10
Volleyball	149	3.84*	.05
Basketball	149	1.22	.27

Note. Total Number of Study Participants = 151
Note. Males (N=51).
Note. Females (N=100).
 * $p < .05$.

One-Way Analysis of Variance for Physical Activity and Grade in School

Table 7 presents degrees of freedom, F tests and p values for the four middle school physical education activities (i.e., flag football, soccer, volleyball, and basketball), when compared to grade in school (i.e., 6th, 7th and 8th grades), collectively. No statistically significant differences were noted for school physical education activities when compared to grade in school.

Table 7. One-Way Analysis of Variance for Physical Activity and Grade in School

Source	<i>df</i>	<i>F</i>	<i>p</i>
Between Subjects			
Flag Football	2	1.61	.20
Soccer	2	0.95	.39
Volleyball	2	0.18	.84
Basketball	2	1.85	.16

Note. Total Number of Study Participants = 151
Note. Males (N=51).
Note. Females (N=100).

Discussion

The purpose of this study was to exam four different curriculum units (flag football, soccer, volleyball and basketball) to the overall physical activity needs of middle school students. When analyzing the data from these curriculum units, across grade level and gender, three particular insights were being learned regarding middle school student's activity during class time. First, males across all grade levels, when compared to females across all grade levels, recorded more steps in three of the four curriculum units, with soccer being the exception. In addition, when comparing the number of steps between genders, across all grade levels, basketball recorded the greatest number of steps. These data appear to coincide with findings by Trost et al., (2002) where as middle school aged males were generally (i.e., across all grade levels) more active than females, with a modest difference. Second, when looking at each grade level (6th, 7th and 8th grades), for males and females combined, the rank-order steps for each activity was the same. The greatest number of steps was recorded in basketball, followed by soccer, flag football and volleyball, respectively. It was also noted that the number of steps decreased, when gender was combined, from the sixth grade to eighth grade for the activities of flag football and soccer. Third, when looking at the step counts for males and females by grade, it appears, in some cases, females recorded more steps than males as grade level increased. For example, 6th grade females recorded more steps in soccer, 7th grade females had more steps in flag football and soccer, and 8th grade females had more steps in flag football, soccer and basketball, when compared to males in similar grades. This data may indicate that middle school females became more active in physical education class as they advanced in school, when compared to their male counterparts.

This current study adds to the body of literature with regards to pedometer use among youth, especially in a physical activity class setting. Specifically, there is some practical application that the classroom teacher can take from this study. From the four

curriculum units studied, the step counts did not go below 1,300 steps for both males and females, across all grade levels. This can serve as a beneficial guide when setting up unit or lesson plans in these curriculum units, in regards implementing specific, structured class activities for males and females, as well as grade level. The data can help guide the physical education teacher's classroom preparation in designing activity units, which would promote maximum activity patterns in classes by both gender and grade level. This information can be used by the teachers to manage and prepare for class time more wisely, for the purpose of eliminating students standing around during class activity time.

Conclusions and Recommendation for Future Research

As the physical educator implements pedometers into these middle school curriculum units, the potential of increased student learning can be greater, because of the emphasis for students to get the maximum number of steps during the class period. Also, there is the possibility that as the students become more skilled from the skills they learn participating in these activities will carry them throughout their lives. Because this study is preliminary in nature, other studies could follow along these lines. For example, studies could continue to look at step counts in middle school physical education curriculum units such as softball, floor hockey, team handball and other units for the purpose of planning maximum activity during physical education. Other studies could investigate step counts of students in elementary physical education, investigating such areas as skill themes, manipulative skills, rhythmic movement skills and other activities. Another study could be in a high school setting, research could investigate the number of steps in lifetime activities such as golf, tennis, and bowling. These types of study could be very beneficial to all physical educators, for the purpose of student's getting physical activity during physical education class time.

Dr. David Barney is an associate professor at Oklahoma State University in Stillwater Oklahoma, Mrs. Lois Mauch is a teacher at Washington Elementary School within the Fargo Public School District (ND) and Dr. Frank Pleban is an assistant professor at Grand Valley State University in Allendale, Michigan.

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Effect of Short Rest Intervals on Running Performance Following a Cycling Exercise Bout

by Michelle StanWiens and Werner W.K. Hoeger

Abstract

The National Governing Body of USA Triathlon imposes a three-minute “time-out” penalty for elite racers who illegally draft during the bike portion of a triathlon. The purpose of this investigation was to determine if an added time-out penalty between a 30-minute bike ride and a 10-km run provided sufficient recovery time to actually become a benefit. Ten ($n = 10$) volunteer trained female subjects performed two bike/run (BR) trials separated by four to seven days. Each BR trial consisted of a 30-minute bike ride performed at an exercise heart rate of 80% of cycling $\dot{V}O_{2\max}$, followed by a 10-km treadmill run at 0% grade during which subjects adjusted the treadmill speed at will. Subjects performed the trials in a random order using a 45-second (BR45s) rest interval and a three-minute (BR3m) rest interval between exercise bouts. A mixed models design showed that there was no significant difference ($p > .05$) between observed and target exercise heart rates at 80% of cycling $\dot{V}O_{2\max}$ during the bike portions of the trials (BR45s = $158 \text{ b} \cdot \text{min}^{-1} \pm 0.05$, BR3m = $158 \text{ b} \cdot \text{min}^{-1} \pm 0.04$). Repeated measures ANOVA showed that 10-km performance was significantly ($p < .05$) faster for the BR3m trial ($47.85 \text{ min} \pm 5.0$) as compared to the BR45s trial ($48.68 \text{ min} \pm 5.4$). These data support the hypothesis that a three-minute rest interval following a 30-minute bike bout performed at 80% of cycling $\dot{V}O_{2\max}$ produces significantly faster 10-km run times as compared to a shorter 45-second recovery period between these exercise modalities.

Introduction

The sport of triathlon is commonly recognized as an endurance event of varying lengths comprised of swimming, biking, and running in sequence. The popularity of the sport has grown dramatically in recent years evidenced by an increase in membership from 15,937 in 1993 to more than 70,000 members in 2006. The number of sanctioned events exceeded 1,800 races in 2006 (USA Triathlon, 2007).

In a triathlon, the transition is a short period of rest during which the athlete quickly changes gear for the next phase of the event. The assumption that the shortest transition is most beneficial to triathlon performance is at the heart of the current penalty system used by the World Triathlon Corporation, Governing Body of the Hawaii Ironman Triathlon race. For elite racers, the penalty for illegal drafting during the bike portion of the triathlon is a four-minute penalty administered in two parts: (a) one minute is added to the elapsed time and (b) a three-minute time penalty during the bike-run transition. The three-minute time penalty, enforced between the bike-run, in essence becomes a rest period between these two phases of the race. Typically, during this penalty period, athletes are sitting, standing, or stretching.

For peak performance, athletes rely on carbohydrates to

contribute most of the energy needed to sustain high-intensity exercise (Costill, 1988). Following exercise, and depending on the intensity of exercise, a rest interval or recovery period of varying length (i.e., seconds, minutes, hours, or days) is required to remove blood lactate and restore adenosine triphosphate, phosphocreatine, and/or glycogen depleted during exercise (Brooks, Fahey, & White, 1996; McArdle, Katch, & Katch, 2007). In the case of aerobic exercise, no significant blood lactate accumulation or phosphocreatine depletion occur. For optimal recovery, the most critical component following high-intensity and/or prolonged aerobic endurance events is the replenishment of muscle glycogen (Wilmore & Costill, 2004). This replenishment comes primarily from carbohydrate intake during or following exercise and the recovery rate is faster in trained athletes (McArdle et al., 2007).

Studies detailing the effects of rest periods on human performance indicate that long-term recovery bouts improve subsequent performance. (MacDougall, Ward, Sale, & Sutton, 1977; Maehlum, Felig, & Wahren, 1978). Most of the research in the area of exercise recovery has focused on the benefits of long-term recovery on subsequent glycogen repletion (Blomstrand & Saltin, 1999; Burke et al., 1996; Burke, Collier, & Hargreaves, 1993; Casey, Short, Hultman, & Greenhaff, 1995), but a review of the literature in the area of high-intensity aerobic endurance exercise revealed no findings on the effects of a rest interval of less than five minutes on subsequent athletic performance.

Using multiple maximal sprint cycling tests of 5-second duration with either 10- or 30-second recovery periods between sprints, Glaister, Stone, Stewart, Hughes, & Moir (2005) found higher measures of maximum and mean power output following 30-second recovery periods. Additionally, significantly lower measures of fatigue, heart rate, respiratory exchange ratio, oxygen uptake, blood lactate, and ratings of perceived exertion were found with the 30-second recovery periods. The researchers concluded that the length of recovery affects performance when performing repeated cycling sprint intervals, and although the exact mechanism of this response is unknown, these results should be considered when developing and evaluating performance capabilities of multiple sprint athletic events. The possibility exists that performance may also increase in a second bout of exercise when using different relatively short-duration recovery periods (i.e., less than 5 minutes) between two bouts of high-intensity aerobic endurance events. Thus the purpose of this investigation was to determine the effect of a 45-second and a three-minute rest interval on 10-kilometer (km) running performance following a 30-minute cycling exercise bout performed at an exercise heart rate equivalent to 80% of maximal oxygen uptake ($\dot{V}O_{2\max}$).

Methods

Ten ($n = 10$) volunteer aerobic endurance trained female subjects members of a women's triathlon training group participated in three

exercise sessions, an initial bike maximal oxygen uptake ($\dot{V}O_{2\max}$) test and two bike/run (BR) trials. Table 1 provides a summary of basic subject characteristics.

Table 1. Subject Characteristics

Variable	M \pm SD	Range
Age	30.9 \pm 5.7	19.0 – 37.0
Height (cm)	171.1 \pm 3.7	165.0 – 178.0
Weight (kg)	58.6 \pm 4.9	49.1 – 65.9
$\dot{V}O_{2\max}$ (ml·kg ⁻¹ ·min ⁻¹)	54.4 \pm 4.8	46.9 – 62.8
EHR at 80% of $\dot{V}O_{2\max}$ (b·min ⁻¹)	157.8 \pm 8.4	141.0 – 168

Each BR trial consisted of a 30-minute stationary bike ride at an exercise heart rate (EHR) equivalent to 80% of $\dot{V}O_{2\max}$ followed by a 10-km run at self-selected speeds and 0% grade on a motor-driven treadmill. For the purposes of this study, “self-selected speeds” meant that subjects freely adjusted running speeds at any time during the run to achieve the best possible performance in the 10-km run. The participants were aware of the distance covered, as shown on the treadmill control panel, but were not aware of the elapsed time.

One BR trial was performed with a 45-second rest interval between the bike ride and the 10-km run (BR45s), a rest period long enough for subjects to change into running shoes. The other trial allowed for a three-minute rest interval (BR3m) between the bike and the run during which subjects also changed into running shoes. The two BR trials were conducted in a random, counterbalanced order. Participants were allowed to consume only water, ad libitum, during all exercise sessions.

Two days prior to all testing, participants were asked to refrain from intense physical activity above a “somewhat hard” intensity level according to the rate of perceived exertion scale (Borg, 1982). Subjects were also asked to maintain similar diets (i.e., energy and nutrient intake) during the two days prior to the two BR trials and refrain from food intake two hours prior to testing.

The three testing sessions were spaced four to seven days apart. Testing was conducted at the same time of the day for each subject. All tests began with a 10-minute warm-up. This warm-up consisted of a two-minute walk on the treadmill at 4.0 km·h⁻¹ followed by three-minute jog at 9.7 km·h⁻¹. Following the treadmill warm-up, participants completed a sequence of static stretching exercises for 4.5 minutes, with each stretch being held for approximately 20 seconds.

The exercise variables measured in this study were $\dot{V}O_{2\max}$, EHR associated with 80% of $\dot{V}O_{2\max}$, EHR during each minute of the 30-minute bike ride, and final 10-km treadmill run time. Each subject’s $\dot{V}O_{2\max}$ was assessed on a Monark bicycle ergometer using techniques of open circuit spirometry. Metabolic measurements were determined using a TrueMax 2400 ParVo Medics metabolic measurement cart. EHR at 80% of $\dot{V}O_{2\max}$ was determined by finding the EHR associated with 80% of $\dot{V}O_{2\max}$ during the initial maximal bike test.

For the bike portion of the two BR trials, the EHR was used to control exercise intensity. The resistance on the bicycle ergometer was continually adjusted to keep each subject at the EHR associated with 80% of $\dot{V}O_{2\max}$. In this manner all subjects cycled for 30 minutes at the same intensity level, thereby entering the run portion at approximately the same level of fatigue. EHR during the cycling portion of each trial was monitored via telemetry using a wireless Polar heart rate monitor and recorded every minute during the trial. A Quinton Q-50, Series 90 motorized treadmill was used for the run portion of the trials. To assess the effect of the two different rest periods (45 sec vs. 3.0 min) on 10-km running performance, subjects were allowed to run at self-selected speeds during the two 10-km runs. The final 10-km run time was recorded immediately upon completion of the run.

A repeated measures ANOVA design was used to analyze the 30-km performance (run time) between the BR45s and BR3m trials. A randomized order and counterbalanced design ensured that the order of treatment did not affect the results of the study. The order of the tests was also analyzed with a repeated measures ANOVA design to confirm the lack of learning effect from the first to the second test.

To confirm that all subjects met the experimental conditions concerning EHR intensity during the 30-minute bike bouts, a mixed models design was used to analyze variability between the actual exercise heart rate (AEHR) and the target exercise heart rate (TEHR) at 80% of $\dot{V}O_{2\max}$. Only AEHRs taken from minutes 5 to 30 were used in the analysis. AEHR data from minutes 1 to 4 were excluded from the analysis because during the initial five minutes of the bike ride, exercise heart rates gradually increased to the TEHR.

Approval from the Boise State University Institutional Review Board for the Protection of Human Subjects in Research was obtained prior to the start of this study and all subjects signed and informed consent form before participating in the study.

Results

Results of the 10-km treadmill run times for the BR45s and BR3m trials are given in Table 2. Results of the repeated measures ANOVA indicated that the 10-km run time was significantly faster ($p \leq .05$) following the three-minute rest interval (BR3m time = 47.85 min) versus the trial with only 45 seconds between the bike and the run (BR45s time = 48.68 min) portions of the trial.

Results from the second repeated measures ANOVA conducted to ascertain that there wasn’t a learning effect from BR trial 1 to

**Table 2. 10-Kilometer Treadmill Run Time (min)
Results for BR45s and BR3m Trials¹**

Trial	n	M \pm SD
BR45s	10	48.68 \pm 5.42
BR3m	10	47.85* \pm 5.02

¹BR45s = Bike/run with 45 seconds rest between exercise modalities

BR3m = Bike/run with a three-minute rest interval between exercise modalities

*Significantly different from BR45s ($p \leq .05$)

trial 2 (BR45s and BR3m were performed in a random order), indicated that there was no significant difference ($p > .05$) in 10-km performance from trial 1 to trial 2, (48.33 min vs. 48.20 min). Table 3 provides the times for the two 10-km treadmill run trials.

Table 3. 10-Kilometer Treadmill Run Time (min) Trial Results		
Trial	n	M ± SD
Trial 1	10	48.33 ± 5.5
Trial 2	10	48.20* ± 5.0
* Not significantly different from Trial 1 ($p > .05$)		

Results from the mixed model analysis comparing AEHR and TEHR from minutes 5 through 30 for both the BR45s and BR3m trials indicated that there was no significant difference ($p > .05$) between the AEHR and the TEHR (158 b·min⁻¹ in all cases). Table 4 provides the bike EHR data for both the BR45s and BR3m trials.

Table 4. Actual Exercise Heart Rate (AEHR) and Target Exercise Heart Rate (TEHR) Results for Cycling Portion of the BR45s and BR3m Trials ¹			
Trial	n	AEHR M ± SD	TEHR M ± SD
BR45s (b·min ⁻¹)	10	158 ± 8.72	158 ± 8.89
BR3m (b·min ⁻¹)	10	158 ± 8.75	158 ± 8.89
¹ BR45s = Bike/run with 45 seconds rest between exercise modalities BR3m = Bike/run with a three-minute rest interval between exercise modalities *Significantly different from BR45s ($p \leq .05$)			

Discussion

The result of this study indicate that 10-km run time is affected by the length of the rest interval following a 30-minute bike ride at an EHR equivalent to 80% of VO_{2max}. As with improved anaerobic performance in subsequent intervals following a longer rest period (5 vs. 30 seconds) during multiple cycling sprints (Glaister et al., 2005), this study found that 10-km performance was 49.8 seconds faster on the BR3m trial (47.85 min ± 5.0) as compared to the BR45s trial (48.68 min ± 5.4).

The exact mechanism for improved performance between high-intensity aerobic events interspaced by short recovery periods has not been investigated. Recovery from strenuous steady state exercise requires resynthesis of high-energy phosphates, replenishment of body fluids and oxygen in the blood and in myoglobin, removal of blood lactate, heat dissipation, and reduction of thermogenic hormone levels (McArdle et al., 2007). Although little lactate accumulation occurs at an oxygen consumption below 60% of VO_{2max}, the subjects in this study rode the bike at 80% VO_{2max}; an intensity level that may have caused some increases in lactate. It is also feasible that blood glucose rose slightly through gluconeogenesis, a process known to increase as a result of intense exercise. All of the aforementioned factors could

begin to be positively influenced in a brief three-minute recovery period, long enough to improve performance in a subsequent bout of high-intensity endurance exercise.

Based on these findings, an “imposed” four-minute (240 s) penalty in shorter events such as investigated in this research, in essence becomes only a 2-minute 25-second penalty (240 s – 45 s transition – 50 s improved performance). The 50-second improvement in 10-km performance, however, does not completely overcome the time lost due to the imposed penalty, but it may affect the athlete’s final placement within an event and may not provide sufficient penalty to deter participants from illegally drafting during races.

Additional research is necessary to determine the effects of different duration “time-out” penalties on longer duration races; including some with the swim portion of the triathlon. If the findings of the current study hold true for longer races and even in the Iron-length triathlons, the time penalty imposed on athletes for illegal drafting during the cycling portion of the triathlon should really be added to the final finish time instead of providing the athlete with the added benefit of a longer rest period that subsequently may enhance running performance.

Ms. Michelle StanWiens is the founder and director of performancehigh.com and Dr. Werner W.K. Hoeger is a faculty member at Boise State University, Idaho (USA)

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Effects of Selected Personal Environmental, and Activity Characteristics on Exercise Adherence

by Robert C. Schneider and Fred A. Aiken

Abstract

The purpose of this study was to explore selected personal, environmental, and activity characteristics among individuals who exercise. Subjects volunteered from exercise facilities that agreed to participate (N=203). The Self-Motivation Inventory (SMI) was used to determine the subjects' level of motivation. Four groups were identified: (a) High-motivation/Low Adherence, (b) High-motivation/High Adherence, (c) Low-motivation/Low Adherence, and (d) Low-motivation/High Adherence. After applying a one-way ANOVA and Scheffé Test, it was found that individuals who exercise regularly derive pleasure from their activity, believe that exercise is beneficial, feel better about their appearance and state of health, and perceive fewer barriers to participation.

Effects of Selected Personal, Environmental, and Activity Characteristics on Exercise Adherence

Despite the overwhelming evidence of the positive effects of exercise, well-intentioned individuals still drop out of exercise programs at an alarming rate of 40 to 60% within the first six months (Dishman, 1986). The Department of Health and Human Services (1990) has set forth five goals in their *Healthy People 2000* promotion regarding physical activity and fitness risk reduction objectives. In order to meet these goals, healthcare professionals, public health administrators, and exercise leaders must address two major problems: First, encouraging sedentary people to start engaging in regular physical activity; Second, developing strategies to promote continued exercise participation (Rutherford, Corbin, & Chase, 1992). In an effort to solve these problems, many investigators have studied exercise behavior as it relates to persistence with regular physical activity.

Many common characteristics have been identified regarding those who continue to exercise, as well as those who stop exercising. According to Dishman, Sallis, and Orenstein (1985) and Martin and Dubbert (1982), factors or characteristics that have been found to predict exercise participation and level of adherence may be divided into personal characteristics, activity/characteristics, and environmental characteristics.

Two major personal characteristics related to exercise adherence include self-motivation (Dishman, Ickes, & Morgan, 1980; Rutherford et al., 1992) and the perceived personal control and responsibility one has toward his or her health (Ziff, Conrad, & Lachman, 1995). These studies have concluded that people who have high self-motivation and/or perceive they have more control over their health are more likely to maintain a regular exercise program. Lechner and DeVries (1995) found that low-adherence subjects and dropouts were least convinced of their ability to participate in the program. A report by Napolitano and Marcus (2000) substantiates the importance of self-efficacy related to

exercise compliance.

There are several other personal characteristics that influence continued participation in an exercise program. Past participation (Dishman, 1982; Morgan, 1977; Oldridge, 1982) has a positive association with adherence, while blue-collar occupations, smoking (Cox, 1984; Fielding, 1982; Oldridge, 1982; Oldridge et al., 1983), and being overweight (Brownell, Stunkard, & Albaum, 1980; Dishman, 1981) are negatively associated with adherence. Age has demonstrated no association with adherence according to Morgan (1977), Oldridge (1982), and Dishman (1982).

Activity characteristics refer to either lifestyle activities or fitness-related activities. Lifestyle activity patterns include activities related to daily living and occupational activities. These activities do not differ greatly by age or gender, but men and younger adults are more likely to engage in fitness-related activities. While more men than women will adopt vigorous or fitness-related activities in the period of a year, a large proportion of women will increase lifestyle activities. In addition, lifestyle activities have a drop out rate of about one-half that of fitness-related activities (Dishman et al., 1985; Michigan Department of Health, 2000). Intensity and perceived exertion have demonstrated a negative association with continued exercise (Epstein, Koeske, & Wing, 1984; Martin & Dubbert, 1982; Pollock et al., 1977). According to Pollock et al. (1977), attrition due to injury from over training was the leading reason for discontinuing an exercise program. Physical activity produces results that can either encourage or discourage continued participation. Perceived discomfort during an exercise program, regardless of exertion, has been reported among women who drop out (Oldridge et al., 1983).

Environmental characteristics can have a mixed effect on exercise adherence. Spouse support (Dishman, 1982; Morgan, 1977; Oldridge, 1982; Wallace, Raglin, & Jastremski, 1995) and social reinforcement either by an exercise leader or partner (Dishman, 1984; Wankel, 1984) demonstrated a positive correlation with continued exercise. These findings illustrate the power of the social environment in shaping exercise patterns. An individual's perceived available time has been the most common reason given for dropping out of an exercise program (Dishman, 1982; Gettman, Pollock, & Ward, 1983; Oldridge, 1982). Interestingly, active individuals are as likely, or more likely, than sedentary individuals to view time as a barrier to activity (Canada Fitness Survey, 1983; Perrier Great Waters of France, 1979). Access to a facility, whether it is only perceived as convenient or is actually in close proximity geographically to home or work, influences adherence to a fitness program (Dishman et al., 1985; Oldridge, 1982). Enrollment fees have been reported not to be a barrier to exercise participation according to survey results by the Canada Fitness Survey (1983) and Iverson, Fielding, Crow, and Christenson (1985). However, already-active individuals were twice as likely to claim that less expensive facilities would increase involvement in exercise (Perrier Great Waters of France, 1979).

Research has demonstrated that people who have a higher level of self-motivation are more likely to adhere to an exercise program. Studies have also identified environmental and activity factors that may either help or hinder an individual's level of participation in an exercise program. The purpose of this study was to identify selected personal, environmental, and activity factors which can be incorporated into fitness programs that will enhance the retention of individuals who are less likely to continue a regular exercise program. The specific problem addressed was an identification of the personal, environmental, and activity characteristics that influence exercise adherence.

The following research questions were investigated:

1. Can common personal, environmental, and/or activity characteristics be identified among people who exercise?
2. Is there a relationship between selected personal, environmental, and/or activity characteristics and exercise adherence?
3. Are there common personal, environmental, and/or activity characteristics among those who have low self-motivation and high exercise adherence?

Methodology

Subjects

The population consisted of members of selected fitness facilities who were 21 years of age or older. The areas in which the facilities were located were three counties in southern NJ. Twenty-one facilities were selected randomly using the telephone book. The name of each facility listed in the telephone book was placed in three separate hats representing each county. Seven names were drawn from each hat. The managers of the facilities were contacted by telephone or in person by one of the researchers. The study was explained verbally and written information was provided upon request. Out of 21 facilities 6 were willing to participate in the study. Those facilities that declined to participate stated several reasons which included: an unwillingness to disrupt club members with the survey, a lack of interest in the study, and an unwillingness to admit non-members into the facility. Two additional facilities were recruited from outside of the defined area before the study began. One facility was in northeastern MD and the other was in central NJ. The researchers were familiar with the managers at these two facilities, who expressed an interest in being a part of this study.

Three hundred seventy survey packets were distributed at eight different facilities. Two hundred three returned surveys comprised the total number of subjects for the study. Subjects from the following eight facilities agreed to participate in the study: (a) a non-profit organization, $n = 68$; (b) a phase four cardiac rehabilitation program, $n = 24$; (c) a privately owned health club, $n = 23$; (d) a privately owned health club, $n = 8$; (e) a privately owned health club, $n = 16$; (f) a franchised aerobic dance program, $n = 24$; (g) a corporate fitness facility, $n = 28$; and (h) a college operated facility, $n = 12$. The response rate was 54.86%. Presented in Table 1 is the demographic data of the sample.

Instruments

Development of the Participant Profile Questionnaire (PPQ)

Table 1. Demographic Data of the Sample Based on the Responses from the Participant Profile Questionnaire (N=203)

Variable		Frequency	Percent
Age	21-30	29	14.3
	31-40	40	19.7
	41-50	52	25.6
	51-60	29	14.3
	60+	53	26.1
Married	Yes	144	70.9
	No	59	29.1
Gender	Male	84	41.4
	Female	119	58.6
Current Smoker	Yes	14	6.9
	No	189	93.1
Former Smoker	Yes	95	46.8
	No	108	53.2
	Never	94	53.2
Income Below	\$25,000	15	7.7
	\$25,000-\$49,999	41	20.9
	\$50,000-\$74,999	48	24.5
	\$75,000-\$99,999	43	21.9
	Over \$100,000	49	25.0
Occupation	Missing	7	
	White-collar	94	46.5
	Blue-collar	24	11.8
	Retire	44	21.8
	Other: (housewife, student, unemployed)	40	19.8
Education	Missing	1	
	Did not finish HS	2	1.0
	HS graduate	31	15.3
	Some college	53	26.1
	College graduate	66	32.5
Race	Post graduate	25.1	51
	Caucasian	195	96.1
	Minority	8	3.9

Note. HS = high school.

included a panel of experts. Pertinent elements related to personal, environmental, and activity factors from the literature were selected for analysis. Based on the literature, the PPQ was developed. The panel members also received a copy of the SMI and a copy of Dishman et al. (1985), which summarizes pertinent elements related to personal, environmental, and activity factors. The panel was asked for suggestions to improve the PPQ.

Based on their suggestions, significant content and format revisions were made and the questionnaire was returned for further review. The panel was satisfied after this rewrite. This process helped establish content validity for the questionnaire.

The questionnaire was then field tested by 16 individuals (two staff representatives from each facility who were not selected for testing). During this process, the following were evaluated: (a) testing time, (b) ambiguity of the questions, (c) confusion with the directions, and (d) relevance. Based upon feedback from this

group, a revised edition was constructed and submitted for final approval by the panel.

The SMI is an instrument that measures a person's tendency to persevere or to be self-motivated. The SMI consists of 19 positively keyed items and 21 negatively keyed items. The possible response range is from 40 to 200, with a high score indicative of high self-motivation. Construct validity of self-motivation was established through the development of a scale that is logically valid, internally consistent, and reliable (Dishman et al., 1980). Item analysis of the 40 items revealed a Cronbach's alpha reliability coefficient of .91. Cross validation of the inventory on a second, independent sample of 48 undergraduates also yielded a high index of internal consistency (alpha = .86), as well as a test reliability of .92.

Data Collection Procedures

The questionnaire packet consisted of the following: (a) instructions for completing the packet, (b) the SMI, (c) a PPQ, and (d) an answer form. The SMI and PPQ were completed during the same testing period. The packet was administered to the subjects by one of the researchers.

One of the researchers visited each facility twice, on different days of the week and at different times of the day. Members were approached while attending the facility. One of the researchers provided an overview of the study and recording procedures to each potential subject. Those members who agreed to participate in the study were considered as subjects. The participants were given four weeks to return the questionnaire. There were no means to identify who may have completed a questionnaire; therefore, no follow-up was done.

Each subject was provided with an anonymous code. This code was placed on both the instruction page, which the subject took with him or her, and the answer sheet, which was returned to one of the researchers.

Monitoring Procedure

An attendance sheet was developed containing a matrix with the subject's code and date. It was left at the facility for tracking purposes. Bimonthly for the 12 weeks of the study, one of the researchers collected the attendance sheet and replaced it with a new one.

Attendance was calculated over a 3-month period. Subjects were instructed to record each time they came to the facility to exercise. The subjects were instructed to place an (X) in the matrix with their corresponding code and date if they exercised at the facility. The subjects were instructed to place an (O) in the matrix with their corresponding code and date if they exercised outside of the facility. If the subject exercised both at the facility and outside the facility on the same day, the instructions were to record an (X) and an (O) on that date. Instructions were written on the attendance sheet as a reminder for the subjects. The attendance sheet was located in a convenient location designated by the facility.

Data Analysis

An alpha value of .05 or less was required for statistical significance. Frequency distributions and contingency tables were generated to adequately describe the sample and its demographic and influences on exercise behavior. A principal components

analysis was performed on the 60 items on the PPQ defined earlier as being related to personal, environmental, and activity characteristics. Each subject's attendance was calculated and separated into Exercise at the Facility, Exercise Outside the Facility, and Total Exercise. Pearson correlations were computed to examine any relationship between selected personal, activity, and environmental factors and the three exercise variables.

A multiple regression was performed to examine whether any predictability of exercise adherence was observed from selected personal, activity, and environmental factors. In order to identify whether any common characteristics existed among individuals with low self-motivation and high exercise adherence, a one-way analysis of variance (ANOVA) and Scheffe Test were calculated.

Results

Self-report Questionnaire

The mean score for the Self-report Questionnaire was 153 with a standard deviation of 21.6 for the subjects who participated in this study. According to Dishman et al. (1980), the mean score for the SMI is 140 for college age subjects with a standard deviation of 20.

Exercise Adherence Data

Of the 203 subjects, 174 completed the tracking of their exercise at the facility and outside the facility. This was 85.7% of the original study participants. Not all of the subjects recorded exercise participation for the 12 weeks of this study. Exercise participation was calculated in 2-week intervals.

One hundred fifty subjects (86.2%) completed 10 to 12 weeks of the study. The remaining 24 subjects (13.8%) recorded their exercise participation for 8 weeks or less. All of the data gathered were incorporated into the findings regardless of the number of weeks the subjects participated. The actual adherence may be under reported because some subjects may have stopped recording their participation but continued to exercise.

Research Question 1

A principal components factor analysis using a varimax rotation was performed to determine the underlying dimensions for items on the PPQ. Variables loading at .30 or higher were used in naming the factors. The rotated factors explained 63.8% of the variance among the items. Even though 11 factors were identified, only 4 factors provided a significant relationship with exercise adherence: Perception of Health and Appearance, Climate, Facility Accessibility, and Fear of Health Problems.

Research Question 2

There was a modest relationship between selected personal, environmental, and activity characteristics and exercise adherence. A positive correlation existed between Exercise at the Facility and the following items: (a) Appearance ($r[174] = .16, p < .05$), (b) State of Health ($r[174] = .17, p < .05$), (c) Time to Exercise ($r[174] = .16, p < .05$), and (d) Perceived Motivation ($r[174] = .16, p < .05$). Members of this group expressed greater contentment with their physical appearance and current state of health as exercise adherence increased. Making time to exercise was a greater priority for those with higher exercise adherence and as perceived level of

motivation increased, likewise exercise compliance increased.

A negative correlation between Exercise at the Facility and Time of Year ($r[174] = -.21, p < .01$) was observed. The item was inserted to determine whether seasonal changes influenced exercise adherence. Seasonal changes have less influence as exercise adherence at a facility increases.

A negative correlation was observed between Exercise Outside the Facility and the following five environmental attributes: (a) Convenient Hours ($r[174] = -.23, p < .05$), (b) Equipment Availability ($r[174] = -.15, p < .05$), (c) Staff Supervision ($r[174] = -.17, p < .05$), (d) Travel Distance ($r[174] = -.21, p < .05$), and (e) Membership Cost ($r[174] = -.16, p < .05$). These five items were related to aspects associated with facility management or location. As exercise adherence increased, these elements became less of an influence on exercise patterns.

A negative correlation was reported for Travel Distance ($r[174] = -.22, p < .01$) and Convenient Hours ($r[174] = -.15, p < .05$) with regards to Total Exercise. For this group of subjects, attributes associated with the physical environment were not perceived as a significant barrier to exercise compliance. The concern regarding Future Health Problems ($r[174] = -.19, p < .05$) was inversely correlated with Total Exercise. As exercise adherence increased, the concern for Future Health Problems decreased. The attribute Happy with Appearance ($r[174] = .18, p < .05$) was positively correlated with the same exercise variable.

Pearson product-moment correlations were computed to examine whether any relationships existed between the three exercise variables and the 11 identified factors. Perception of Health and Appearance had a positive correlation with Exercise at the Facility ($r[174] = .16, p < .05$) and Total Exercise ($r[174] = .15, p < .05$). For this group of subjects, participation was higher for those who perceived health and appearance to have a stronger influence on exercise involvement.

A negative correlation was observed between Exercise at the Facility ($r[174] = -.16, p < .05$) and Climate. Concerns about weather-related factors decreased as exercise participation increased. Similarly, Facility Accessibility was inversely correlated with Exercise Outside the Facility ($r[174] = -.26, p < .01$) and Total Exercise ($r[174] = -.23, p < .01$). As Exercise Outside the Facility and Total Exercise increased, Facility Accessibility became less of an influence.

Fear of Health Problems (Factor X) was negatively correlated with Total Exercise ($r[174] = -.15, p < .05$). As Total Exercise increased, Fear of Health Problems became less of an influence for exercise adherence.

Stepwise Multiple Regression

To investigate further, correlates were determined of exercise adherence, for the three variables (a) Exercise at the Facility, (b) Exercise Outside of the Facility, and (c) Total Exercise. To do so, stepwise multiple regressions were performed.

With regards to Exercise at the Facility, Climate was the best predictor of exercise adherence. Level of Education was the next best predictor of exercise adherence. These were the only two predictors for Exercise at the Facility. Climate had a negative correlation with Exercise at the Facility, suggesting that subjects with higher exercise adherence were less affected by the weather

with regards to exercising at the facility.

There were no predictors for Exercise Outside the Facility. And, the only predictor for Total Exercise was Facility Accessibility.

Research Question 3

Four groups were defined using scores on the SMI and exercise adherence data: (a) Low Motivation/Low Adherence, (b) Low Motivation/High Adherence, (c) High Motivation/Low Adherence, and (d) High Motivation/High Adherence. The group in which this investigation was most interested was Low Motivation/High Adherence. The purpose was to examine whether there were any common characteristics among those individuals who continued to exercise but were not highly self-motivated. The results of the one-way ANOVA and Scheffe Test revealed that there were no common characteristics among this group that completely differentiated it from the others, regardless of the exercise variable.

Discussion

Prior research has found that those who believe exercise has little value for health, and that health outcomes are uncontrollable, were more likely to exercise less and drop out (Dishman et al., 1985). This study demonstrated higher exercise adherence at the facility among those subjects who expressed greater satisfaction with their appearance and state of health. The fear of future health problems decreased with the same subjects as total exercise increased. These findings supported those of other research that suggests that a belief in the value of exercise as it relates to health was a significant influence on exercise compliance.

Most people who enter into an exercise program share similar positive attitudes and beliefs about exercise, perception of ability, and health responsibility, but these do not predict adherence to the program. Health beliefs can influence the intention to be active, but intentions have failed to predict continued participation (Dishman et al., 1985). Wankel (1985) found that those with higher exercise compliance scored higher on the goals to develop recreational skills, reported a greater increase in positive reactions to the program, and reported a greater satisfaction with program activities. The subjects in this study scored above the established mean on the SMI and expressed enjoyment with activity.

Field and Steinhardt (1992) reported that individuals with a "self-control" orientation were more likely to exercise to improve physical appearance or performance. Their research indicated that individuals who reported exercising to improve appearance and/or physical performance had a higher dropout rate than those with higher self-esteem who exercised for pleasure and athletic reasons. The mean score for the SMI in this study was higher than the one determined by Dishman et al. (1980), which may indicate higher self-esteem among these subjects. As stated previously, enjoyment of exercise and activity was positively correlated with exercise adherence between various groups and exercise variables.

Significant individual attributes and those contained within the two factors, Intensity and Contentment and Perception of Health and Appearance, were similar to ones identified by Field and Steinhardt (1992) and Wankel (1985). These relationships identified personal attitudes about exercise that were related to an increase in exercise adherence. The subjects displayed greater enjoyment with exercise and activity and higher satisfaction with health

and appearance. Research has identified positive attitudes about activity and beliefs about exercise to have a significant influence on whether an individual persists with an exercise program (Field & Steinhardt, 1992; McAuley & Courneya, 1993; Ziff et al., 1995). The results of this study demonstrate the influence of both belief and enjoyment related to exercise adherence.

An initiative of this study was to identify common personal, environmental, and activity characteristics among low self-motivated individuals who continued to exercise. Previous research has identified common characteristics among people with low self-motivation who drop out of exercise programs and interventions that have supported short-term compliance. Based on a one-way ANOVA and Scheffe Test to determine differences between the Low Motivated/High Adherence group and the other three groups, there were no common personal, environmental, and/or activity characteristics that completely distinguished the Low Motivation/High Adherence group from the others regardless of the exercise variable.

Dishman et al. (1985) and Wankel (1985) identified the same five attributes (Convenient Hours, Equipment Availability, Staff Supervision, Travel Distance, and Membership Cost) as common complaints among those individuals with higher dropout rates from exercise programs. Items related to the facility had a negative correlation with exercise adherence for this sample; therefore, attributes related to the physical environment were not a deterrent to exercise. A positive correlation was computed between exercise compliance and the willingness to make time to exercise. These results were similar to those that found a higher dropout rate among those who perceived inconvenient time, lack of time, and program convenience as barriers to program adherence (Andrew et al., 1981; Dishman et al., 1985; Wankel, 1985). The higher mean score on the SMI may have contributed to these results.

Literature presented by Dishman et al. (1985) and Martin and Dubbert (1982) described attributes associated with the social environment as having a significant influence on exercise adherence. This analysis did not reveal the same findings; so, for this group of subjects, social support (spouse, family, and/or peers) was not a significant factor in exercise compliance. These results did not demonstrate the level of importance for the social environment as prior research (Dishman et al., 1985; Martin & Dubbert, 1982; Wallace et al. 1995; Wankel, 1984, 1985). Social support was not significantly related to exercise adherence for this population even though Peer Support, Family Support, and Staff Support were identified by the principal components analysis.

This study found that demographic attributes were not significantly correlated with exercise. Gale, Eckhoff, Mogel, and Rodnick (1984) identified 11 variables related to exercise adherence; these variables were demographic and performance related. Their research concluded that for healthy volunteers, participant characteristics were not good predictors of exercise compliance. Their results were consistent with this study.

Contributing to these results may be the fact that the cut-off for low self-motivated group was a score of 140 on the SMI, one standard deviation above the 120 recommended by Dishman et al. (1980). This score was adjusted because only 14 subjects scored below the recommended cut-off. The mean score on the SMI for this study was 153; Dishman's investigations have computed a

mean score of 140. These self-selected volunteers appeared to be more closely aligned with the High Motivated/High Adherence group. In addition, the mean adherence score for both Exercise at the Facility and Total Exercise fell within the guidelines for exercise participation. Therefore, the subjects in this study were already exercising at a prescribed range.

Conclusions

Based on the results of this study, individuals who exercise regularly derive pleasure from their activity, believe that exercise is beneficial, feel better about their appearance and state of health, and perceive fewer barriers to participation. The findings support the position of the Department of Health and Human Services (1996) that the influences on physical activity patterns among adults and young people include self-efficacy, enjoyment of physical activity, support from others, positive beliefs concerning the benefits of physical activity, and lack of perceived barriers to being physically active. These common characteristics lead to the conclusion that attitudes, beliefs, and self-motivation internally drive exercise compliance.

Implications and Recommendations

For the practitioner, this study reflects the importance of providing exercise alternatives clients enjoy. In addition, educational programs emphasizing the benefits of exercise should be offered in a variety of formats so that lifetime participation is encouraged. Facility managers should explore the possibility of providing some type of motivational testing to identify potential dropouts and implement appropriate interventions. For the researchers, this study demonstrates the need for accurate tracking of exercise participation utilizing electronic record keeping. The researchers need to be aware of the difficulty in identifying a substantial number of low self-motivated subjects who are physically active. Surveying the entire membership or doubling the sample size of the present study are suggested solutions to this problem.

Dr. Robert C. Schneider is an Associate Professor of Sport Management at the State University of New York at Brockport in Brockport, New York and Dr. Fred Aiken is an Assistant Principal at Burlington County Institute of Technology at the Medford Campus in Medford, New Jersey.

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Age Differences in Health-Related Physical Fitness among Primary School Boys in Okwuato, Aboh Mbaise of Imo State, Nigeria: Implications for Health and Physical Education in the UBE Program

by Dr. Ignatius O. Nwimo

Abstract

Health-related physical fitness of 64 10-year and 64 11-year old randomly selected primary school boys in Okwuato, Aboh Mbaise of Imo State, Nigeria was assessed using the modified Army Physical Fitness Test and the Eurofit Battery of Fitness Test. Five test items of pull-ups, push-ups, sit-ups, sit-and-reach and 1.6km run-walk were used to determine the health-related physical fitness of the boys. Means, standard deviations and t-test statistics were used in the data analysis. Results showed muscular strength, muscular endurance and flexibility of the 11-year old boys differed from those of the 10-year old boys and the differences were significant ($p < .05$), except for push-ups and sit-ups. The 10-year old boys had a better cardiorespiratory endurance index (10-year old, $M = 7.98$; 11-year old, $M = 6.75$) as measured from the 1.6km run-walk than the 11-year olds, but the difference was not significant. However, the health-related physical fitness scores of the pupils fell short of existing health-related physical fitness scores of their contemporaries in both developed and developing countries. Since health-related fitness scores of the boys are lower than those of their contemporaries elsewhere, primary school Physical and Health Education (PHE) curriculum planners are challenged to re-examine the PHE curriculum so as to include activities that might aid primary school pupils improve on their strength and endurance, among others, in the UBE program. It is suggested that high fitness levels should be the goal of every primary school in the UBE program.

Age Differences in Health-Related Physical Fitness among Primary School Boys in Okwuato, Aboh Mbaise of Imo State, Nigeria: Implications for Health and Physical Education in the UBE Program

The benefits of having an appreciable level of fitness are obviously numerous. High risks of cardiovascular disease (CVD) and obesity levels have been documented for individuals who do not possess an appreciable level of fitness (Hansen, Hasselstrom, Gronfeldt, Froberg, & Anderson, 2005; Ozer, 2005). Poor physical fitness profiles of adults (Pitetti & Yarmer, 2001) has been attributed to factors such as physical inactivity, chronotropic insufficiency, poor motivation, less access to physical activities facilities and difficulties in accurate fitness assessment of the population (Fernhall, 1993; Kavale & Forness, 2000).

Physical fitness testing is a highly visible and important part of physical fitness programs. School and other concerned organizations

must adopt a logical, consistent, and scientifically sound approach to physical fitness. The focus of physical fitness testing should be health-related rather than athletic-related (American College of Sports Medicine, 1988).

Health-related fitness focuses on optimum health and prevents the onset of diseases and problems associated with inactivity. Maintaining an appropriate level of health-related fitness allows a person to meet emergencies, reduce the risk of disease and injury, work efficiently, participate and enjoy physical activity (sports, recreation, leisure), and look one's physical best (Huang & Malina, 2002). Sharkey (1997) noted that fitness, in whatever form, is more than increased performance or improved safety. The active life and fitness lead to better physical and psychological health, lower risk of degenerative disease, enhanced vitality and longevity, and an improved quality of life. The benefits of fitness extend well beyond those related to one's job. Activities that lead to improved fitness are associated with reduced risk of heart diseases; hypertension and stroke; reduced incidence and severity of diabetes; reduced risk of certain cancers; reduced incidence of over weight and obesity; strengthened bones, ligaments, tendons and muscles; reduced risk of osteoporosis; reduced risk of injury and illness, and increased energy mobility and even longevity (Beets & Pitetti, 2005; McArdle, Katch, & Katch, 2001).

Data from studies (Chen, Lin, Peng, Li, Wu, Chiang, Wu, & Huang, 2002; Monyeki, Koppes, Kemper, Monyeki, Toriola, Pienaar, & Twisk, 2005; Pena Reyes, Tan, & Malina, 2003) indicated need for physical activities to develop health-related physical fitness of primary school children. According to Pate (1982), the American Alliance for Health, Physical Education, Recreation and Dance in 1980 introduced and designed the health-related physical fitness test to evaluate physical fitness components associated with preventing diseases and promoting physical health. Several studies (Bagnet, Twisk, Kemper, Van Praagh, & Berthoin, 2006; Finkenberg & Dinucci, 1995; Rowland, Kline, Goff, Martel, & Ferrone, 1999) evaluated health-related physical fitness profiles of children in the United States and European countries. Regrettably, little information is available about health-related physical fitness profiles of Nigerian children (Toriola, Ajisafe, Ogunjimi, & Musa, 1992). The little available information on health-related physical fitness of Nigerian children documented those outside Okwuato, Aboh Mbaise of Imo State; and did not consider age as a variable of importance in tracking health-related fitness in youth age 9 to 12 (Marshall, Sarkin, Sallis, & McKenzie, 1998). This situation prompted the present study to assess health-related physical fitness of primary school pupils (ages 10 & 11) in Okwuato, Aboh

Mbaise of Imo State, Nigeria. One hypothesis, which states that there is no significant difference between the mean health-related physical fitness scores of 10 and 11 year old boys was postulated for verification at $p < .05$.

The Universal Basic Education (UBE) program in Nigeria is a federal government effort to provide basic education that should be universally free and compulsory to every Nigerian child of school-going age having formal and non-formal components. The formal component of UBE, which concerns the subjects of the present study, starts from primary one to third year of Junior Secondary School for the children (Aguokogbuo, 2004). Age 10 and 11 are border ages separating end of primary school and beginning of secondary school. Therefore, determining the health-related physical fitness of the boys at this border could serve as a guide for planning Physical and Health Education (PHE) program in the primary school.

Data generated in this study will likely be useful to primary school PHE curriculum planners in the UBE program to re-examine what constitutes PHE curriculum so as to include activities that might aid primary school pupils improve on their muscular strength and endurance, if considered low. It is worth noting that muscular strength helps the body be in proper shape and delays early atrophy. Muscles that are strong could withstand certain levels of strain and stress and do not get fatigued easily. Data emanating from the study could also serve as baseline information on health-related physical fitness of primary school pupils in the area under study; and could be of help to PHE teachers to identify activities to include in school physical and health fitness program in the UBE program.

Methods

Participants and Setting

One hundred and twenty eight randomly selected 10-year ($n = 64$) and 11-year ($n = 64$) old boys from eight primary schools in Okwuato, Aboh Mbaise, Imo State of Nigeria served as participants. Okwuato, Aboh Mbaise is a rural community in Imo State of Nigeria. It is considered a rural community in the sense that it has no government sponsored or provided social amenities such as a central water supply system and electricity. Furthermore, none of the roads leading to Okwuato, Aboh Mbaise from the nearest major (Owerri-Umuahia) road are tarred. Presently, the fastest, but costly, means of transportation in this community is the motorcycle, popularly called 'Okada' in Nigeria. Because of the poor nature of the community members, the most available and affordable means of transportation for most people is the bicycle. Children, especially boys, learn to ride on the bicycle as early as when they are 6 years old. Most children trek and some ride on their bicycle, to school. The children might also get involved in after-school activities involving long distance trekking and bicycle riding. Experience shows long distance trekking and riding on bicycles could confer some level of fitness on children and even adults.

Sources of Test Items

The test items used in the study were all obtained from two sources, namely: the modified Army Physical Fitness Test (Nwegbu, 1988), and the Eurofit Battery of Fitness Test, which was

initially used to test the health-related physical fitness of primary school children in Australia and New Zealand (Eurofit, 1988). The selection of these fitness test items was based on the premise that all the test items could cater for subjects of all ages. Dike, Alor, Nwimo, and Nji (2004) had successfully used these test items in testing health-related physical fitness of primary school pupils. These test items had been found to be appropriate to determine health-related physical of children (Ajiduah & Okuribudo, 1990); and objective, valid, reliable and standardized. Reliabilities of the test items namely: pull-ups $r = .78$; push-ups $r = .96$; sit-ups $r = .94$; sit-and-reach $r = .86$ and 1.6 run-walk $r = .67$ have been found (Johnson & Nelson, 1982; Rikli, Petray, & Baumgartner, 1992).

Collection of Data

The test batteries consisted of pull-ups; push-ups for one minute; one minute flexed knee sit-ups; sit and reach, and 1.6km run-walk tests. Pull-ups test measured the strength of muscles of arm and shoulder girdle; push-ups test measured muscular endurance of the arms and shoulder girdle; sit-ups test measured abdominal muscle strength and endurance; sit and reach test measured flexibility of the lower back, and 1.6 run-walk measured maximal functional capacity and endurance of the cardiorespiratory system. After permission was sought from head teachers of the primary schools and informed consent was obtained from the subjects, purpose and procedures of the test were explained to the subjects before commencement of the tests. Tests were carried out between 8:30 and 11:30 a.m. each day for 10 school days. Tests were usually preceded by ten-minute warm-up exercises involving simple activities involving pushing pulling, bending, brisk walk and running on the spot. One test was completed before another test was introduced. The best trial out of three was recorded for each participant in any given test.

Data Analysis

Descriptive and inferential statistics were adopted to analyze the data, using Statistical Package for Social Sciences (SPSS), version 14.0 for Windows (SPSS, Inc., 2005). Means and standard deviations were used to describe health-related physical fitness of 10-year and 11-year old pupils. Student t-tests ($p < .05$) were employed to determine whether statistically significant differences existed between means of the two groups of pupils in each of the fitness tests. Participants' health-related physical fitness scores were compared to established fitness norms in both developed (Ludlowe, 2004) and developing countries (Musa, 1998).

Results

Results of the study are shown in Table 1. It can be observed that both the 10 and 11-year old boys have mean scores which are far below the health-related fitness norms established for their contemporaries in other parts of the world. Specifically, it can be seen that 10-year old boys have a lower mean score in pull-ups than the 11-year old boys. The same trend is observed in push-ups, sit-ups and sit-and-reach. However, a reverse trend is observed in 1.6 km run-walk, where the 10-year old boys have a higher mean score than the 11-year olds. T-tests indicate that difference in means of these 10 and 11-year old boys in pull-ups and sit-and-reach are significant in favor of the 11-year olds.

Table 1. Means and Standard Deviations of Health-Related Physical Fitness of 10 and 11- year Old Boys (N = 64 each)

Variables	10 Year Olds			11 Year Olds			<i>T Value</i>		
	M	(SD)	Norm	M	(SD)	Norm			
Pull-ups (in one min)	6.53	0.78	NA ^a	12 ^b	10.98	1.18	NA ^a	12 ^b	-24.9*
Push-ups (in one min)	9.94	2.18	10	12	10.63	1.99	11	12	-1.8
Sit-ups (in one min)	8.40	2.74	22	28	8.58	4.14	25	28	-0.2
Sit-and-reach (cm)	16.25	2.57	25	26	20.47	2.16	25	26	-9.9*
1.6 km run-walk (min)	7.98	3.65	9.30	11.0	6.75	5.12	9.15	11.0	1.5
NA = not available									
^a norm for developed countries									
^b norm for developing countries									
* <i>p</i> < .05									

Discussion

The discussion is presented in terms of two components of health-related physical fitness namely: muscular fitness and cardiorespiratory fitness.

Muscular Fitness

In order to assess strength and endurance of muscles of the arms, shoulder girdle and upper back, pull-ups and push-ups were used (Table 1). The table showed that the 11-year old boys obtained higher scores than the 10-year old boys in all muscular strength, endurance and flexibility measures. The difference in the scores obtained by 10-year olds and 11-year olds in pull-ups was statistically significant. However, the differences in the scores obtained by the two groups in push-ups and sit-ups were not statistically significant. It is pertinent to note that the health-related physical fitness scores of both groups of boys were below the norms for boys of same age group indicated earlier.

The superiority of the 11-year old boys over the 10-year olds in pull-ups was not surprising. This is because, muscular strength tend to increase with age (Fortier, Katzmarzyk, Malina, & Bouchard, 2001). The above observation implicated the fact that muscular strength index of 11-year olds could differ from the 10-year olds. Experience shows that in Igbo traditional society, the older a child is, the more out-of-school activities he is likely to engage in, as routine domestic chores. Such activities might include fetching firewood and water, among others, which could confer in the older child more strength than the younger child.

However, the proportion (> 60% in each case) of the boys who scored above the mean could be an indication that the 10-year olds were more consistent in their performance than the 11-year olds. Nevertheless, the superiority in muscular strength of the 11-year olds over the 10-year olds is consistent with the findings of Bagnet, et al. (2006) that their older subjects showed a superior muscular strength over their younger subjects.

The fact that there were no significant differences revealed between the 10-year olds' and 11-year olds' scores in sit-ups was not a welcome revelation. The implication is that the younger boys could develop strong abdominal muscles, as do the older

boys. The findings are not consistent with those of Rowland, Kline, Goff, Martel, and Ferrone (1999) who reported there was a significant difference between scores obtained by their older subjects and those obtained by their younger subjects. However, the inclination of the difference or superiority identified by the previous study was not shown. This makes it imperatively difficult to proffer further argument regarding the variation in the findings of the previous study from the present one.

Furthermore, the results in showed that 10-year old boys scored lower in sit-and-reach than the 11-year olds. The comparison showed that the difference was statistically significant. The difference found in sit-and-reach was not surprising. However, the scores made by the pupils in sit-and-reach are below the norms established for their contemporaries in other parts of the world. All things being equal, the 11-year olds are expected to possess longer arms and longer legs, which wouldn't help with sit-and-reach. The implication of the above finding for the present study is that the 10-year old pupils be exposed to physical exercises, which might help them develop ample strength, endurance and flexibility even before they are 11 years old.

Cardiorespiratory Fitness

The results of 1.6 km run-walk for the two groups showed that 10-year old boys scored higher than the 11-year old boys. The comparison showed that the difference in the scores obtained by the 10-year olds and 11-year olds was not statistically significant. It was plausible to note that more than 80% each of the groups of boys scored above their respective mean. This trend shows some level of consistency in both groups of boys at the rate they develop cardiorespiratory endurance. However, the scores both groups of boys obtained in 1.6km run-walk are below the established health-related fitness norms in both developed and developing countries.

Cardiorespiratory fitness had been recognized as the single most important component of health-related fitness (Otinwa, 2005; Hong, Chang, & Li, 1998). It has positive effects on cardiorespiratory health (Leon, 1991) and on the prevention of hypertension, non-insulin dependent diabetes and obesity (Bouchard & Shephard, 1993; Carrel, Clark, Petterson, Nemeth, Sullivan, & Allen, 2005;

Vouri, 1991). Therefore, the low fitness observed in the boys was not a pleasing.

The findings are not consistent with previous studies (Carrel, et al., 2005; Rowland, et al., 1999) that found there were higher levels of cardiorespiratory endurance in active children than in inactive ones. Other findings of studies (Musa, 1998; Sharkey, 1997) that are not consistent with those of the present study, show that endurance training and regular physical exercises can improve working capacity of cardiovascular and respiratory systems and there is observable improvement on the variables related to cardiorespiratory endurance on previously inactive persons after receiving training. This evidence indicates that physical activity is one of the most important factors, which could influence cardiorespiratory fitness. These evidences have implications for the present study, which could suggest regular physical exercises for children in primary schools in Okwuato, Aboh Mbaise of Imo State and elsewhere.

Conclusion

The findings of the study showed that the health-related fitness scores the boys obtained were below established norms in both developed and developing countries. However, the 11-year old boys obtained significantly higher scores than the 10-year olds in pull-ups and sit-and-reach. On the other hand, in 1.6 km run-walk, the 10-year old boys scored higher than the 11-year olds, but the difference was not significant. Since physical inactivity does not bestow in individuals the fitness level to enjoy vigorous lifetime activities, it is recommended that high fitness levels should be the goal of every primary school in the UBE program, since there is a significant relationship between activity and health-related fitness (Katzmarzyk, Malina, Song, & Bouchard, 1998).

The high fitness goal could be achieved through a well-developed physical and health education program of activities. In addition to being physically active, children need to learn fundamental motor skills to aid the development of health-related physical fitness. Physical education provided at school is an ideal way to encourage activity and develop fitness among children and, for many children, will be their only preparation for an active lifestyle (Summerfield, 1998).

Implications for Health and Physical Education in the UBE Program

The findings of the study present, among others, the following challenges for PHE in the UBE program:

1. Since health-related fitness scores of the boys are lower than those of their contemporaries elsewhere, primary school PHE curriculum planners are challenged to re-examine the PHE curriculum so as to include activities that might aid pupils improve on their strength and endurance, among others, in the UBE program;
2. Primary school teachers are challenged to identify and include in the primary physical and fitness program, activities that might help pupils develop an appreciable level of health-related fitness in the UBE program;
3. Since a pattern of inactivity (U.S. Department of Health and Human Services, 1996), begins early in life promotion of physical activity for development of health-related fitness among

primary school pupils in UBE program becomes a necessary challenge for the program planners;

4. Among children and adolescents, physical activity can prevent or delay the development of hypertension and can reduce blood pressure in those young people who already have hypertension (U.S. Department of Health and Human Services, 1996). Therefore, the provision of a well-developed activity program, which could help primary school pupils develop health-related fitness in the primary school UBE program, becomes a necessary challenge, and

5. Physical and health education, provided at school, is an ideal way to encourage activity and development of health-related fitness among children and, for many children, will be their preparation for an active lifestyle. For this reason, the Centers for Disease Control and Prevention (CDC), the National Association for Sport and Physical Education (NASPE), and the American Heart Association (AHA) all recommend comprehensive daily physical education for children in order to develop encouraging levels of health-related fitness (Summerfield, 1998). This recommendation also affects in-school primary children in Nigeria in the UBE program.

Dr. Ignatius O. Nwimo is on the faculty at the University of Nigeria, Nsukka.

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Effect of an Ecological-Based Program on Teaching Specific Volleyball Skills to Young Adults with Mild Cognitive Impairments

by Jiabei Zhang and Jinjin Yang

Abstract

The purpose of this study was to examine the effect of an ecological program on teaching young adults with mild cognitive impairments specific volleyball skills. A two-group pretest-posttest experimental design was used. Nine participants in the experimental group were taught volleyball skills in two 60-min teaching sessions per week for a total of 10 weeks, while 11 participants in the control group still participated in general classes. A 2 (group) x 2 (test) analysis of repeated measures on the overall test and its follow-up tests were used to analyze data. Results revealed differences not only on the overall test but also on all follow-up tests at a significant level of .01. The ecological program used in this study was therefore effective in teaching young adults with mild cognitive impairments specific volleyball skills.

Key words: ecological program, sport skill training, individuals with cognitive impairments, and volleyball.

With the enactment of the Education for All Handicapped Act (now the Individuals with Disabilities Education Act) in 1975 in the United States of America, physical education services, specially designed if necessary, must be made available to every student with disability receiving a free and appropriate public education (*Federal Register*, August 23, 1977). The specially designed physical education services are required to develop individually for meeting the unique needs of a student with disability. These needs can be determined through the use of appropriate assessments (Ulrich, 1985).

Traditionally, the assessments used to determine the individual needs for developing a program have been norm-referenced standardized assessments in which an individual's scores were compared to the scores of others on the same assessments (Safrit, 1990). Based on the results of these standardized tests, an eligible individual's program could be developed and implemented (Block, 2007). That is, the focus of this program was the poor areas or skills identified through the evaluation such as an individual's balance score being below the 30th percentile, which were taught or trained in the implementation of this program. This is named as the traditional approach in the majority of literature for placement and programming (Auxter, Pyfer, & Huettig, 2005; Block, 2007).

However, this approach has been criticized in teaching skills for the facilitation of including individuals with disabilities in general environments (Block, 2007). This is because the result of standardized assessments used in this traditional approach may not provide the useful information directly regarding critical skills required in general environments. In the traditional approach, the use of standardized assessments makes some practitioners to follow the developmental continuum. With this continuum, deficiencies at the lower level of a developmental continuum become the focus of

a program without regard to how these skills affect the acquisition of important skills required in general environments (Block, 2007).

For example, a middle school student who does poorly on the *Bruininks-Oseresky Test of Motor Proficiency*, a standardized test used by physical educators (Ulrich, 1985), may be locked at the lower level of developmental continuum. If the student does poorly on test items in the sub-test area of balance (e.g., standing on preferred leg on balance beam), then this student would focus on improving his or her vestibular function (i.e., the lower levels of developmental continuum). The focus on the improvement of vestibular function would then result in that the teaching of specific sport skills (i.e., the top level of developmental continuum) were ignored in general middle school settings.

An alternative to the traditional approach in terms of teaching skills for the facilitation of including individuals with disabilities in general environments is the ecological approach (Block, 2007; Sherrill, 2004). The major feature of this ecological approach is that the selection of critical skills based on the interaction between individuals and environments as the target skills of a program. That is, the skills preferred by peers, parents, communities, and institutions are selected as target skills in a program (Voeltz, Wuerch, & Bockhaut, 1982). The use of this ecological approach is believed to be a better approach for teaching critical skills for the facilitation of including individuals with disabilities in general environments (Block, 2007).

Unfortunately, the review of literature revealed that a few of experimental studies have been conducted to examine the effect of ecological approach. Sufficient experimental data could not be located to support that the ecological approach is effective in teaching individuals with disabilities important skills for the facilitation of including persons with disabilities in general physical education. Only was a study located that examined the effect of ecological program in adapted physical education.

Specifically, Zhang and Berkey (2002) examined the effect of an ecological program on teaching the age-appropriate motor skills to individuals with mild cognitive impairments. The program was developed based on an ecological survey (i.e., determine the age-appropriate motor skills based on interaction between individuals and environments). A group of 22 individuals with mild cognitive impairments received two 60-min teaching session(s) per week for 10 weeks. The magnitude of increase of the number of task-analyzed steps between the first session and the last session by the participants was significant after training, indicating that this ecological program manipulated in this study was effective in teaching those important motor skills determined based on the ecological survey.

The effect of the ecological program confirmed in Zhang and Berkey's research (2002), however, is questionable because of its poor research design. The research design used in this study was the one-group pretest-posttest design. Although one can use this

design to determine the improvement between before and after ecological teaching, this design cannot allow the researcher to explain why this improvement occurs (Thomas & Nelson, 2005). Since there was no control group used by Zhang and Berkey (2002), the significant improvement demonstrated by one group of the participants might have resulted from some historical events that occurred over the time when the study was conducted, rather than from the manipulation of an ecological-based program.

The improvement demonstrated by the participants in Zhang and Berkey's study (2002), for example, might be resulted from those similar motor programs conducted in the community of these participants. This indicates that a significant need exists to examine the effect of ecological program further with an appropriate research design in which a control group is included. Therefore, the purpose of this study was to examine the effect of an ecological program on teaching young adults with mild cognitive impairments volleyball skills. Specifically, the ecological program used in this study was similar to the one conducted in Zhang and Berkey's study (2002), but the research design included both an experimental group and a control group.

Method

Experimental Design

A two-group pretest-posttest experimental design (Thomas & Nelson, 2005) was used. The two groups were an experimental group and a control group. Participants in the experimental group received volleyball skill training in an ecological program for 10 weeks with two 60-min training sessions per week. In contrast, participants in the control group received physical education classes based on original schedules without volleyball activities over the period during this investigation. Each participant in both groups was administered the pretest and the posttest. The pretest was administered at the first session, while the posttest was administered at the last session.

The purpose of using this design was to control those threats such as history of events to the internal validity of the ecological program used in this study, rather than to compare the effect of ecological program to the effect of traditional approach. Since all the participants had exposed to similar distributed events (e.g., community activities) over the period during this investigation, the increase of skill performance by the participants in the experimental group would result from the manipulation of the ecological program, rather than from the occurrence of other events (e.g., school classes) if the skill performance by the participants in the control group had no changes at the end of this investigation.

Participants

Participants recruited in this study were 20 young adults with cognitive impairments, 11 females and 9 males, ages from 17 to 26 years old (M age = 21.07). They were sampled from the young adult program in a special post-secondary school conveniently. The staff from this school identified these individuals categorized with mild cognitive impairments. However, specific assessments administered to determine the level of cognitive impairments were not reported by the staff from this school. In the experimental group there were 9 participants, 5 females and 4 males, ages from 19 to 26 years old (M age = 20.78), while in the control group there

were 6 females and 5 males, ages from 17 to 25 years old (M age = 21.36).

Participants from four similar classes were conveniently assigned into two groups. Those participants with physical education classes on Monday and Wednesday in their school were assigned into the experimental group; while the participants having physical education classes on Tuesday and Thursday scheduled in their school were assigned into the control group. It should be noted, at the beginning of this investigation, that a total of 23 participants were recruited from this school, including 11 participants in the experimental group and 12 participants in the control group. However, a total of 3 participants were excluded due to their sickness and relocation over the period of this study. This includes 2 dropouts in the experimental group and 1 dropout in the control group.

Ecological Program

Participants in the experimental group were taught in a specific ecological-based program. This program included five programming components used in Zhang and Berkey's (2002) investigation. The five components were (a) the selection of three basic skills from a type of sport for the participants using an ecological survey, (b) the task-analyses of each basic sport skill into meaningful steps employed for the criteria of assessments, (c) the development of the individualized plan for each of the participants based on the result of pretest, (d) the development and implementation of 20 activity plans based on their individualized plans, and (e) the writing of a outcome report based on the result of posttest. Each one of these components is described below.

The target sport for the participants was determined using an ecological approach (Block, 2007). In this approach, a survey was first conducted to determine a type of sport based on the following variables: personal interests, family preferences, popular sports used in communities, sports expected by the school, and age-appropriate sports. The specific sport favored by the largest number of these variables was then selected as the target sport of this ecological-based training program for these participants. The results of this survey revealed that volleyball was ranked as the top one among all the sports listed. Therefore, volleyball was selected as the target sport for the participants in this investigation.

Next all recruited participants' performance was observed on each of the basic volleyball skills. It was determined that none of these participants in either experimental group or control group could independently correctly perform any one of the basic volleyball skills. Three specific volleyball skills were then selected, including (a) serve, (b) pass, and (c) set, as the target skills in this investigation. Those participants in the experimental group were taught to perform the three specific volleyball skills correctly, while those participants in the control group were involved in the pretest and posttest on these skills only in this study.

Each of the three target volleyball skills was task-analyzed into numerous steps based on their natural movement sequence. At the same time, we also considered the self-application and functional ability of participants in task-analyzing these skills. The self-application addressed a participant's self-initiation of a skill; a participant who picks up related materials to perform a target skill would be the first step of a task analysis (Nietupski, Hamre-

Nietupski, & Ayres, 1984). The functional ability addressed the simplification of related step responses based on a participant's functional level (Snell, 1987). We then defined the task-analyzed step responses and used these steps as criteria for evaluating a participant's performance on a target skill. An example of a task-analysis is presented in Table 1.

Table 1. Serve a Volleyball over the Net: An Example of Task Analyses of Three Volleyball Skills based on Self-Application by Participants, the Natural Sequence of Skills, and the Functional Ability of Participants

Steps	Definitions
1	Find and pick a volleyball up from the bag or on the floor in the volleyball court
2	Walk or run to stand behind the serving line specified on the volleyball court
3	Stand in a ready position with bending knees slightly and eyes on the partner
4	Hold the ball in two hands with placing the hitting hand on the top of this ball
5	Step toward the volleyball net in the balanced foot opposite to the hitting arm
6	Bring the hitting arm backward while keeping the ball on the non-hitting hand
7	Swing the hitting arm forward while dropping the ball in the non-hitting hand
8	Hit the ball toward the targeted partner with a fist made with the hitting hand
9	Follow-through toward the partner by stepping the non-balanced foot forward

During the first session, a participant in the experimental group was tested to determine how many steps of a task-analyzed volleyball skill this participant could complete correctly. The result of this pretest was used to develop an individualized plan for this participant. The plan included 5 components (a) personal information, (b) task analyses of target volleyball skill, (c) testing procedure using task-analyzed steps as criteria, (d) the present level of performance, and (e) the long-term goals and short-term objectives. The individualized plan then served as the basis for developing activity plans for the corresponding instructional sessions.

Each activity plan developed for a corresponding teaching session was required to focus on unlearned steps (i.e., task-analyzed steps on which a participant could not perform correctly). The unlearned steps were taught using several activities but each activity had a short duration (e.g. 3 to 5 min). The use of multiple activities for teaching the unlearned steps with the short duration of each activity was based on the fact that all the participants recruited in this study had a short attention span because of their disability of cognitive impairments. In addition, we also worked on the associated underlining problems that might negatively influence the performance of a targeted volleyball skill.

During the last session (Session 20), each participant was tested again to determine how many steps of a task-analyzed target volleyball skill he or she could complete correctly. An outcome

report form for a participant was required to be completed by the instructor. The report included scores at both the pretest and the posttest to examine the magnitude of increase between the first session and the last session during the period of 10 weeks with two 60-min sessions each week. The magnitude of increase would show how much progress a participant had made during the period of conducting this investigation.

Student-instructors

A participant in the experimental group was taught by a student-instructor who enrolled in an introductory to adapted physical education course in a one-on-one format. All instructors taught their participants based on a formatted laboratory manual, in which the methods how to develop and conduct the pretest, the individualized plan, the activity plans, the posttest, and the report are presented.

Data Analyses

Since the participants were conveniently sampled and assigned into the experimental group and the control group, three statistical analyses were used to justify the appropriateness of using these two groups in this study. Independent *t* test was performed to analyze the difference of ages between the experimental group and the control group. A one-way multivariate analysis of variance design on three dependent variables (serve, pass, and set) was used to analyze the difference of pretest scores between the male participants and female participants. Another one-way multivariate analysis of variance design on three dependent variables was used to determine if there was a difference in the pretest scores between the experimental group and the control group.

Both pretest and posttest data collected on performing each of the three target volleyball skills by each participant in both the experimental group and the control groups were analyzed in a 2 (group) x 2 (test) analysis of repeated measures on multiple dependent variables (serve, pass, and set) for the overall difference between two groups (experimental and control) over two tests (pretest and posttest). After a significant difference was determined on the overall test, the follow-up univariate tests, 2 (group) x 2 (test) analyses of repeated measures on only a single dependent variable, were computed. The procedures provided by Schutz and Gessaroli (1987) and Morgan and Griego (1998) were followed to conduct and interpret our data analyses using SPSS software (SPSS Inc., 2004).

Results

The independent *t* test on the difference of ages between the experimental group and the control group was not significant, $t(18) = 0.46, p = .65$. The one-way multivariate analysis of variance on the difference of pretest on three dependent variables between the male participants and the female participants collapsed across the experimental and groups was not significant as well, $F(3,16) = 0.21, p = .89$. Further, the one-way multivariate analysis of variance on the difference of pretest scores on all the dependent variables between the experimental group and the control group was also not significant, $F(3, 16) = 0.11, p = .95$. These results revealed that the groups used in this study were appropriate.

Based on the overall test of a 2 (group) x 2 (test) analysis of

repeated measures involving three dependent variables (serve, pass, and set), there was a significant difference between two groups (experimental and control) over two tests (pretest and posttest) on the three dependent variables, $LRATIO(3, 16) = 25.28, p = .00, \text{Eta}^2 = .83$. Based on this finding, both the experimental group and the control group differed in their performance between the pretest and the posttest on at least one of three dependent variables (i.e., three specific volleyball skills).

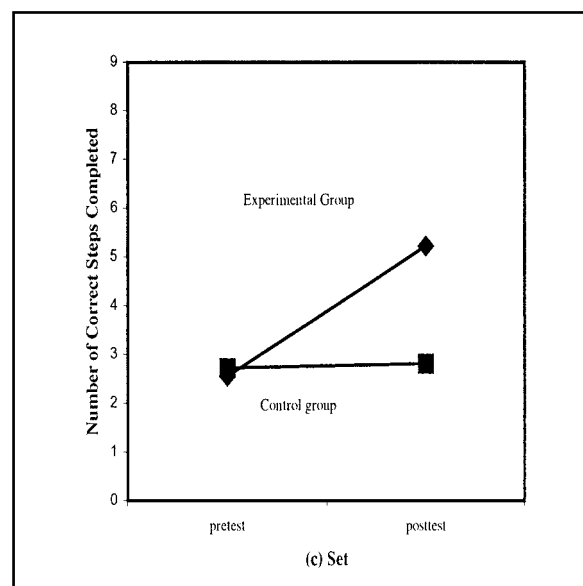
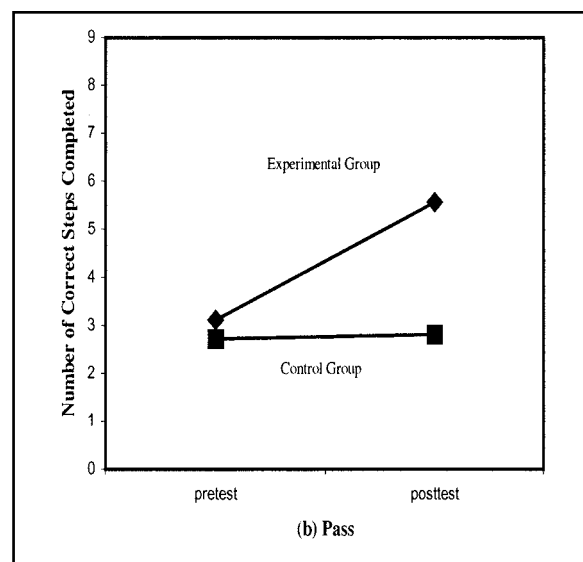
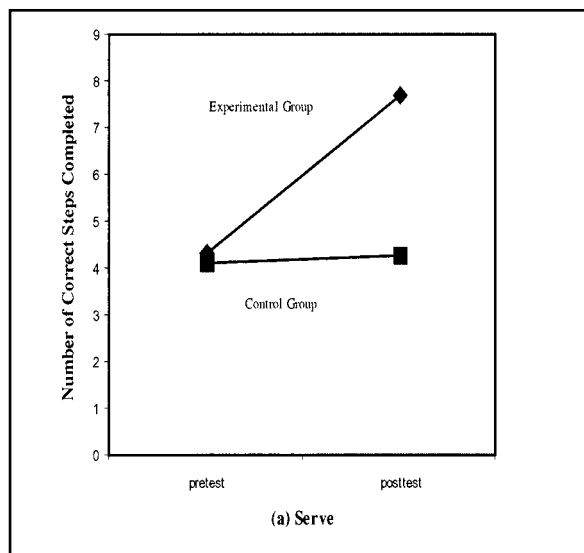
The follow-up univariate tests, using $2(\text{group}) \times 2(\text{test})$ analyses of repeated measures between the two types of groups over the two types of tests on each dependent variable, also demonstrated significant differences. The follow-up tests demonstrated a significant difference on the serve, $F(1, 18) = 32.02, p = .00, \text{Eta}^2 = .64$, the pass $F(1, 18) = 13.29, p = .00, \text{Eta}^2 = .43$, and the set, $F(1, 18) = 39.65, p = .00, \text{Eta}^2 = .69$. These indicated that the experimental group increased the performance significantly based on the difference between the pretest and posttest scores on each dependent variable, but the control group had no statistically significant changes.

Discussion

Based on the results obtained in this investigation, the improvement of participants in the experimental group on performing three volleyball skills was resulted from the manipulation of independent variable only. There was no significant difference on the external variables of age, genders, and pretest scores on dependent measures between the experimental group and the control group before the ecological program was initiated. After the ecological program instruction, however, the experimental group only significantly increased their performance (note in Figure 1). Therefore, the ecological program was effective in teaching young adults with mild cognitive impairments three volleyball skills.

Since the ecological program used in this investigation confounded multiple variables, as presented in the method section, the effect of this ecological program would result from all of

Figure 1 - A Graphic Representation of Mean Scores on the Volleyball Serve, Pass, and Set Skills by the Experimental Group and the Control Group between Pretest and Posttest



the programming variables, including the conduction of ecological survey, the task analyses of targeted skills, the measurement of targeted skills, the development of individualized physical education plans, and the development and implementation of teaching activities. The conduction of ecological survey, however, would be a major component to the effect of ecological program because the result from conducting the ecological survey ensured that the target skills selected were critical skills for including persons with disabilities in general physical education classes (Zhang & Berkey, 2002).

Volleyball selected based on the ecological survey is a very popular sport across all the schools and colleges in the state where our participants lived. The participants' schools, teachers, communities, peers, and parents, including the participants, most likely love to play and/or watch volleyball because this sport would be helpful for them to have social interactions with other individuals. Each year, volleyball practices, games, and camps are periodically and continually conducted at high school and college levels in this state, resulting in that most individuals who live in

this state believe the volleyball is an ecologically valid activity because the ability to perform this activity well would enable individuals to function better in the ecosystem (Overton, 2003; Sax & Thoma, 2002). All the volleyball skills taught in this study are thus ecologically valid for the participants.

It should be indicated that based on the model of motor development, specific sport skills for the participants in this study were directly selected from the top level of motor developmental model even though the participants might show problems at lower levels of motor developmental model. Almost all participants employed in this study had some associated problems at the lower levels of motor functions based on our observations. Someone had vestibular dysfunctions, while others showed perceptual-motor problems or poor physical fitness. These problems would have been targeted for the participants if a developmental approach were used (Block, 2007) because three levels of motor functions are developed in a sequence from the neurological function (e.g., vestibular function), to general abilities (e.g., balance), and to specific skills (e.g., a sport skill).

The participants of this study, however, were young adults with an averaged age of 21 years old and they demonstrated slower learning rate because of the specific type of disability. The instructional physical activities selected for these participants based on solving their problems at low levels of motor functions would make them to participant into activities being not age-appropriate. For example, a participant (i.e., a young adult) with vestibular problem at the bottom level of neurological function would be taught using multiple vestibular exercises such as walking on a beam and rolling and standing with a leg for a period of time. These exercises, however, are clearly inappropriate for young adults based on the age.

This study thus selected specific volleyball skills directly from the top level of motor function as the targeted skills for young adults based on the ecological survey. All the physical activities used during teaching in this study were developed and conducted to help all the participants learn three volleyball skills based on the task analyzed steps. It should be noted, however, that physical activities might be also used to help a participant to solve the problems at the low levels of motor functions if the problems were associated with the volleyball skills. For example, forearm image exercises were used for helping a participant to know how to use his or her forearms to pass a ball correctly.

The above discussion reveals that the programming variable of ecological survey played a major role to ensure the target skills trained in this program being ecologically valid. Learning how to perform these targeted skills correctly by participants, however, were also associated with other programming variables. The variable of task analyses established criteria for testing skills, while the variable of assessments determined the unlearned task analyzed steps for a participant. The variable of developing individualized physical education plans set up goals and objectives based on assessment results, while the variables of developing and implementing activity plans trained the participants to perform all steps of task-analyses correctly. Therefore, these variables also made contributions to the effect of this ecological-based program.

In conclusion, the ecological program used in this study was effective in teaching young adults with mild cognitive impairments

three volleyball skills. The ecological survey used in this program was a major programming variable to ensure the target skills were critical for participants to be included in general physical activities. The effect of this ecological program confirmed, however, was also contributed by associated programming variables, including task-analyzing the targeted skills found based on the ecological survey, assessing each of the targeted skills based on the task-analyzed steps, developing individualized plans based on the assessment results, and implementing activity plans developed based on individualized plans.

Dr. Jiabei Zhang teaches at Western Michigan University while Dr. Jinjin Yang is on the faculty at Southern Connecticut State University.

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Dance Dance Revolution: A Physiological Look at an Interactive Arcade Game

by Josh Trout and Karra Zamora

Abstract

The purpose of this study was to examine body composition (via Bodpod®), time in target heart rate zone, estimated caloric expenditure (via heart rate monitor), prior physical activity levels (via Baecke questionnaire), and enjoyment levels (via Physical Activity Enjoyment Scale) as a result of playing Dance Dance Revolution® (DDR) three times per week for 20 minutes over eight weeks. Participants were 14 female and 12 male participants aged 18-30. Participants showed a significant reduction in body fat from pre- to post-treatment. Males and females expended an estimated 276 and 176 calories respectively during each dance session. Results showed consistent high levels of enjoyment over the eight weeks. Exit interviews revealed that DDR was perceived as fun yet challenging and beneficial.

Key words: dance, exergaming, obesity

Dance Dance Revolution: A Physiological Look at an Interactive Arcade Game

Video games that require the gamer(s) to be physically active are growing in popularity. The animated virtual-reality excitement of these games may be a critical tool in increasing the amount of time people spend in daily moderate to vigorous physical activity (MVPA). Daily MVPA is a crucial component in the battle against hypokinetic diseases such as obesity and heart disease. The most recent data from the National Center for Health Statistics show that 19% of U.S. children aged 6-11 and 17% of adolescents aged 12-19 are overweight. Even worse, 32% of adults in the U.S. aged 20-74 are overweight and an additional 34% are obese (United States Department of Health and Human Services [USDHHS], 2006). Being overweight or obese increases the risk of hypertension, type II diabetes, coronary heart disease, stroke, osteoarthritis, and some cancers (Centers for Disease Control and Prevention [CDC], 2005; USDHHS, 2001). This chronic and worsening health trend requires immediate attention as obesity is currently the second leading cause of death in the U.S. owing to physical inactivity. In fact, physical inactivity and poor diet (the two most frequent cited causes of obesity) cause over 400,000 deaths per year in the United States (Mokdad, Marks, Stroup & Gerberding, 2004). This is more than the number of deaths caused by infectious diseases, firearms, motor vehicle crashes, illicit drug use, alcohol, and HIV combined; only tobacco use causes more deaths (Mokdad et al., 2004).

While the statistics are disturbing, technology may be a possible solution in the form of “exergaming” (exercise + gaming). Exergaming involves playing a video game using your body as the joystick. One of the most popular forms of exergaming is an interactive dancing arcade game (there are also home versions) known as Dance Dance Revolution® (DDR) (Konami of America, Inc., Redwood City, CA). This game provides opportunities for

people who enjoy video games to engage in physical activity and possibly improve their health at the same time. Lanningham-Foster et al. (2006) found that energy expenditure more than doubled when participants played active video games such as DDR compared to playing sedentary video games. Furthermore, Unnithan, Houser, & Fernhall (2006) found that children who played DDR for 12 minutes exceeded the minimal American College of Sports Medicine (ACSM) recommended heart rate intensity for developing and maintaining cardiorespiratory fitness.

Although empirical evidence in this area is slim, anecdotal evidence in countless newspaper and magazine articles have provided personal testimonies of people losing weight (“Dance Dance Revolution”, 2005; Barker, 2005; Doyle, 2004; Kreimer, 2004) and even managing diabetes (Twede, 2005) after a just few weeks of playing the game. Due to the overwhelming popularity of DDR since it was released in the U.S. in 2001, it has been featured on Fox News, CNN, ABC News, the Early Show on CBS and several other media outlets. In fact, the game has been so popular with children and teenagers that Konami (the company that manufactures DDR) recently announced plans to place DDR in all 753 public schools in West Virginia (Lash, 2006).

Although widely popular in physical education programs, arcade stores, and even living rooms, few studies have examined physiological variables during game play. Furthermore, no empirical evidence exists regarding enjoyment levels. The purpose of this study was to examine body fat percentage, time spent in target heart rate zone (THRZ), caloric expenditure, prior physical activity, and enjoyment levels in healthy young adults while playing DDR. Caloric expenditure estimates were collected for comparison to more traditional physical activities as well as to examine differences between genders. Gender comparison with regard to caloric expenditure and enjoyment was necessary since males receive more DDR media coverage, most of which focuses on enjoyment and weight loss. No explanation is available for this, however, if males enjoy the game more or expend more calories while playing (and thus lose more body fat), the media may focus more attention on them compared to females. Both genders were examined equally in this investigation.

Four hypotheses were determined prior to data collection: (a) participants would show a reduction in body fat and body weight, (b) participants with higher enjoyment scores would spend more time within or above their THRZ and show greater improvements in body composition compared to participants with lower enjoyment scores, (c) participants who were more physically active prior to the study would enjoy DDR more than less physically active participants and (d) participants would report high levels of enjoyment from playing DDR. Regarding the latter hypothesis, the relationship of enjoyment scores and the degree to which participants were physically active prior to the study was also examined. Participants were diverse in terms of their daily levels of physical activity, thus analyzing these variables allowed

investigators to determine if sedentary or highly active individuals enjoyed the game more.

Methods

This study was approved by the Human Subjects Review Committee at California State University-Chico. Informed consent was obtained prior to data collection from all participants.

Participants

Twenty six students (12 males and 14 females, aged 18-30) volunteered to participate. Twenty participants were white, two were Hispanic, two were Asian, one was Filipino, and one was American Indian. All but one were graduate or undergraduate students at a university in Northern California who represented 12 different majors across campus. Participants were recruited by posting advertisements about the study around campus and asking for volunteers. Participants were not compensated for participation in the study.

Procedure

After signing an informed consent, participants filled out the Baecke Questionnaire of Habitual Activity, which asks a series of questions on a 5-point Likert scale to quantify work activity, sports activity, and non-sports leisure activity (Baecke, Burema, & Frijters, 1982; Aadahl & Jorgensen, 2003). Participants also completed a Physical Activity Readiness Questionnaire to determine whether or not their health was at risk prior to participating in the study. Next, after sitting quietly for five minutes wearing a heart rate monitor, participants' resting heart rate was recorded. This information along with age and target exercise intensity zone (set at 60-80%), was used in the Karvonen formula $[(220 - \text{age}) - \text{Resting HR}] \times 0.6$ or $0.8 + \text{Resting HR}$ to determine THRZ during exercise. Upper and lower limits of exercise intensity were programmed into the heart rate monitor at 60% and 80% respectively. These limits are the generally accepted heart rate range for exercise and fall within ACSM's classification for "moderate" and "hard" exercise intensity (American College of Sports Medicine [ACSM], 2006, p.340).

Participants then underwent a BodPod® (Life Measurement, Inc., Concord, CA) assessment to determine their body fat percentage as well as their total pounds of lean and fat weight (Ball, 2005; Fields, Higgins, & Radley, 2005). The BodPod® was calibrated and tests were conducted according to the manufacturer's guidelines.

After baseline data were collected, participants reported to the lab three times per week for the next eight weeks to play DDR using a Sony Playstation 2® (Sony, Foster City, CA) and an electronic dance pad (Cobalt Flux, Inc., Salt Lake City, UT). Dance Dance Revolution® requires the player to step or "dance" on one of four arrows on a 3' X 3' touch-sensitive pad on the floor based on visual cues from the screen and the beat of a song.

Participants were not allowed to miss any sessions. Missed appointments were rescheduled as close to the originally scheduled date as possible. Each dance session, (24 in total over the 8-week period) lasted 20 minutes. While playing, participants wore an Ekho E300 heart rate monitor (Ekho, Minneapolis, MN) that was programmed with the individual participants' body weight,

age, gender, and upper and lower limits of their THRZ. Heart rate monitors measured time spent within, above, and below the THRZ and estimated caloric expenditure. Although evidence suggests that a degree of error is involved in estimating caloric expenditure from heart rate (Hiilloskorpi et al., 1999), research suggests that heart rate data and activity type are acceptable methods for determining this variable (Treuth, Adolph, & Butte, 1998). For practicality, it was determined that estimates of caloric expenditure, as opposed to direct measures were acceptable for the scope of this investigation.

While dancing, participants were allowed to choose the songs they wanted to dance to. Participants were also allowed to dance at their own pace and select their own difficulty level as long as they remained active for the entire 20 minutes. The goal was to simulate a self-selected leisure level of play similar to playing the game at home or in an arcade. Data on which songs each participant chose were not collected.

After each dance session was completed, participants completed a modified Physical Activity Enjoyment Scale (PACES) (Motl, Dishman, Saunders, Dowda, Felton, & Pate, 2001; Kendzierski & DeCarlo, 1991) to determine their enjoyment level during game play. We chose the modified version because it was shorter and easier to understand and more appropriate for this study since participants would have to complete it 24 times during the 8-week treatment (three questionnaires per week for eight weeks). Participants were asked to rate 14 questions on a 5-point Likert scale (1 = "Disagree a lot" and 5 = "Agree a lot"). Positive statement scores such as "I enjoy it" were calculated at face value. The values of negative statement scores such as "It frustrates me" were reverse scored. This allowed every statement to have a numeric value so a score could be averaged.

Participants were asked at each session to write down any changes to their routine physical activity levels, nutritional consumption, and/or medications. Participants were also asked not to make any changes in these areas and to notify the investigators if they did. When the participants finished their 20-minute dance session in the lab, the investigators recorded the amount of time spent above, within, and below their THRZ, as well as, their estimated caloric expenditure from the heart rate monitor wrist strap.

After eight weeks of playing DDR three times per week, participants again underwent a BodPod® assessment to measure post-treatment body composition. Immediately after the Bodpod® assessment, participants were formally interviewed using the standardized open-ended interview approach (Patton, 2002) for approximately 30 minutes. These exit interviews were designed to obtain information regarding participants' feelings on dancing, playing video games, and overall perceptions of DDR. Participants were asked again about their food intake, physical activity outside the lab, and medications taken during the 8-week study since these variables could have had an impact on body composition. Exit interviews were tape-recorded and transcribed for analysis. Transcripts were coded by two researchers to identify and compare emergent themes.

Statistical Analysis

Paired sample *t* tests were used to compare body fat percentage as well as body weight before and after the 8-week treatment.

Scores for all 14 questions on the PACES were summed for each time playing DDR. Daily enjoyment scores were averaged every two weeks for the duration of the 8-week study. This allowed investigators to examine changes in enjoyment in four separate time periods. Repeated measures ANOVA examined enjoyment scores over each of four time periods (weeks 1-2, weeks 3-4, weeks 5-6, and weeks 7-8) and was used to compare the estimated calorie expenditure by gender each week. Simple linear regression was used to predict changes in body fat percentage from PACES scores. Simple linear regression was also used to predict the amount of time spent within and above THRZ from PACES scores. A third simple linear regression was used to predict PACES scores from the degree to which participants were physically active prior to the study. Alpha level was set at $p < .05$.

Results

Quantitative

Post-test bodyweight ($M = 157$ pounds, $SD = 33.4$ for females and $M = 167.3$ pounds, $SD = 20.2$ for males) was significantly less (see Table 1) than pre-test bodyweight ($M = 158.6$ pounds, $SD = 34.3$ for females and $M = 168.8$ pounds, $SD = 21.8$ for males), ($t(25) = 1.99$, $p < .05$). Among both genders, post-test body fat percentage ($M = 25.6\%$, $SD = 11.9\%$) was significantly less than pre-test body fat percentage ($M = 26.8\%$, $SD = 11.5\%$), ($t(25) = 3.33$, $p < .05$). Twenty-two of the 26 participants showed a reduction in body fat, while four gained body fat (see Figure 1).

Table 1. Demographic and Pre/post Tests Data

ID#	Pre-Test Body weight	Post-Test Body weight	Pre-Test Body fat %	Post-Test Body fat %	Activity Level ^a	Age	Height ^b	PACES ^c
Females								
1	183.5	175.3	38.9	37	4.0	23	68	67.5
2	177.4	175.2	36.4	35.9	5.	20	68	69.9
3	154.6	155.2	37.8	36.9	9.6	18	65	68.5
4	117.6	115.7	33.4	30.9	5.7	23	64	69.0
5	163.6	160.5	27.2	23.5	9.8	20	71	53.8
6	151.9	155.7	32.3	34.4	4.8	25	63	68.9
7	125.6	125.5	27.8	30.1	7.2	23	62	42.9
8	209.0	210.4	43.6	43.5	7.2	23	65	69.8
9	157.9	157.1	31.8	31.5	7.0	22	62	47.9
10	121.9	120.4	31.9	31	10.0	21	63	66.8
11	162.4	161.6	34.5	34.2	7.7	19	63	66.8
12	107.2	104.7	30.6	27.9	8.0	24	64	63.7
13	158.9	159.5	37.0	36.2	4.6	28	68	58.5
14	229.0	221.6	49.9	49.2	4.3	22	63	56.8
Males								
15	169.3	169.8	18.9	18.8	10.8	21	74	60.8
16	165.8	158.1	14.5	9.3	8.6	21	74	69.1
17	203.8	196.2	20.6	20	4.5	29	74	68.3
18	198.1	190.2	22.2	17.6	9.2	22	72	66.0
19	169.1	164.1	26.7	24.5	8.6	18	68	69.6
20	185.0	185.3	28.3	26.6	8.7	20	69	53.5
21	124.8	126.2	9.5	9.0	10.8	22	68	69.2
22	154.5	157.3	9.2	7.7	8.7	20	70	64.6
23	156.5	156.7	6.0	5.4	10.8	22	68	56.3
24	153.2	157.0	9.3	7.5	10.8	20	69	62.3
25	184.7	190.7	25.3	25.7	8.8	20	67	49.9
26	160.7	155.7	12.0	12.3	10.1	20	75	66.3

^a Measured using Baecke Questionnaire. ^b Measured in inches. ^c Average over eight weeks.

Although only a 1.2% reduction in body fat was observed, no other weight loss strategies such as caloric restriction or consuming fat-burning supplements were implemented. The intervention was only 60 minutes of physical activity per week.

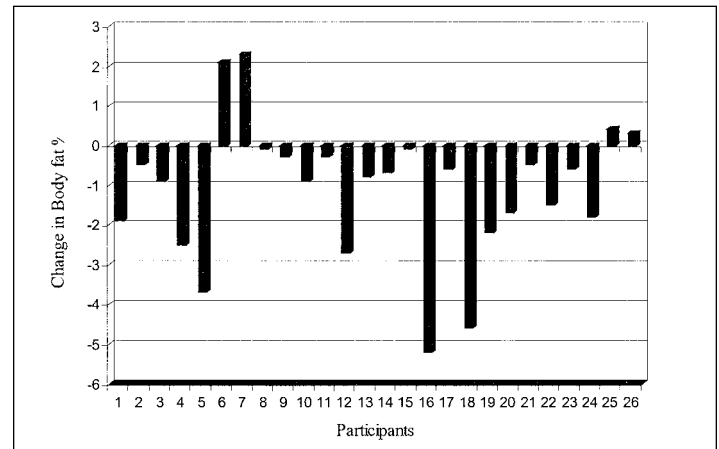


Figure 1. Change in body fat % for each participant after the 8-week treatment.

Although nutrition logs and daily caloric expenditures were not recorded throughout the eight weeks, it is likely that the reduction in body fat was due to participation in the study. Participants were asked prior to participating in the study not to make any changes to their diet, physical activity patterns, or medications. If any changes were made, participants were asked to list them each time they reported to the lab (questions about these lifestyle changes were added to the PACES questionnaire). Less than ten changes in total, mostly binge eating or drinking, were noted from all participants throughout the study. Only two participants became ineligible for participation due to these restrictions: One began using oral contraceptives and one was a student-athlete whose training season would have begun during the study.

Males burned significantly more calories ($F(1,24) = 26$, $p < .05$) per 20-minute session playing DDR ($M = 276.3$, $SE = 14.2$), compared to females ($M = 177.5$, $SE = 13.2$). The number of calories burned per dance session did not significantly change over the 8 weeks.

Perhaps the most interesting finding from this study was the

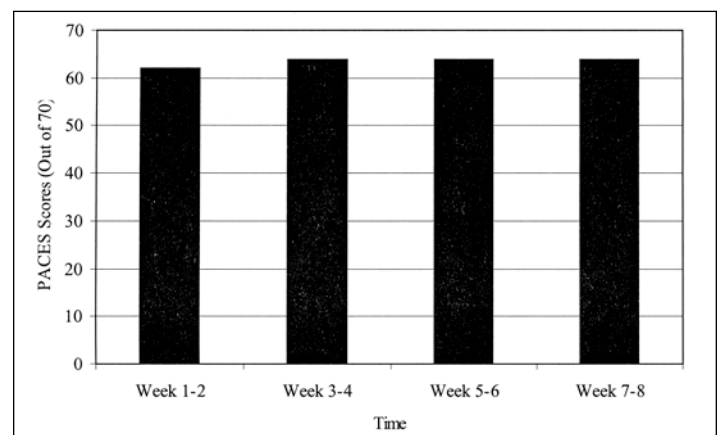


Figure 2. Mean enjoyment scores for all participants. The 8-week treatment was divided into four 2-week blocks.

extent to which participants enjoyed the game. When all 14 PACES statements were averaged, 81% of participants scored a 4 or higher out of 5 (5 being the highest level of enjoyment) on the PACES over the 8 weeks indicating consistent high levels of enjoyment (see Figure 2). No significant change in enjoyment scores was observed over time during the eight weeks and no significant relationship was observed between enjoyment scores and gender.

Participants who were more active prior to the study had significantly lower enjoyment scores in all four time blocks (see Table 2) except weeks 5-6 where it approached significance [weeks 1-2, $F(1,24) = 5.43, p < .05$; weeks 3-4, $F(1,24) = 6.39, p < .05$; weeks 5-6, $F(1,24) = 4.08, p = .06$; weeks 7-8, $F(1,24) = 4.75, p < .05$]. Prior physical activity scores from the Baecke questionnaire were divided into low, medium and high groups. The PACES comparisons among these groups do not differ greatly. The least active third of participants averaged 62.4, 65.5, 63.3, and 64.1 on the PACES in weeks 1-2, 3-4, 5-6, and 7-8, respectively. In the same four time blocks, the medium group scored 61.3, 63.2, 63.3, and 62.9. The high, or most active group scored 62, 62.2, 62.1, and 61.

Table 2. Enjoyment Scores from PACES in Four Separate Time Blocks

ID #	Weeks 1-2	Weeks 3-4	Weeks 5-6	Weeks 7-8
Females				
1	66.3	67.1	67.8	68.5
2	69.8	70.0	70.0	69.6
3	67.6	69.0	69.0	68.3
4	69.0	69.0	69.0	69.0
5	55.8	53.3	55.6	50.5
6	67.8	68.3	69.5	70.0
7	39.5	43.5	45.67	43.0
8	69.6	69.6	70.0	70.0
9	41.1	50.1	49.0	51.1
10	66.0	66.5	67.8	66.6
11	61.8	70.0	68.8	66.5
12	63.1	64.0	63.6	63.8
13	57.0	58.6	59.1	59.0
14	60.6	57.8	53.0	55.6
15	63.5	60.8	59.6	59.3
Males				
16	69.0	70.0	67.3	70.0
17	67.1	67.0	69.1	69.6
18	65.6	65.8	66.8	65.6
19	68.6	70.0	69.8	70.0
20	53.1	52.6	54.1	53.8
21	67.0	69.8	70.0	70.0
22	61.8	65.5	67.0	64.0
23	55.5	57.0	56.0	56.5
24	62.5	62.0	62.0	62.8
25	56.9	51.7	46.4	44.4
26	63.7	66.8	67.8	67.0

There was no significant relationship between enjoyment scores and time spent within or above the THRZ and between enjoyment scores and changes in body fat percentage.

Qualitative

Exit interviews with each participant provided insight into what participants liked and disliked about DDR, if they perceived to have benefited from participation in the study, and their general feelings regarding dancing and video games. Overall, participants said they enjoyed playing DDR. In fact, all but one subject used the word “fun” to describe their experiences playing the game. Participants said they liked “combining physical activity with a video game”, “being able to select the intensity level based on how I felt that day”, and “feeling successful after learning [how to dance to] a song.” With regard to the music played while dancing, eight participants stated that they enjoyed the music, while seven felt that the music was either “boring,” “monotonous,” or “inappropriate for real dancing.”

Negative responses to DDR. Negative responses to the game included “it hurt my feet,” “I had trouble staying on the dance pad,” and “it was too repetitive.” The most prominent negative response was that progressing to the next level (there are 5 levels in the game) was frustrating. Several participants noted that each time they attempted the next higher level; it was too fast and complex resulting in frustration. They expressed a desire for more “in between” levels with a more steady progression.

Another common negative response was that stepping on the arrows on the dance pad was too “constraining” compared to freestyle dancing (e.g., dancing at nightclubs, weddings, or other dance events). One participant stated “I guess I’m used to [dancing] differently and that was kind of frustrating for me to have to move the way [the game] showed me to move.” Another participant said “It’s like really unrealistic dancing. You would never actually dance that way.” Another participant noted “the only problem with DDR is those stupid right, left, forward movements. It kind of gets a little hard to bust a move.” Even though some participants felt constrained by playing DDR in comparison to freestyle dancing, they still said they enjoyed the game. Even more interesting is that the seven subjects who disliked dancing in general said they enjoyed playing DDR.

Perceived benefits of DDR. When asked “What, if anything, do you like about DDR?,” the most common response was that it was challenging. When probed for further explanation, participants stated that the game implemented several strategies to keep them constantly challenged including “trying to keep the red bar [that indicates successful dance steps] full,” “picking faster songs,” “going for higher combinations [of perfect dance steps],” “trying to get a higher grade like an ‘A’ on every song,” and “avoiding the ‘boos’ on the screen when you messed up.”

Some participants described feeling so challenged by the game that it brought out the competitive spirit in them. For example, one participant stated “I enjoyed the competition the most, being able to go up against a video game and just keep improving myself. There’s never a time when you can actually beat the game. You just keep progressing.”

Twenty-four of the 26 participants said they felt like they benefited in some way from playing DDR. Perceived benefits included: (a) increased leg strength and endurance, (b) feeling less winded and more energized throughout the day, having better balance and eye-foot coordination, and (c) feeling healthier overall. Three participants actually mentioned that their performance in

other areas had improved. One participant mentioned “I do a lot of dancing...with the beat, you know, like if it’s a four count...I [am enrolled in a] Beginning Ballroom [dance class] and I can just kind of keep on count without consciously making an effort which I didn’t do [before participating in this study].” Another participant felt her cardiovascular endurance had increased. She said “Cardio-wise I have more endurance. Like when I ran the race on Saturday, the three miles, I felt good...I wasn’t struggling to like run so I think [DDR] has helped.”

Overall, participants described many reasons why they enjoyed playing DDR and how it challenged them. In fact, all but three indicated their intention to purchase a home version of DDR to play at their leisure.

Discussion

In addition to the positive effects on body composition, participants reported consistent high levels of enjoyment from playing DDR throughout the eight weeks. The objective measurement of enjoyment from the PACES parallels the subjective responses from exit interviews in that participants reported consistent high enjoyment levels throughout the eight weeks from both. Most participants discussed how the game constantly challenged them in a way that made them want to continue playing. This is encouraging since exercise adherence has been linked to exercise enjoyment (Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997; Lindgren & Fridlund, 1999). Even satisfaction with the music being played during exercise is linked with exercise enjoyment (Wininger & Pargman, 2003). This is particularly interesting since several participants in this study said they enjoyed the self-selected music that accompanied the dance sequences. Thus, it is plausible to expect that individuals who enjoy DDR (or even the music associated with DDR) are likely to adhere to this form of exercise.

Although most participants enjoyed playing DDR based on PACES scores and exit interviews, those who were more physically active prior to the study reported significantly lower enjoyment scores compared to less physically active participants in weeks 1-2, weeks 3-4, and weeks 7-8. This relationship approached significance in weeks 5-6. Five subjects had a cumulative activity score (this includes a work, sport, and leisure-time index) that was 10 or higher. These were considered the most physically active participants prior to the study. These participants reported more highly active leisure time as well as regular participation in sports such as bowling, golf, running, motocross, soccer, basketball, lacrosse, cycling, and softball. The reason that participants who were more physically active did not enjoy playing DDR as much as those who were less physically active is not fully understood. Perhaps they were satisfied with their current level of daily physical activity and therefore received less enjoyment from the addition of DDR. It is also possible that, because they were already active in sports, they had already found the types of physical activity that they enjoyed, thus making DDR more of a “chore”.

Regardless of the degree to which certain participants enjoyed playing DDR, most expended as many or more calories playing DDR than comparable physical activities. Not surprisingly, males expended significantly more calories than females, which were initially assumed to be a factor of males having greater body

weight. However, males only weighed an average of 10 pounds more than females in this study. One variable that may explain this is to examine the amount of effort males put into playing the game. Exit interviews indicated that males competed with themselves or against the game more often than females. In addition, males reported more strategies to keep themselves challenged by the game compared to females. Reasons why participants produce varying levels of effort in exergaming needs to be examined further. It is reasonable; however, to predict that, like any game or sport, some individuals will enjoy and excel at the specified motor patterns, timing, and rhythm of DDR, while others will not. Exit interviews revealed that participants found DDR “challenging” yet “constraining.” Perhaps the motor learning required to play DDR appeals to individuals who enjoy other sports/physical activities that are also challenging yet constraining.

Males and females burned as many or more calories as other MVPA’s. For example, males in this study whose mean weight was 169 ± 34 pounds burned an average of 276 kcals per 20 minutes of playing DDR. Using a web-based interface (www.caloriecontrol.org) to estimate caloric expenditure, an individual weighing 169 pounds would burn approximately 253 kcals in 20 minutes jogging, 176 kcals weight lifting, 135 kcals performing yoga, and 226 kcals swimming. According to the same source, females in the study whose mean weight was 159 ± 34 pounds and burned an average of 177 kcals, would burn approximately 238 kcals in 20 minutes jogging, 166 kcals weightlifting, 127 kcals performing yoga, and 213 kcals swimming. Thus, playing DDR has implications for weight management since playing it requires as many calories as other popular physical activities. DDR, however, has an advantage over the more traditional physical activities such as jogging on a treadmill or swimming laps. It has exciting music, eye-catching animation, and offers an innovative way to have fun while exercising in a virtual environment. In addition, most participants who said they disliked dancing in general said they enjoyed playing DDR. Thus, DDR could be used as a tool for physical educators, personal trainers, or after school program directors to introduce concepts of dance to individuals who would otherwise be reluctant or too intimidated to even try.

Results from this study indicate that playing DDR is an enjoyable and challenging activity even after playing it three times per week for eight weeks. DDR also appears to have positive effects on body composition. Perhaps video games and technology devices that have contributed to sedentary lifestyles will, ironically, be the tools to get our nation moving again.

Dr. Trout is a faculty member at the California State University, Chico. Karra Zamora is a physical education teacher in California.

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Website Content Analysis of PGA and LPGA based on Sport Marketing Mix: Comparisons across the United States, Japan, and South Korea

by Hyun-Duck Kim and Hongbum Shin

Abstract

The purpose of this study was to explore the website content characteristics of the Professional Golfers Association (PGA) and the Ladies Professional Golfers Association (LPGA) in Japan, South Korea and the United States on the basis of the components of sport marketing mix. The measurement tool was developed and validated by the researchers to verify website content characteristics relating to the sport marketing mix. Findings indicate that only 67.3 percent of the website contents were considered to be sport marketing related. Thus, there was considerable room for improvement in the website contents of the organizations for obtaining a competitive market advantage.

Website Content Analysis of PGA and LPGA Based on Sport Marketing Mix: Comparisons across the United States, Japan, and South Korea

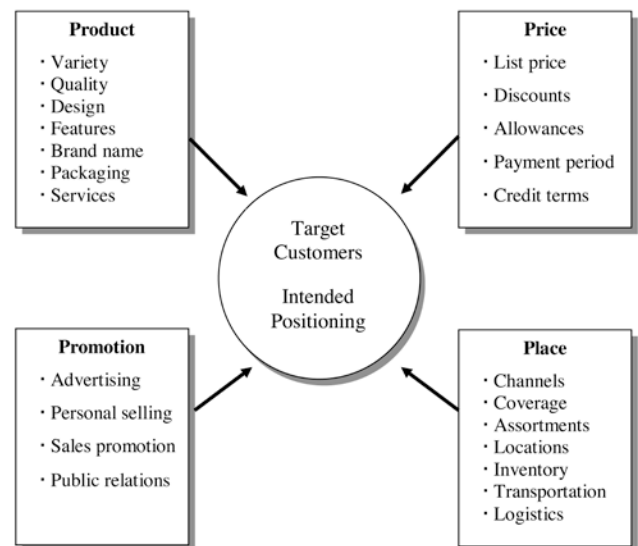
The rapid development of the Internet allows the worldwide network to access sports related information previously unavailable (Bush & Gilber, 2002; Fallows, 2004; Internet World Stats, 2005). The Internet offers the sport marketing manager a revolutionary marketing tool. Most sport organizations have established an online website as the way of marketing their products, building consumer loyalty, and reducing organizational costs (Pitts & Stotlar, 2002). The internet website allows sport organizations more effective marketing communication to the target market. It is important to emphasize that websites may not always be able to entirely replace traditional means of management and marketing, but it is the wave of the future and brings with it new rules of communication (Pitts & Stotlar, 2002). Success of Internet marketing requires not just the initial creation and steady maintenance of a website, but also the willingness to adapt to potential changes in the competitive market situation.

The sport marketing mix is one of the major concepts in modern marketing (Parkhouse, 2001). Kotler and Armstrong (2001) define marketing mix as “the set of controllable tactical marketing tools that the firm blends to produce the responses that it wants in the target market” (p.28). It is everything the sport organization can do to influence the demand for its product. The possibilities fall into four components known as the “four P’s”: product, price, place, and promotion.

A “product” is a bundle of tangible attributes and intangible benefits that buyers perceive they will obtain if they enter a transaction (Parkhouse, 2001). Basically, the bundle includes everything favorable and unfavorable that a buyer receives for his/her exchange. Not only a putter, ball, or other tangible equipment but also a travel package to a golf resort, tournament pass, golf membership, or sports event can be categorized as a sport product.

The money paid for a ticket to a sporting event, to a golf clinic, or for a new pair of golf spikes are examples of “price.” Price is an expression of the value of a sport product or event (Pitt & Stotlar, 2002; Wilson, 2000). Price is very visible and intricately related to the other major elements of the marketing mix (Parkhouse, 2001). “Place” is the geographic location of the product, such as stadium or arena, as well as the point of origin for distribution of the product or service. “Promotion” is a process by which various techniques are used to communicate with consumers. Sport promotions are most successful when the message the marketer wants to convey is directed toward one or more target markets (Parkhouse, 2001). Figure 1 outlines the particular marketing tools under each P of the sport marketing mix.

Figure 1 - The Particular Marketing Tools under Each P of the Sport Marketing Mix



Note: From The Four Ps of the Marketing Mix by P. Kotler and G. Armstrong, 2001, *Principles of marketing* (9th ed.), p. 67. Copyright 2001 by Prentice-Hall, Inc.

Each element of the marketing mix has been treated in isolation, even though these elements have a simultaneous cross-impact on the customer. A potential buyer of a sport product does not view the price of a product in isolation from the promotional process, the place function, or the nature of the product and product extensions (Mullin, Hardy, & Sutton, 2000). An effective marketing program blends all elements into a coordinated program designed to achieve the company’s marketing objectives by delivering value to consumers. Therefore, the marketing mix constitutes the company’s tactical tool for establishing strong positioning in target markets (Kotler & Armstrong, 2001).

According to Pitts and Stotlar (2002), the development of the sport marketing mix involves deciding optimal combination of the 4Ps. In other words, the 4Ps of sport marketing mix are all interrelated. Thus, potential decisions regarding one element should be made in accordance with decisions on all other elements. There are various considerations and constraints that have an impact on one or all of the 4Ps. Foremost, Pitts and Stotlar (2002) noticed that in order to identify constant changes in the market places, sport marketers must monitor four different elements called 4Cs (i.e., consumer, competitor, company, and climate).

Professional sport organizations now provide rich information on their websites that can establish a dialogue with fans through interactive features (Bush & Gilber, 2002; Caskey & Depley, 1999; Fallows, 2004; Parkhouse, 2001). Most research on the use of the web has focused on describing the new medium to marketers (Blackman, 2003; Bradner, 2002; Bruce & Fox, 2002; Kahle & Meeske, 1999; Pitts & Stotlar, 2002; Smith, Pent, & Pitts, 1999) and successful website management (Caskey & Depley, 1999; Murphy, Frost, Webster, & Schmidt, 2004). Other briefly covered topics either focus on Internet marketing in the sport industry, especially user activity patterns and communication objectives (Brown, 2003) or the effectiveness of Internet advertisements on sport websites (Yu & Stotlar, 2000). Previous studies primarily focused on how to build a successful sport website. Little is known about what sport organizations are actually doing on these websites. No studies were found examining professional golf organization websites and their efforts to augment marketing through the gigantic electronic medium, the Internet.

Considering the number of Internet users, a website content analysis study might provide useful information. Analyzing and comparing the data from this study between Korea, the U.S., and Japan who are leaders in both the Internet market and golf industry might provide information helpful to marketers to construct appropriate marketing strategies and to find new ways to provide potential customers with better service.

In this regard, the purpose of the study was to explore the website content characteristics of the Professional Golfers Association (PGA) and the Ladies Professional Golfers Association (LPGA) in Japan, South Korean and the United States on the basis of the elements of sport marketing mix.

Methodology

Selection of Sites

The unit of analysis for this study was limited to the official websites of the Professional Golf Association (PGA) and Ladies Professional Golf Association (LPGA) in three countries, including: 1) U.S PGA (www.pga.com) and U.S LPGA (www.lpga.com), 2) JPGA (www.pga.or.jp) and JLPGA (www.jpaga.or.jp), and 3) KPGA (www.koreapga.com) and KLPGA (www.klpga.com). The sites chosen were the official websites of professional golf association representing both male/female professional golfers in each country, and (2) the sites were judged to be at the same level of competition for the game of golf.

Content Analysis of Site

The content of the websites for the six different websites was examined. For data collection, a measure of website content

was developed by the researchers to verify website contents in accordance with the four elements of the marketing mix. The categories for the measurement tool were preselected by the researchers. That is, the contents of the websites were categorized based on the elements of the marketing mix and then re-arranged in terms of frequency measured as suggested by Carlson, Rosenberger, and Muthaly (2003). The goal of this mapping process was to transform symbolic and visual data on the websites into a data matrix suitable for statistical analysis. Categories for the measurement of content analysis, based on the 4 P's of the marketing mix, include: (a) product, including player information, tour results, statistics, and merchandise catalog; (b) price, which involves information on ticket and merchandise; (c) promotion, which is associated with upcoming events, online-chat room, multimedia, or breaking news; (d) place, which refers to course information, unique URL name, and upcoming event schedule; and (e) other, not belonging in one of the previous categories such as email contact, banner advertisement, or voting poll.

For validating the measurement tool, guidelines for content analysis which were suggested by Weber (1990) were followed thoroughly. Especially, to deal with content and construct validity issues, the measures were submitted to a panel of three bilingual experts (e.g., Korean/English and Japanese/English) who possessed a substantial amount of knowledge and research experience in the areas of sport management. In making improvement decisions, they were provided with detailed information about the fundamental purpose and overall design of the study. The panel reviewed each of the items to determine whether the individual items adequately represent the domains of the underlying constructs in terms of wording, clarity, format, and adequacy as suggested by Chatterji (2003).

Coding Website Contents

Scoring for each website content was made by assigning a '0' for absence of a category element or '1' for presence of a category element. Three bilingual researchers were asked to follow the study's coding protocols for the measurement process. First, the researchers accessed the pre-selected sites through the Internet Explorer 5.0 on the same days. TechSmith Corporation's SnagIt v6.0, windows screen capture software was used to save various contents of the websites as picture files. With the saved files, the first coding occurred on 14 July 2005 and the second coding was followed on 21 July, 2005.

Intercoder Agreement

Due to potential researchers' subjectivity, the researchers made diligent efforts to get a systematic and objective description of the website content characteristics as suggested by Kassarian (1977). Interrater reliability (IR) has appeared as one of the adequate ways to handle the reliability issue. As noted by Kassarian (1977), interrater reliability is the percentage of agreement between several judges processing the same communications material. In other words, it is the degree of consistency between coders applying the same set of categories to the same content. Krippendorff's alpha coefficient for dichotomous data was estimated as a way of verifying the interrater reliability. The estimation of the interrater reliability was made in percent agreement. According to

Krippendorff (1980), the most widely accepted minimum rate for that type of reliability estimation is .80. In this study, the interrater reliability ranged from .91 to 1.00 suggesting acceptable estimation of interrater reliability.

Findings

The website content analyses on the six official websites of PGA and LPGA from the U.S, Japan, and Korea categorized the overall contents of the websites into 34 components according to the sport marketing mix. Among the 34 components, eight components (23.5%, $IR=.98$) were devoted to Product; three (8.8%, $IR=.95$) were devoted to Price; eight (23.5%, $IR=.91$) were linked to Promotion; while six components (17.6%, $IR=.99$) were for Place; and nine (26.6%, $IR=.96$) were used to provide information on Others (see Table 1).

Table 1. Summary of the website content analysis on PGA and LPGA official websites

Sport Marketing Mix	# of Components	% Accounted	Intercoder Reliability (IR)
Product	8	23.5	.98
Price	3	8.8	.95
Promotion	8	23.5	.91
Place	6	17.6	1.00
Other	9	26.6	.96
Total	34	100	

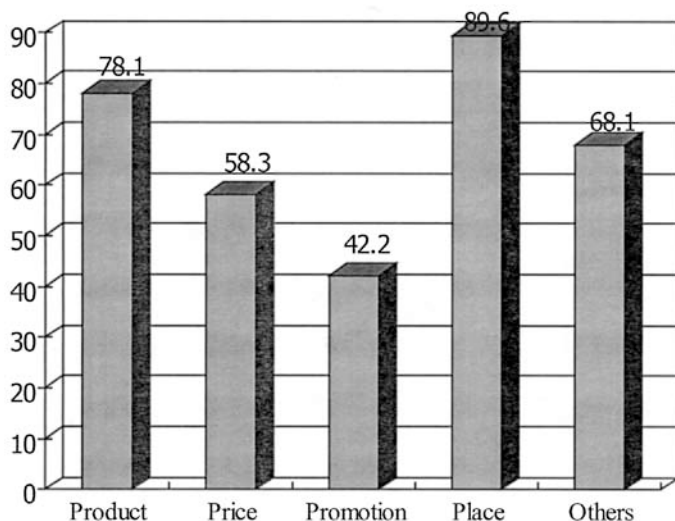
It was found that not all the website contents fit into the components of sport marketing mix. Only 67.3 percent of the information in the official websites were considered to be sport marketing related. For the sport marketing related categories, the

further findings from the analysis indicate that 89.6 percent of the website contents disclosed information relevant to the categories of Place (see Figure 2). This was followed by Product (78.1%), Others (68.1%), Price (58.3%), and Promotion (42.2%).

For more detail, all the official websites noted information on player's profile (100%), news releases (100%), tour results (100%), and logo/mascot (100%) under the categories of Product. For Promotion categories, all the official website made efforts to promote future tours (100%). Under the Place perspective, unique URL name (100%), upcoming tour schedule (100%), tour day information (100%), and prize money and world ranking (100%) were provided on the websites. In the Others categories, three out of nine categories were carried by all PGA and LPGA websites, which were external links (100%), Email contact (100%), and museum, history, and about us (100%). Highly utilized categories were players' statistics (87.5%) in Product, course information (87.5%) in Place, and sponsors (87.5%) in Others categories.

For the Product categories, U.S. PGA and Japanese LPGA possessed information on promoting golfing programs for juniors. Only the U.S. PGA had a link to its on-line store for sales of its licensed products (such as caps, T-shirt, and bags). Only the U.S. and Japanese websites offered comprehensive information for purchasing tickets. The Korean and Japanese websites provided a link to the website established in English. However, the information offered in English translated website was not identical in intent and meaning. For the element of Promotion, the U.S. PGA and LPGA websites were equipped with comparatively more advertisements for its tournaments, events, and players. Particularly, the U.S. LPGA provided the links to 'Chat room/forum' and 'downloadable Screensaver/wallpaper' for their visitors. Place categories were used highly by most websites, but 'Site map' was utilized by only half of the official websites which were U.S. PGA, and Japanese PGA.

Figure 2
Sport Marketing Mix Index of PGA and LPGA Website Contents



Note: Values represent percentage of website contents associated with each element of the sports marketing mix.

Discussion

For managers of professional golf organizations, it would be valuable to make a conscious marketing decision based on the findings described in the previous sections. This study has comprehensively shown that contents of the PGA and LPGA websites can be categorized according to the components of sport marketing mix. Differences in content characteristics and information were found among the PGA and LPGA in the U.S, Japan, and Korea.

Although the results indicate that the PGA and LPGA websites did not fully fit into the marketing mix, 67.3 percent of the sites' content was devoted to it. For more detail, Product related information focused primarily on tournament schedule, and player records, and statistics. Allowing access to detailed and up-to-date information on Product might have a positive influence on website visitors' revisit intentions. The internet is not only a source of information but also an effective marketing tool in the sport business. The internet is increasingly replacing the traditional media channels such as television, radio, and newspapers. The internet becomes more of a substitute to those traditional tools (e.g., television, radio, and newspapers) due to its advantageous features. Thus, regularly uploading up-to-date information and news releases about the organizations and their players has been

the natural option for most sport organizations. It also helps the organizations potential increase in the level of website traffic.

The amount of content included on the websites regarding Price was comparatively smaller than the information on other components of the marketing mix. Among the 34 components as related to the sport marketing mix, three contents were purely associated with Price. Information on tournament tickets and merchandise pricing was found. The websites of the U.S and Japan provide enriched information on tournament schedules and ticket sales for their visitors. Website visitors to both the Korean PGA and LPGA have not been allowed to purchase tournament tickets online due to the absence of content or hyperlinks. In this regard, one of the most critical elements of the marketing mix has been completely ignored by the Korean PGA and LPGA. On-line ticket sales enable organizations to eliminate the need for the consumers to leave the computer and go to a ticket outlet. Organizations not placing merchandise and ticket sales information on their website are missing an opportunity to attract both more and repeat visitors. The least amount of information and contents was associated with Promotion (42.2%). Under Promotion, website visitors might be able to learn more about the organizations with effective interactive opportunities. The websites have been utilized as the best means for the marketing communication for many businesses. However, it was found that the U.S. LPGA was the only organization offering interactive opportunities, such as chat room and forum. Moreover, it was the only organization which offered promotional items (e.g., screensaver and wallpaper) for its visitors. Advertising is truly a byproduct of the organizations. According to the results of this study, most organizations have sponsors, but just half of websites located banner advertisement for them. All of the websites analyzed allowed visitors interactive communications with the organizations. This means of communication is valuable for superior marketing.

Place accounted for 89.6 percent of the website contents. As indicated by the relevant percentage, the majority of the websites have adopted contents relevant to upcoming tour schedule, weather of tour day, and course information. Sports marketers operate their businesses in a unique business circumstance due to unique aspects of sports products and consumers. Place takes a significant role in marketing sport because sport consumers are always looking for multiple places for their product consumption (Mullion, Hardy, & Sutton, 2007). Consumers constantly look for reliable and up to date information. Thus, it is obvious that the websites must provide information on ticket sales, player statistics and records, course information, upcoming tour schedule, and tour day information.

Conclusion and Suggestions for Future Research

The findings suggest there is considerable room for improvement in the website contents and characteristics for obtaining a competitive market advantage. All the sites contain the criteria for a successful website. Of the 34 content areas identified in this study, only U.S. LPGA utilized most of the content area (30 contents, 88.2%). Furthermore, professional golf organizations must shift the focus of Place oriented websites to include all elements of the marketing mix. Interactive content should be integrated into websites, enabling website users to stick themselves into the

website, creating stronger fan identification, resulting in potential revenue generation.

The results suggest that the PGA and LPGA websites are not being used to their fullest potential. The Internet has rapidly become an extremely efficient medium of communication. The primary motivation for website development has been to increase awareness, to influence new customers, and eventually to cultivate loyal customers. As suggested by Wilson (2000) who explored potential functions of the Internet website for various business entities, the PGA and LPGA websites must become a functional, transaction enabled business unit that enriches the total sport experience, thus creating fan loyalty and fostering stronger customer relationships. Since both the PGA and LPGA are engaged in the golf industry, it might be advantageous to support each other by developing contents facilitating the game of golf and professional golfers in general.

The content analysis technique used in this study also provides an easy-to-use benchmarking-framework to determine what competitors' websites comprise content-wise. This approach can be used as an evaluation tool of competitors' sport marketing activities.

There is an increasing need to conduct research into what features of a website work best, how users' attitudes to organizations are affected by interactivity, and what the effect of interactivity is on both number of website visit and levels of fan loyalty.

Further study should examine the relationship between the marketing oriented elements of sport websites and quality indicators for the website contents. Additional study for other sports sectors' using this content analysis technique could be undertaken to identify the similarities and differences that may exist across sports sectors. This analysis could also integrate additional elements (e.g., attitude toward the website, quality of service, loyalty to the organization, and visitor satisfaction) that would seek to identify which characteristics of the sport team/organization website distinguish successful from unsuccessful websites. For this exploratory study, the websites were chosen from three different countries. However, this study was not able to find out potential difference in the content characteristics due to cultural background. Zhao, Massey, Murphy, and Fang (2003) also noted that different culture shapes different content characteristics for the internet websites for retail businesses. It might also prove valuable to determine how the website contents and designs of sports organizations vary based on cultural background.

Dr. Hyun-Duck Kim is on the faculty at Arkansas State University and Dr. Hongbum Shin teaches at Western Illinois University.

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Collegiate Recreational Sports: A Historical Perspective

by Paul Rohe Milton

Abstract

The role of recreational sports programs and facilities has become increasingly prominent on America's college and university campuses. Budgets, facilities and staff have all increased, almost exponentially in some cases, as institutions continue to direct resources into the programs and facilities that are often utilized by 60% or more of an institution's student population. But such prioritizing of resources has not always occurred on college and university campuses in the United States. This paper provides a brief, yet comprehensive history of the development of collegiate recreational sports in America.

Collegiate Recreational Sports: A Historical Perspective

Programs of recreational sports in the United States play a more prominent role on college campuses than ever before; particularly as a means of enhancing the quality of life and as a complement to the academic experience a student receives at a particular institution (Delworth, Hanson, & Associates, 1989). Kovac and Beck (1997, p. 12) reported that "Recreational programs and facilities are accessed by the highest percentage of students than any other program identified in the Quality and Importance of Recreational Services survey." Recreational sports programs have become increasingly comprehensive and the leadership and management of such programs correspondingly complex.

Recreational sports programs also have been said to enhance the student recruitment and retention efforts of colleges and universities. Maas asserted "it appears that higher participation levels in recreational sports correlates positively with enhanced persistence in the university" (1999, p. 15). The pilot study of the Quality and Importance of Recreational Services conducted by the National Intramural-Recreational Sports Association found that 30% of the students who responded in the study considered the availability of recreational facilities and programs "important" or "very important" in their decision to attend their chosen university (Holsberry and Kovac, 1991).

The importance of providing such programs and facilities on college campuses is increasingly evident. One of the most compelling statements regarding the accelerating growth in all facets of collegiate recreational sports programs was seen in a discussion on the future of recreational sports by Karabetsos (1991). In this seminal article, the author reiterated the notion that recreational sports programs would continue to play a vital role in higher education, particularly in the recruitment and retention of students. Citing several well known observers of higher education, Karabetsos (1991) indicated that not only did the 1980s experience a boom in the construction of collegiate recreation facilities, but that the 1990s and beyond would witness even more construction of such facilities. The commentary was indeed prophetic in that research conducted by the National Intramural-Recreational

Sports Association (2004) reported that in the years from 2000-2003, NIRSA member institutions spent \$6.6 billion on the new construction and renovation of indoor recreation facilities.

As a result, the way in which recreational sports programs are delivered on college campuses today is profoundly different than in the past. The question of how recreational sports departments evolved to their current state is one that fosters intense interest. The purpose of this paper, therefore, is to provide a brief, yet comprehensive history of the development, growth, and maturation of recreational sports programs on America's college campuses.

Earliest Programs

The exact origins of recreational sports on college campuses are sketchy, but the first documented "intramural" activities occurred between the freshmen and sophomore classes at Princeton in 1857 when the baseball teams representing their levels competed in a game (Hyatt, 1977). A contest such as this one actually helped foster the growth of intercollegiate athletics as schools began to compete against each other, in similar fashion to the baseball contest, but in other sports. In fact, it was not long after the 1857 "intramural" baseball contest that the first intercollegiate football game, between Princeton and Rutgers, was held in 1869 (Rudolph, 1990). Physical education programs also began to receive more attention as colleges and universities recognized them as legitimate additions to the academic curricula (Siedentop, 2007). Intercollegiate athletics and physical education underwent parallel growth through the early part of the 20th century, so much so, in fact, that the recreation/athletic "needs of the masses of students were almost entirely neglected" (Mueller and Reznik, 1979, p. 13).

From Student to University Controlled

The beginning of the 20th Century was the period in which student control of intramural programs was at its peak. Fraternities took over most of the leadership of intramurals due more to the permanency of their organizations. This formal control of campus recreation by students did not last much past 1915, however, due in large measure to the unwieldy growth sustained by the activities, and students' inability to manage programs effectively (Means 1963).

It was not until about 1915 that university leaders began to recognize the need for a more formal organization of recreation. Even as early as 1904 the President of Cornell University organized instruction in gymnastics for students who were not participating on the intercollegiate team. The gymnastic coach, in this example, provided instruction to the nonvarsity athletes at the same time the intercollegiate team practiced (Mueller and Reznik, 1979).

Also at this time "university administrators began to examine the situation on their campuses and worked toward faculty control of both interschool and intramural programs" (Colgate, 1978, p. 4). Beeman, Harding, and Humphrey (1974, p. 1) wrote that

not only did colleges begin to organize intramural departments at the turn of the century; they began to appoint “one person as the director.” In fact, the University of Michigan and Ohio State University in 1913 were among the first to appoint a faculty member to oversee intramural programs on their respective campuses (Colgate, 1978). Other institutions quickly followed suit as reported by Hyatt (1977, p. 1): “by 1916 over 140 educational institutions had established departments under the direction and supervision of single individuals”. This movement that witnessed control of recreational sports programs removed from the hands of students and entrusted to a professional person corresponded with a larger movement in student affairs/personnel that brought about an increase in specialized student services. This era was characterized by the development of a new level of institutional administration, and recreational sport administrator positions were part of this evolution (Delworth & Hanson, 1989, p. 26).

In 1916, Elmer Mitchell published the first textbook about intramurals titled *Intramural Athletics*, and three years later, under Mitchell’s direction, the University of Michigan opened the first indoor facility on a college campus devoted to intramurals and campus recreation pursuits. For these reasons, and for his enduring contributions to intramurals and the field of recreational sports in the United States, Mitchell is widely regarded to be the “father of intramurals.”

Growth in the 1930s

The 1930s produced an era of increased construction of gymnasiums on college campuses. This rather unusual circumstance was the direct result of the economic depression America was undergoing at the time. Hyatt (1977, p. 9) reported that “The depression-filled 1930’s brought about large increases in the number of recreation facilities constructed.” The Works Project Administration and other governmental agencies built many new gymnasiums and other sport facilities. Such construction was certainly a windfall for institutions of higher education and for their intramural programs in particular. According to one source, “The WPA constructed gymnasiums, swimming pools, auditoriums, ski facilities and stadiums. Many of these facilities still host high school and university sport events” (Siedentop, 2007, p. 49).

Other factors led to the 1930s being a period of great expansion for intramural/recreational sports programs on college campuses. The creation of the Federal Emergency Relief administration, which in 1933 provided financial aid to many students who worked in intramural programs, proved to be a boost for those programs. Also, leisure time was on the rise, not only because of the depression, but industrialization and automation produced a shorter workweek thereby creating more free time. According to Siedentop (2007) “spectator sport fared poorly during the depression because few could afford the price of admission. This precipitated a major shift to participatory sport mostly at the local level” (p. 49). Educational institutions saw the need to provide recreational activities for students as a partial means of preparing them for their roles in society (Colgate, 1978).

Growth in the War Years

World War I and World War II contributed greatly to the rise in interest among college students for programs of intramurals and

recreation. The first World War brought about increased emphasis on competitive recreational sports due to poor physical condition of the individuals who served. World War II had an influence on the increase in recreational sports activity for the same reason, and because of two other issues: (a) recreational sports were part of the physical training regimen of servicemen, and (b) when veterans returned from the war and enrolled in college, they wanted to continue their competitive sport participation. Most colleges and universities experienced exponential growth in recreational sports participation at the end of World War II, growth that paralleled the swelling enrollments on college campuses following the end of the war (Beeman, Harding, & Humphrey, 1974). Furthermore, the federal government provided another boost to both athletic and recreational sport participation on America’s college campus through the funding of the design and construction of several “memorial gyms”, facilities that served to honor and commemorate the service men and women of World War II.

Professional Associations and the Baby-Boomers

A number of professional associations sprang up around the country that recognized the importance of intramural/recreational activity, thereby enhancing the status of recreational sports. Acknowledgement from the American Physical Education Association in 1930, the College Physical Education Association in 1933, and the American Association for Health, Physical Education and Recreation in 1938 helped solidify the place of recreational sports on the national level. Furthermore, in February 1950, the National Intramural Association was formed by an amalgamation of intramural directors who met at Dillard University in New Orleans. These directors, all of whom were from Historically Black Colleges and Universities, laid the groundwork for the association known today as the National Intramural-Recreational Sports Association (Colgate, 1978).

The growth in college enrollments continued to increase in the 1960s with the influx of the “war babies”. Facilities devoted to recreational sports also continued to be built on college campuses and were done so for the first time with fees that the students voted to charge themselves specifically for the purpose of building and operating such facilities (Colgate, 1978). This trend continued and quickly became the rule rather than the exception as noted in one 1973 study which stated that “Collegiate intramural facilities are primarily financed through student fee income” (Preo, 1973, p. 3).

Further Change in Organization and Governance

In the mid-1960s, a change occurred which would alter the course of both recreational sports programs and the people who led them. The existing governing bodies for men’s and women’s intercollegiate athletics programs met in Washington, D.C. and recommended that the intramural programs (as they were still referred to at the time) no longer report administratively to an academic physical education or recreation department, or intercollegiate athletics. Instead, the conference participants recommended that the intramural programs report “to an administrative officer at the Vice-president level” (Colgate, 1978, p. 7). This recommendation was made for a variety of reasons, but perhaps the most important reason was that intramural programs on college campuses were

maturing into viable, independent entities that needed a sustained separate identity from athletics, physical education, and recreation departments. It wasn't until several years later, however, that a group of highly respected recreational sports professionals, and the NIRSA, took a formal, definitive stand on this matter.

This milestone event in recreational sport administration occurred in 1994. Bryant, Anderson, and Dunn (1994) developed a white paper titled *Rationale for Independent Administration of Collegiate Recreational Sports Programs*, in which they argued that because of the different missions, program comparisons, staff selection, funding, use and need for facilities, and certain community benefits between physical education programs, intercollegiate athletics programs, and recreational sports programs, that the three areas should have "Separate but equal organizational structures..." (Bryant, Anderson, & Dunn, 1994, p. 4). The authors posited that recreational sports programs in particular had historically been "subservient or indistinguishable from the others" (p. 3), and that as a result, resources such as money and facilities placed "physical education and intercollegiate athletics requests ahead of recreational sports" (p. 3). This white paper, adopted by the NIRSA Board of Directors in October 1994, helped position recreational sports programs throughout the country as more equal players with physical education and intercollegiate athletics departments in the eyes of executive level university administrators. A trend which had its beginning in the 1960s, received a significant boost in 1994, continues even today as seen in such actions as placing recreational sports programs under divisions/departments of student affairs, reporting, in many cases, directly to the chief student affairs officer (Patchett, Haley, & Maas, 1997).

Toward More Inclusive Programming

Up until the late 1960s, and into the early 1970s, recreational sports programs consisted mainly of competitive team, dual, and individual sports. A look at the typical program of offerings from the mid-1930s to the early 1970s revealed few changes in the types of programs offered recreational sports participants (Nordly, 1937). Nordly (1937) surveyed the intramural athletics programs at 12 different colleges and found a total of 39 different activities. All of the activities were competitive team, dual, or individual events. Interestingly, nearly four decades later in one of the first inferential studies of recreational sports directors, Preo (1973) reported that most recreational sports programs still consisted of the competitive team, individual, and dual sports.

Another theme running through the intramural/recreational sports programs from their beginning up to the late 1960s, even in the early 1970s was that virtually all programming was for men students. Changes at some universities occurred prior to this time at places like Michigan State University and Kent State University. But even these, and the handful of other institutions that started programs for women, did not do so until the early 60s, or late 50s at best. This paralleled the rise of what Hyatt (1977, p. vii.) called the "new intramurals" which, he reported began "roughly in the late 1950's."

Colgate (1978) reported that this changed quickly because of Title IX of the Education Amendment Act of 1972. Recreational sports programs were arguably the fastest athletic system to respond to the changes mandated by Title IX. Women were, by

then, attending colleges and universities in greater numbers than ever before, and they came with the desire to have an active lifestyle to accompany their academic pursuits. Women participated in the traditional intramural program offerings, but also precipitated changes to the status quo. Programs which emphasized fitness and a holistic approach to well being were introduced into the recreational sports selection of activities.

The rise of aerobic conditioning activities was especially attractive to female students and became highly successful in the late 1970s and early 1980s. Variations on the early offerings make the aerobics programs at most colleges still highly popular today among female students. Women participants also were responsible, in large measure, for the inclusion in recreational sports programs of exercise machines such as stairsteppers, treadmills, stationery bikes, and the like, as well as selectorized or body part machines which isolate certain muscle groups during exercise. Such offerings have caused women's participation in today's recreational sports programs to increase dramatically over the last 30 years. Burke and Tennaro (1997, p. 43) testified to this monumental increase: "the idea that more females [are] engaged in sports than at any other period in American history suggests that at long last women have achieved equal opportunity in sport." Kimme wrote as early as 1977 that women "*are a major force in intramural sports*, and we are rapidly approaching equal status with men's intramural programs" (p. 41).

A further development occurred that mirrored the changing nature of collegiate recreational sport. As programs changed to meet the demands of a more diverse group of participants, the leadership of the National Intramural Association believed that the name of the national governing body needed to reflect the more inclusive, diverse, and wide range of offerings provided by member institutions. As a result, the association was renamed the National Intramural-Recreational Sports Association in 1975.

A few years later, the NIRSA expanded its professional scope with the publication in 1977 of a scholarly, peer-reviewed journal called the *NIRSA Journal*. Its original purpose was to provide useful, timely research, how-to articles, and thought pieces that would appeal to practitioners. At first, very few empirically based articles appeared, and the editors found it difficult to maintain a four-issues-per-year pace. Today, the journal, now called the *Recreational Sports Journal* has two issues per year that includes a balance of both empirically based articles, and those with a more anecdotal, opinion, and how-to orientation.

Recreational sports programs have indeed embarked on a new era in the last 25 to years. Hyatt (1977, p. 10) devised a definition of the "new intramurals" that is as fitting today as it was visionary when he wrote it: "The new intramural sports comprise a comprehensive program of competitive and noncompetitive sports and recreational activities that *may* be conducted within the walls of the institution." The programs of the new era work well with intercollegiate athletics and departments of physical education, both traditional "rivals" of recreational sports programs for facilities, funding and personnel; especially since the modern recreational sports programs stand alone and provide programs that are not offered by either of the other two operations. Hyatt (1977, p. 10) further described the new and expanded recreational sports program:

These new intramurals are wider in scope, offer more activities, possess more highly trained leadership, and render more services than do the traditional programs. Likewise, their budget is a separate one based on the sports and recreational needs of the students and financed by the school as a separate budget item.

Recent Historical Developments

In recent years, recreational sports programs have exploded on the collegiate scene. Holsberry and Kovac (1991, p.3) reported in a national survey conducted to measure student satisfaction with recreational sports programs that "Recreation programs and services constituted the highest level of use among student service opportunities". In this same study, the authors reported that 95% of the respondents indicated that they participated in some form of recreation each week, and that 40% participated four or more times per week. These numbers have a critical impact on recreational sports departments since students, faculty, and staff, and, in many cases, the community use recreation facilities and programs at the highest levels of participation in history.

Also in the last ten to fifteen years, many institutions increased student fees, often through referenda, in order to fund the construction and operation of campus recreation centers. A natural outgrowth of the proliferation of such centers was the expansion of departmental operating budgets and administrative staff. Recreational sports departments became more business-oriented in their operation (Milton, 2008). As these new facilities opened, operational expenses were more likely to come from student fees, and students indicated they were willing to pay for quality facilities and services. A definite trend in the implementation of user fees was observed, and faculty, staff, and community members were found to be willing to pay a substantial amount for memberships to recreational facilities and programs (Childress, 1996).

The recreational sport program of the late 20th and early 21st Century, on most campuses, is comprehensive and complex. Childress (1996) reported that budgets in selected programs increased over 25% during the period from 1989 to 1996. The size and comprehensiveness of both the indoor and outdoor facilities that must be managed have increased exponentially. The marketing of recreational sports programs has become big business (Green, Gonsoulin, & Nordin, 1997). The number of staff members in many recreational sports departments has expanded to meet the needs of a growing, increasingly diverse group of participants. In 1995, the National Intramural-Recreational Sports Association reported that the recreational sports department with the greatest number of professional administrative staff was located in the western portion of the country and consisted of nineteen individuals (NIRSA, 1995). In a monumental example of the depth of change, currently The Ohio State University will add nearly 50 administrative staff members to its existing staff with the development and opening of both phases of the Recreation and Physical Activity Center (RPAC), the new benchmark collegiate recreational sport facility in the United States (Dunn, 2006).

Legal and liability concerns have created intricacies and nuances to a degree unknown to the recreational sports programs and directors of past eras (Norum, 1992). Furthermore, recreational sports leaders are called upon more and more to develop and implement risk management and emergency action plans in their

departments (McGregor, 1997). In fact, legal and liability issues are of such importance that the National Intramural-Recreational Sports Association devoted an entire issue of its refereed journal to legal, liability, and risk management concerns in recreational sports (NIRSA, 1988).

One of the side effects of student fee-based facilities and programs is that recreational sports programs are increasingly required to be self-sufficient, auxiliary operations (Milton & Young, 1996), fostering an increased emphasis on entrepreneurship (Jinske, 1992), and fundraising (Steinbach, 2000). Additionally, recreational sports departments are service-oriented organizations striving to create environments that are customer/member oriented (McChesney, 1999).

Communication also has become increasingly important in the management of recreational sports programs. Erickson and Hernon (1996) discussed the importance of computer and electronic mail applications as a means for mass communication to highly segmented markets. Handel and Hall-Yanessa (1997) took the communication research to the next logical progression and reported on the importance of the worldwide web in communication between program administrators and participants, as well as the ability to develop "e-commerce," i.e., providing programs with the opportunity to conduct transactions online.

Recreational sports programs and personnel are held more accountable for programs, expenses, revenue generation, and the like more than ever, causing increase in attention to assessment processes. The development of recreation-oriented standards by the Council for the Advancement of Standards attests to this increased attention. Parsons (1990) suggested a structured assessment approach including budget documentation, long-range planning, assessing participants, more academic orientation, and consideration of public impact. Neilson (1994, p. 22) discussed the process of hiring and working with assessment consultants and stated that "interest in assessment has grown among directors of recreational sports programs because it is now common for university officials to require justification for a program's existence."

Recreational sports has always been a participation driven profession. A recent and needed emphasis has been placed on the study of participation in recreational sports. Lindsey and Sessoms (2006, p. 34) considered the frequency of participation across a variety of demographic variables, one which had particular interest was the finding that women were significantly more likely than men to participate in recreational activity one to three times and four to six times per week ($\chi^2(1) = 23.27, \alpha = .01$). Watson, et al. (2006) considered participation in recreational sports programs (users vs. non-users) and reported, among other things, that users were at "higher stages along the transtheoretical model" (p. 9).

Recreational sport, as a profession, has placed considerable emphasis in the last 15-20 years on the development of individuals who are specifically educated and prepared for professional careers in the recreational sport field. In a seminal work on the topic of professional preparation, Jamieson (1980) analyzed the competencies of recreational sports personnel at selected institutions of higher education. Her findings indicated that different competencies and education were needed for entry level categories as compared to top-level administrators. Although not

a big surprise, her work nevertheless served another, perhaps more important purpose: it got executive level university administrators understanding the importance of competent recreational sport administrators, and it got recreational sport researchers involved in a new and important research direction. Since that time research on competency, professional standards, educational levels and the like, has proliferated in the recreational sport literature. Nicoletto (1992) found that professional preparation of recreational sport administrators has taken two directions, that which focuses on the employee and that which focuses on the employer. Ross (1990) contended that one of the most important and effective methods for preparing the recreational sports professional was through field experiences. Montgomery (1990) focused on experiential learning and the internship process in her research. Lamke (1990) suggested that the major influence on professional preparation of recreational sports administrators is the individual faculty members who teach recreational sports administration or management.

Recreational sport has suddenly become a major player in the arena of co-curricular education in higher education. Evidence of this is seen in the fact that the National Intramural-Recreational Sports Association was a co-participant in the compilation of *Learning Reconsidered II* (Keeling, 2006), the publication calling for a more deliberate approach on the part of non-academic departments in higher education to develop programs and activities that have direct impact on student education. NIRSA and the recreational sports field also has been closely involved with CHEMA.

Recreational sports programs continue to have a bright future. Issues that must be addressed are legal and liability concerns, aging facilities, program assessment and the impact of programs on student learning, strategic planning, and financial resources. A perusal of the scholarly publication of the recreational sports profession, *The Recreational Sports Journal* (NIRSA, 2006, p. 80) indicates that further study and concern centers on participation, economic impact of recreational facilities and programs, sponsorship and fund raising, to name a few.

Dr. Paul Rohe Milton is on the faculty at Ashland College, Ohio

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Adult African American Women's Perspective on Influences that Affect their Physical Activity Involvement

by Jeffrey M. Cherubini

Abstract

The purpose of this study was to qualitatively identify individual, social environmental, and physical environmental influences that affect adult African American women's physical activity participation. Coparticipants were 12 adult African American women (M age = 42.2 years). A descriptive qualitative design was used to discover insights into the perspectives that influence adult African American women's physical activity participation. Semi-structured interviews were conducted and an analysis of interview data using grounded theory was employed. Categories derived from transcribed interviews include: (a) individual influences, (b) social environmental influences, (c) physical environmental influences, (d) related psychosocial variables, and (e) strategies for promoting change.

Adult African American Women's Perspectives on Influences that Affect their Physical Activity Involvement

The U.S. Department of Health and Human Services (USDHHS) and the Centers for Disease Control and Prevention (CDC) provide national estimates of physical inactivity and obesity to highlight the large numbers of racial and ethnic minority and other social groups participating in little or no physical activity (CDC, 1999; McElroy, 2002; USDHHS, 1996, 2000). The USDHHS (2000) identifies "the proportion of the population reporting no leisure-time physical activity [to be] higher among women than men, higher among African Americans and Hispanics than whites, [and] higher among older adults than younger adults" (p. 5). Even after taking into consideration a variety of factors such as education, family income, occupation, employment, and marital status, Crespo, Smit, Anderson, Carter-Pokras, and Ainsworth (2000) reported levels of physical activity among African Americans to be lower than their white counterparts.

The Task Force for Community Preventive Services (2002) links increased physical activity to physical and social environmental correlates in addition to behavioral and social correlates. Despite this connection, physical activity research has not always given ample focus to the ecological factors that may influence physical activity (Grzywacz & Marks, 2001). Until recently, a relatively limited set of studies have examined the associations of environmental attributes with physical activity (Humpel, Owen, & Leslie, 2002). McElroy (2002) postulated "it is necessary to pay attention not only to the characteristics of individuals but also to the social conditions that affect their behaviors. Social epidemiologists call such interest *upstream analysis*" (p. 36). The fundamental thought is that the social structure is a valid element of analysis and that structural characteristics are different from individual characteristics. Termed ecological thinking, this point of view focuses on social structures and processes within which

behaviors such as inactivity develop (McElroy). Yen and Syme (1999) advocate this increased knowledge of the role of the social structure (an upstream analysis) to deter future (downstream) health problems as inactivity. Similarly, researchers investigating favorable or unfavorable factors to adherence of physical activity must also embrace practical information about both perceived and real constraints in the environment (Kumanyika, 2001).

A more comprehensive theory of health behavior, the ecological approach also attends to the possibility of victim-blaming (Grzywacz & Marks, 2001). Placing the responsibility for health behavior entirely on the individual without accounting for potential lack of environmental control and other broader social issues can be thought of as blaming the victim (Becker, 1986). This ecological approach addresses the environmental and societal influences on an individual's choice of health behavior (e.g., being physically active) beyond that of just individual control. To recognize how individual behaviors are developed and to discover the most effective ways to change these behaviors, it is necessary to acknowledge not only individual level characteristics but also the social and environmental conditions that affect their health behaviors.

Method

Rationale for a Qualitative Research Design

Despite numerous studies that use correlational, prospective, and experimental designs, the literature remains inconclusive regarding which variables relate to physical activity behavior change (Masse, Dassa, Gauvin, Giles-Corti, & Motl, 2002). The Cooper 2001 Conference dedicated a session to discussing measurement and statistical methods that could contribute to advancing physical activity research (Masse et al.). Specifically, qualitative methods were identified to "help researchers generate or revise conceptual frameworks or models, gain a more complete picture of a phenomenon, gain insights into attitude formation and motivations...and assist in formative intervention research and evaluation" (Masse et al., p. 45). Similarly, in a review of 25 physical activity intervention studies and 45 physical activity correlational studies, Baranowski, Anderson, and Carmack (1998) advocate the use of qualitative methods to refine our understanding of the influences on physical activity. Qualitative research is used to gain insight into the dynamics underlying attitudes, feelings, beliefs, and behaviors from the participants' perspective. This inquiry also allows for a more in-depth understanding of psychosocial events in their social and interactive contexts than can often be obtained from quantitative methods such as surveys or inventories (Stillman, 1992).

Role of the Researcher

In qualitative research, the researcher is the primary data collection and data analysis instrument. Recognizing

interpretations as subjective, research needs to accurately describe the interpretations of coparticipants, and the social processes through which these interpretations are produced (Ezzy, 2001). Therefore, it is still necessary to account for “taken-for-granted assumptions” on the part of the researcher in the process of designing and providing services with minority populations (Kumanyika, 2001). Tendencies of cultural imposition and ethnocentrism affect all human beings to some degree or another. As no individual is completely impervious to these tendencies, individuals in helping professions need to take steps toward increasing cross-cultural competence (Kumanyika & Morssink, 1998). Additionally, as a result of numerous mistreatments, African Americans may have developed a cultural paranoia toward the health care system. Pittman (2001) describes cultural paranoia as an effective coping reaction of African Americans to deal with the real dangers of racism, resulting in a deep distrust of white people. Cultural paranoia has been recognized in health care and social work and also has its effect on physical activity programs (Pittman). As a white male coparticipating with African American females, my own bias, cross cultural competence, and the impact of cultural paranoia were considered. Through acknowledging my own conscious and subconscious attitudes about my own culture, an earnest willingness to learn about other cultures, and the development of cross-cultural interaction skills (Kumanyika & Morssink), I have begun the process of increasing my level of competence.

Data Collection Procedures

Distinct from quantitative analysis, qualitative research does not attempt to make inferences from coparticipants to some larger population. Thus, in terms of coparticipant selection, the coparticipants were selected because they had certain characteristics. In this study, coparticipants were selected based on current levels of physical activity and certain levels of expertise or experience.

Physically inactive and physically active coparticipants were selected based on current Healthy People 2010 classifications for no leisure-time physical activity, moderate physical activity, and vigorous physical activity (USDHHS, 2000) as well as Cardinal's (1995) Stages of Exercise. Facilitator coparticipants were selected based on direct contact with African American women in the context of everyday settings (e.g., fitness instructors and personal trainers working with minority populations in fitness clubs).

Snowball sampling was utilized to complete the number of coparticipants in the study. Connections in the health promotion field and neighborhood fitness facilities were the first steps in coparticipant recruitment. Eight of the 12 coparticipants were acquaintances with the researcher. The remaining four coparticipants were introduced through colleagues and friends of the researcher.

Interview technique was the primary source of data collection and a semistructured format was used, as directed by an interview guide (see Appendixes A & B). Prior to interviews, approval was obtained from the appropriate Institutional Review Board.

Coparticipants

Coparticipants were 12 adult African American women currently living and working in a large East Coast, United States city. To ensure confidentiality, each coparticipant selected an alias by which she will be referred to throughout this study (see Table 1). The coparticipants ranged from 21 to 70 years in age (M age = 42.2 years; SD = 16.1 years). Of the 12 coparticipants, based on self report, 4 were physically active coparticipants, 4 were physically inactive coparticipants, and 4 were facilitators of physical activity programs having direct contact with African American women as clients.

Three of the four physically active coparticipants were classified as being in the maintenance stage of exercise and the fourth in the action stage of exercise. These women ranged in age from 44 to

Table 1. Summary of Coparticipants

Name	Age	Occupation	Stage of Exercise	Type	Marital Status
Ashley	60	Security Guard	Precontemplation	Inactive	Married
Iris	45	College Teacher	Contemplation	Inactive	Single
Vanessa	54	Administrator	Preparation	Inactive	Married
Waitplace	51	Administrator	Preparation	Inactive	Single
Nettie	46	Student	Action	Active	Divorced
Pam	44	College Professor	Maintenance	Active	Single
Tia	45	Administrator	Maintenance	Active	Divorced
Unity	70	Retired Physician	Maintenance	Active	Married
Christel	25	Fitness Instructor	Maintenance	Facilitator	Single
Danyelle	22	Fitness Instructor	Maintenance	Facilitator	Single
Divine	23	Fitness Instructor	Maintenance	Facilitator	Single
Marie	21	Fitness Instructor	Maintenance	Facilitator	Single

70 years (M age = 51.3 years; SD = 12.5 years). Two of the four physically inactive coparticipants were classified as being in the preparation stage of exercise, one in the contemplation stage of exercise, and one in the precontemplation stage of exercise. These women ranged in age from 45 to 60 years (M age = 52.5 years; SD = 6.2 years). All four facilitators were classified as being in the maintenance stage of exercise, with a range of applied experience from two to six years. Facilitators were certified in aerobics, personal training, pilates, spinning, or yoga. These women were younger than other coparticipants, with an age range from 21 to 25 years (M age = 22.8 years; SD = 1.7 years).

Data Analysis Procedures

All interviews were initially tape recorded and transcribed verbatim prior to analysis. Each coparticipant received a copy of the transcript and was asked to review it for accuracy. The only feedback encompassed the correction of typographical errors. These errors were corrected in the initial transcripts. A detailed microanalysis of the data was the first step following transcription. Through this line by line analysis, “researchers are able to uncover new concepts and novel relationships and to systematically develop categories in terms of their properties and dimensions” (Strauss & Corbin, 1998, p. 71). The text was the focus of analysis. The data found to be conceptually related in meaning or similar in nature were grouped under more abstract concepts termed “categories” (Strauss & Corbin).

Results and Discussion

The purpose of this study was to qualitatively identify individual, social environmental, and physical environmental influences that affect adult African American women’s physical activity involvement. The results of the study (see Table 2) identify influences on physical activity in adult African American women from an ecological perspective. The results further acknowledge the complexity and multi-factorial nature of adopting and maintaining a physically active lifestyle. Categories and subcategories derived from transcribed interviews include: (a) individual influences, (b) social environmental influences, (c) physical environmental influences, (d) related psychosocial variables, and (e) strategies for promoting change.

Individual Influences

Categories of individual influences include: (a) personal identity, (b) childhood activity, (c) love of the game, (d) health, and (e) perspectives of exercise.

Personal Identity. An understanding of the influence of gender and ethnicity on physical activity experiences is critical to the understanding of physical activity behavior change (McElroy, 2002). All coparticipants in this study identified themselves as either African American or Black females. Within ethnic groups, issues related to variables such as age, generation, and life stage may also be factors that would influence behavior change (Kumanyika, 2001). The coparticipants ranged from 21 to 70 years in age. Gender, ethnicity, and age are all factors that interact with social environmental and physical environmental influences to impact involvement on physical activity. Specific discussions of such interactions are discussed throughout the remainder of the

discussion section.

Childhood Activity. Active coparticipants and facilitators related positive childhood experiences with physical activity as an influence on their current levels of activity. Influences included participation, enjoyment, success, and parental involvement. Marie’s observation explains many aspects of childhood activity and the influence on current physical activity.

I’ve noticed with a lot of African American women, it starts at such a young age. In high school, a lot of the girls, African American girls just do not want to take gym. They’re just like “I don’t want to have to take gym. I don’t want to get all sweaty. I don’t want to mess up my hair.” A lot of it, I think it’s a beauty thing they don’t want to get messy, don’t want to get dirty. I’m gonna mess with the hair and all this stuff. It starts at a young age. If you grew up in an environment like that. Where it’s looked down upon to be all sweaty. To be “like a boy” and all that stuff. You start thinking that. You don’t want to work out. You don’t want to do stuff like that, you don’t want to get dirty and sweaty. That’s what you know since you were young. If you don’t have anyone showing you something different, then that’s what you know. That’s what you have dealt with your whole life. I think it’s education. Getting your kids involved... to run with your kids and showing them it’s okay to be active and exercise. Giving them that option at least. Giving them the option to do it.

Divine discussed a comfort zone of normalcy in terms of youth just mimicking what they saw their parents doing. Pam further emphasized the impact of being successful in physical activity at a young age. Marie also relates starting at a young age as something that “carries out throughout your life because it’s something that you’ve always done.” In contrast, Iris, in the contemplation stage of exercise, mentioned her lack of participation as a child being an influence on choice of activity. Pittman (2001) addressed early participation, the incorporation of African American culture into programming, and education as keys to promoting physical activity for African Americans. It is suggested that programming for young children, especially girls, plays a critical role in influencing future adult participation.

Love of the Game. Unity, Tia, and Nettie, all active coparticipants, indicated a love of the game as the primary influences on their physical activity. Out of everything we had talked about during our interview, Unity indicated that her “Love of the game, and love of being physically active, wanting to do it” were the primary influences on her physical activity. Additionally, Unity mentioned “innate ability” as a factor. “If you can run if you can do these things you kind of have, you enjoy doing the things you have success in. If you can do things you probably will do them.” Clearly, enjoyment of activity exists as a strong influence on physical activity (Napolitano & Marcus, 2000). Individuals that enjoy physical activity will adhere longer than those who do not. These enjoyment motives are important and clearly have an influence on motivation and adherence to physical activity (Glaros & Janelle, 2001). In planning early participation for young children, programming should be directed at fostering and creating a “love of the game.” Interventions for promoting changes in physical activity levels must focus on the promotion of

Table 2. Categories and Subcategories of Influences that Affect Physical Activity Involvement

Element	Category	Subcategory
Individual Influences	Personal Identity	Gender Ethnicity
	Childhood Activity	Participation Enjoyment Success Parental involvement
	Love of the Game	Desire Natural/Innate ability
	Health	Overcoming statistics Holding my own Denial Generational perspectives
	Perspectives of Exercise	Daily work as exercise The need for exercise
Social Environmental Influences	Roles and Responsibilities	Care for family and home Work responsibilities School responsibilities Community involvement Care for self
	Support	Family support Companionship Catch 22 of companionship Derailment
	Culture	Old tradition of healthy Acceptable body size Culture of eating Resistance to change
	Media	Media images Confusion
	Aerobic Fitness Genre	Not real Not fitting in Role models
Physical Environmental Influences	Neighborhood Characteristics	Outdoor activities Personal safety and gender
	Facilities	Proximity and type Personal care
	Weather	Change of seasons Conditions for walking
Related Psychosocial Variables	Incentives	Healthcare incentives
	Attitude	Attitude toward exercise Intentions to function Determination I can't
	Attention	Misconceptions of task at hand Distractions
	Action	Task and skill balance Goals and purpose
	Adherence	Frustration with lack of results Consistency and change
Strategies for Promoting Change	Individual Strategies	Focus on health Preparation
	Facilitator Strategies	Give a choice Empathy and guidance Being real Sharing personal experience Music
	Environmental Strategies	Affordable facilities/training Community programs

enjoyment and a sense of control over physical activity situations (Hagger, Chatzisarantis, & Biddle, 2002).

Health. King (2001) recognizes health variables as an influence on physical activity levels. The four active coparticipants were all challenged with at least one health issue. The active coparticipants discussed getting out of risk factor categories of diabetes, hypertension, and obesity as a strong influence on their current levels of physical activity. All four of the inactive coparticipants felt comfortable with their current level of health despite potential health risks. Expanding upon this perspective, Ashley introduced the concept of “holding my own.” Waitplace, Ashley, Vanessa, and Iris all noted, in one way or another, the lack of priority placed on current levels of physical activity and health due to no current health risks and the ability to perform everyday tasks. Similar to Iris, two of the facilitators, Divine and Christel, described the tendency for their clients and family members to delay acting on their physical fitness until it became a life altering issue. Divine further commented on her family delaying action and specifically her mom changing behavior only after being diagnosed with diabetes. There was also agreement among several of the coparticipants when relating younger populations to older populations in terms of health. Danyelle suggested, “Younger population tends to be more body image and more what everyone else thinks...after a certain age you watch your health and that’s different.”

These results would suggest for some active women, potential health risks are a primary influence on physical activity levels. However, for others, a level of contentment with current levels of health also exists as an influence deterring physical activity. As long as no perceived imminent health risk is present, physical activity is not necessary. Iris would be a prime example of this contentment. Although educated in biology and well aware of the function of exercise and health, Iris has yet to acknowledge her obesity as an imminent health risk, and has yet to adopt a more active lifestyle. It appears that education focusing on both the benefits of a physically active lifestyle, as well as the risks of a non-physically active lifestyle is necessary. Pittman (2001) also noted education in the areas of nutrition and physical activity as crucial.

Perspectives of Exercise. King (2001) recognizes an individual’s knowledge and beliefs related to physical activity as influences on physical activity levels. Iris and Ashley, in the contemplation and precontemplation stages of exercise, considered their daily routine as enough activity. This perspective contributed to lower levels of leisure time physical activity. Unity shared a similar account from many of her patients at work.

I get this statement from patients all the time, “I am very active at my work. I am up and down. I’m doing this.” And I say, “That’s not exercise.” The things you do at work are not really exercising. You really need the exercise. They feel that they work and they are tired at the end of the day and they have worked and exercised enough at their job and they don’t see the two as being separate.

This account also considers the influence of social factors (work responsibilities) on one’s perspective of exercise.

The results here indicate a need for education that would address the appropriate levels of physical activity (intensity,

frequency, and duration) based on current health and fitness levels. It is possible that physical activities at work could be moderate or vigorous intensity activities. However, often work activities are not vigorous enough for many health benefits (i.e., increased caloric expenditure). A heart rate monitor may be used to indicate heart rate changes throughout a day of work. This “test” may show individuals their real “exercise” throughout the day. It is suggested that an appropriate prescription be based upon current levels of health and fitness.

Social Environmental Influences

Categories of social environmental influences include: (a) roles and responsibilities, (b) support, (c) culture, (d) media, and (e) aerobic fitness genre.

Roles and Responsibilities. As with Pittman (2001), several of the coparticipants talked about influences related to helping others and not having time for themselves. Several of the coparticipants commented on lack of time to exercise due to roles and responsibilities at home, work, school, and in the community. Vanessa discussed her observations of African American women and discovered care responsibilities for family coming before any type of additional physical activity or exercise. Ashley further discussed the priority placed on taking care of her husband and home. Marie described family responsibilities to be the most significant influence on African American female clients’ adoption and maintenance of physical activity involvement. Nettie agreed, “We [African American women] all don’t start out big, but by the time we have kids, ...the pressures I think of living and stuff like that” increase.

Several of the coparticipants also discussed gender and care responsibilities, and their influence on physical activity involvement. Specifically, Unity talked about her concern with child rearing and caring for a home. Marie and Christel added the responsibilities of being a single mother. Ashley also commented on the difference between herself with family responsibilities, and with a friend with no current family responsibilities. Lack of time, including family and work demands, has often been reported as a major influence on inactivity for women (Ainsworth, 2000). Specifically, women who are working outside the home and have young children are less likely to be physically active than women who do not have children (Napolitano & Marcus, 2000).

However, not all care responsibilities for family took time away from physical activity. For Ashley, taking care of her grandchildren served as a positive influence on her levels of physical activity. Tia also regarded family and home responsibilities as a positive influence on maintaining physical activity and exercise. Pam, a college professor and department chairperson, noted typical work and family responsibilities as well. Pam explained her primary “inhibition” to exercise as time spent at work. Pam further commented that her “perception of responsibility” might be more gender specific. Iris described her responsibilities and preparation for her students. Additionally, time spent at work influenced her choice of leisure time activity.

In addition to family and work responsibilities, Waitplace and Nettie noted their responsibilities at school as an additional influence on physical activity involvement. Tia and Ashley were also extremely involved in their communities. Pittman (2001)

suggests a commitment to self and a commitment to others as a solution to this cultural dilemma of helping others before self. Danyelle, Vanessa, and Tia also emphasized the need for African American women to take care of themselves in order to be able to take care of others.

Support. Social support for physical activity from family, friends, or exercise program staff is well established as a determinant of physical activity (Brownson, Baker, Houseman, Brennan, & Bacak, 2001; Duncan & McAuley, 1993; Sallis & Owen, 1999). Several of the active coparticipants discussed support from family and friends as a source of both increased determination and accountability. This support was often a strong influence on current levels of activity. The facilitators agreed and suggested the use of a “workout buddy” as a positive influence on physical activity levels. Most of our physical activity involves participating with others or requires help from others.

Although this companionship was discussed as a positive influence on physical activity, several of the coparticipants discussed the challenge of these collaborative activities. The need for the partner to be on the “same page” and the “double sword, negative positive thing” of having a companion were presented in the interviews. Vanessa and Ashley added thoughts on this “catch 22” of companionship, with the critique of their activities from their husbands. Beyond this “catch 22” of companionship, Vanessa commented on others trying to derail her efforts. Nettie reported similar responses from her family, sometimes being criticized and ostracized from close family members. The results of this study indicate a continuum from an extreme of full support from family and friends to an opposite extreme of derailment. Nettie experienced both extremes on this continuum. For Nettie, the positive support of one friend had mitigated the large lack of support and derailling attempts from her family. Social support can be direct and physical (e.g., exercising with a friend) or informational (e.g., talking about being active and encouraging a friend to participate).

Culture. Many of the coparticipants discussed the concept of culture and acceptable body weight in the African American community. Unity summarized body image, eating, and health within the African American culture.

It is like the older generation that clings to some of the traditions of foods and the old tradition that you were healthy if you had some weight on you and a certain way you wanted to look when you dressed up on Sunday. You had to be portly and look nice. What that whole concept meant about being healthy has to be is an influence that hasn’t gone away. To try to get that generation over to see the need for weight reduction for exercise that would be an accomplishment.

Danyelle referred to these cultural traditions as a “constant tug of war” between family members. Experiences with conflict (e.g., arguments concerning the amount of time devoted to exercise) amongst family members were often observed when beginning a new exercise program. Several of the coparticipants also discussed the cultural acceptance of weight gain. Danyelle and Christel talked about the acceptance of weight gain within some African American family structures. In turn, the results suggest this acceptance of excessive weight gain has led to a few African American women “being comfortable” with weight gain

regardless of the potential health risks. This level of comfort may also contribute to the influence of contentment with lower levels of health discussed earlier. Similarly, four of the coparticipants discussed the influence of the “culture of eating” on healthy behavior. Divine, a vegetarian, discussed feeling like an outcast in terms of adopting healthy behavior. Nettie and Divine observed a resistance to change with their families and friends as a factor that had contributed to the high prevalence of inactivity and unhealthy eating habits.

Educational programming with information on African American culture and a focus on healthy lifestyle and eating habits may influence current levels of physical activity. Role models may be important tools added to this educational programming (Pittman, 2001). Women who have adopted healthier lifestyles yet still incorporate their cultural traditions may serve as an example for other women in the community. Pittman suggests effective programs change health behavior when delivered in a cultural context by African American women.

Media. A few of the facilitator coparticipants viewed the images being portrayed on television as a motivating factor, albeit potentially negative. Divine talked about chasing these media created images and yet never quite reaching the image. “Distorted vision, sense of illusion, confusion, and roller-coaster ride” were all terms used by coparticipants to describe the influence of the media on the African American females. Nettie, and all four of the facilitator coparticipants, viewed the media as a negative influence on physical activity. For Nettie, the images of TV commercials initially mitigated her doctor’s recommendation to start exercising in a gym.

Divine, Danyelle, and Christel discussed the influence of music videos and their perceptions of what the African American male desires in terms of body image. The facilitators expressed a concern over the influence of the media and African American males. Divine confirmed a sense of “confusion” when trying to decipher among messages from her family, messages from the media, and messages from men. She also related this confusion to skin complexion and the African American community, with reference to these media influences as a “roller coaster ride” for African American women.

Each of the above influences (family, media, and men) appears to be a strong factor by itself. When combined together, the message concerning health and fitness seems to become very unclear. Whom is one to believe? The comment of “chasing these media images” is very powerful. It appears that for some women they are constantly chasing an unattainable image presented by the media and sometimes encouraged by men. These unattainable images may produce immediate physical activity, but the lack of goal achievement may in the long run diminish overall levels of physical activity. If the goal is unattainable why continue?

This problem may be addressed from several perspectives. First of all, education must continue in terms of health, fitness, and nutritional programming directed toward women and children in a culturally appropriate context. Second, opportunities must be provided for African American women to work with and within the media to influence and potentially change the cultural content of health and fitness images through television programming, commercials, and print media.

Aerobic Fitness Genre. The facilitators discussed African American women not identifying with the aerobic fitness genre. Christel added to this lack of identification with the concept of the genre as “not real.” Christel also talked about fitness programs on television not being “for real people.” Additionally, Christel and Danyelle commented on a variety of social factors related to African American women not fitting in the fitness genre. Danyelle described her observation of “African American women still see[ing] themselves differently from white women” as playing a role in this concept of not fitting in.

The facilitators discussed further the limited number of female African American trainers and instructors as role models in the fitness genre. Marie affirmed “I don’t see them [female African American instructors] that often. I am starting to see them, just my peers. That’s about it.” Christel added the lack of representation in the fitness genre for Latino women as well. She stated, “A lot of aerobics instructors, female instructors, are Caucasians. There are not even Latinos. I ain’t never met any Latino one yet.”

The influence of seeing other African American women participating in fitness activities was a factor for coparticipants in this study. Christel stated, “just being able to see someone who is doing what you want to do” as the “biggest social factor” influencing physical activity. As a solution to this problem, Tia commented on “being a role model.” Marie and Christel also viewed role models as a big influence on physical activity. Again, programming needs to involve African American females as role models to others in the community. Additional education and training opportunities for African American women to participate in facilitating health and fitness classes may also be helpful.

Physical Environmental Influences

Categories of physical environmental influences include: (a) neighborhood characteristics, (b) facilities, (c) weather, and (d) incentives.

Neighborhood Characteristics. Coparticipants discussed neighborhood characteristics in terms of participating in outdoor activities. Most of the coparticipants noted the availability of a local park or school with a track. However, Vanessa and Waitplace commented on the interruptions of unleashed dogs. Nettie also expressed concern over safety. Overall, higher levels of perceived neighborhood safety have been associated with higher levels of physical activity (CDC, 1999). Vanessa and Waitplace also noted the issue of personal safety related to their gender as an influence on their current levels of physical activity. Safety concerns with public transportation were also an issue for both Waitplace and Vanessa. They shared similar descriptions of the use of public transportation, the “safety issue,” and trying to get home.

Changes to the physical environment involve participation from individuals, participation from social groups within communities (i.e., neighborhood watch or clean-up), and participation from local, state, and federal agencies. Input needs to occur on all levels in order for physical changes to be made to the environment. Programming designed to foster community involvement such as activities involving park and track clean-ups may not only provide an immediate source of lifestyle activity (cleaning debris off track, park clean-up, and patrolling in groups for safety), but also may provide future opportunities for safe outdoor activity. Involvement

on the local, state, and federal level may involve grant money to fund such efforts to keep the neighborhood parks and tracks clean and safe. Additional efforts may be directed at passing legislation, including issues such as increased police patrols in neighborhood parks and monetary fines for unleashed dogs.

Facilities. Coparticipants commented on the proximity of facilities or location and quality of equipment as an influence on physical activity levels. Nettie referred to the “propinquity” of her gym as “one of the biggest factors” influencing her current level of physical activity. Unity also indicated the location of her gym as the most influential environmental factor on current levels of physical activity. Marie commented on fitness facilities being “out of sight, out of mind” in the inner cities as a result of the lack of facilities in African American communities. Danyelle, Marie, and Christel talked about the lack of healthy options in their neighborhoods. They referred to easy access for unhealthy choices and difficult access for healthy options. Waitplace and Iris, coparticipants in the contemplation and preparation stages of exercise, related location with the type of equipment in the facilities. Waitplace stated, “If I could find a facility with the equipment that we have over at the [gym at work], within a seven to eight block area of my neighborhood....I’d go.”

When facilities were discussed, a few of the coparticipants viewed the problem of personal care, when using bathroom and shower facilities, as a factor that had influenced physical activity levels. Many of the coparticipants had previously discussed the convenience of a local track as a place to walk. However, as Vanessa pointed out, many of the tracks do not have accessible bathroom facilities for women. Tia, although very active, did not always like to exercise because of the hassle of changing and showering. Similar to Pittman (2001), Christel observed the concern of hair care as a major influence on physical activity levels of African American women. Pittman suggests “the first area within African American culture where education might help is a focus on hair” (p. 287). Further incorporating African American culture into physical activity and health programming is again suggested as a way to increase physical activity levels of African American women.

Weather. Adult women are sometimes dissuaded from exercising due not only to lack of access to workout facilities and prohibitive costs, but also due to unsuitable weather (Hall, 1998; Sherwood & Jeffery, 2000). Through the change of seasons, for a few coparticipants, weather had been discussed as an influence on physical activity involvement. Vanessa and Waitplace, both described as “walkers”, were most influenced by the change of seasons. This could have much to do with their choice of mode of exercise. When these coparticipants were in preparation or action stages they were walking. However, this choice of mode may be the problem. Weather and seasonal time changes had a direct impact on physical activity throughout the year. Vanessa moved from the action stage of exercise to the preparation stage due to the impact of bad weather. For Waitplace, weather was a “big, big factor...because it’s hot out. That’s like 96% of the reason why I would not be doing any activity.”

Providing alternative indoor or outdoor modes of physical activity during inclement (too hot or cold) weather may be the first step in diminishing the impact of weather on physical activity.

More options may come in the form of increased community programming. Support from local, state, and federal agencies may enable local gym management to offer discounted memberships. Collaborations between researchers, federal agencies, and local facilities may yield discounted memberships based on weekly attendance and participation in selected fitness programs directed toward increasing physical activity levels of African American women living in urban communities.

Incentives. Physical activity behaviors can be influenced by the use of healthcare provider support (Bull, Eakin, Reeves, & Riley, 2006). Tia, Christel, and Danyelle viewed healthcare incentives (e.g., fitness club membership) as a strong physical environmental influence on activity levels of adult African American females. Tia, in the maintenance stage of exercise, found incentives from her healthcare provider as a source of “great encouragement.” For Ashley, Iris, Waitplace, and Vanessa, all inactive coparticipants, healthcare incentives had little or no impact on their current levels of physical activity. For Waitplace, the incentive from her healthcare provider was not a factor because of the type of facility offered with the incentive and the clientele at the facility. Similar to Waitplace, Vanessa was offered an incentive, but did not take advantage of it due to location of the facility. The location of the facility and subsequent safety concerns mitigated the incentive offered.

As the results indicate, healthcare provider incentives may be available; however, other influences may mitigate the impact. In order to increase physical activity levels, it may be necessary for healthcare providers to make available more options through their benefits package. For example, several of the coparticipants discussed being limited in their choice of facility. Such packages can be reformatted to include a wider range of facilities from which to choose. This would give potential users of these incentives additional options when choosing a facility. Additionally, Marie explained that for some African American women living in her community, “they don’t have health care providers, [they] really don’t have that option.” From the public policy level it would be important to emphasize the need not only for healthcare coverage for all citizens but also available health and fitness incentives regardless of type of healthcare coverage.

Related Psychosocial Variables

Categories of related psychosocial variables include: (a) attitude, (b) attention, (c) action, and (d) adherence.

Attitude. Personal attitudes are the individual’s overall evaluations of actually being physically active (Rhodes, Jones, & Courneya, 2002). Pam, Nettie, and Tia indicated a pro physical activity attitude. Ashley, Iris, Vanessa, and Waitplace, all inactive coparticipants, did not share the same attitude as the active coparticipants. Iris liked certain activities; however, she indicated having low motivation towards exercising. Waitplace and Vanessa did not place a high enough priority on exercise to be any more active.

Ashley, Vanessa, and Waitplace shared a common attitude concerning their ability to maintain activity levels in order to function on a daily basis. Their intent was to be able to function. An individual’s intent to engage in being physically active is influenced by both the individual’s personal attitude toward

physical activity, and the influence of social and environmental factors on physical activity (Hagger et al., 2002; Rhodes et al., 2002; Yin & Boyd, 2000). For these inactive coparticipants, their intentions to function may have been influenced by their personal attitude regarding their health, and by social influences regarding what is considered healthy in their social structures.

Tia and Danyelle indicated determination as a factor influencing their physical activity participation. They further commented on the strength of this determination, as a major influence on their physical activity involvement. Deci and Ryan (1985) describe self-determination as a person’s “capacity to choose and to have those choices be the determinants of one’s actions” (p. 38). However, this notion of choice must be considered in discussing self-determination. Cockerham, Rutten, and Abel (1997) argue that “choices are shaped by the individual’s life chances, which are grounded in a particular (socioeconomic, gender, age, racial, etc.) reality” (p. 332). Life chance influences lifestyle options, which ultimately affects health behavior. The authors assign priority to chance over choice, with choice still remaining a central factor in lifestyle selection. For some, chance may have created an attitude of “I can’t.” Marie and Danyelle acknowledged this attitude of “I can’t” in the African American Community. They suggested that the attitude may contribute to lower levels of physical activity among African American women. Danyelle viewed the attitude of “I can’t” as a problem that may not be able to be fixed. She stated,

I don’t know if it’s something that’ll ever really be fixed. I think it’ll be great, but it’s kind of hard. Like I said, there is so many other issues that come into it, social, political, everything. It’s really interesting how all of that stuff ties together no matter what. No matter what the situation is, it all ties together. So unconsciously it comes through in exercise, it’s never conscious. It’s never. I’ve never heard one person be “well because I’m Black I can’t.” I’ve never heard that in fitness ever. But it’s always in your head, “I can’t, I can’t” because you’ve always been told you can’t. It’s hard. I’ve seen that even with white women who have always been told that they can’t. It’s just something that’s been drilled in your head and it comes out subconsciously. You don’t even think about it.

The following definition of health lifestyles is offered: “collective patterns of health-related behavior based on choices from options available to people according to their life chances” (Cockerham et al., 1997, p. 338). It is necessary to address attitude in terms of individual, cultural, social, economic, and political variables that influence choice and potentially determine behaviors that form health lifestyles (Cockerham et al.).

Attention. Individuals initiating or maintaining regular physical activity do well over time when a task-oriented approach is utilized (Boyd, Weinmann, & Yin, 2002; Zizzi, Keeler, & Watson, 2006). Conversely, Danyelle, Marie, and Christel all ascribed fitness misconceptions (a lack of task knowledge) to lower levels of physical activity. The facilitators commented on this lack of knowledge and false preconceived notions concerning weight loss, diet, and exercise as a negative influence on physical activity levels. Danyelle added the opinions of men, along with these misconceptions, as creating fear and negatively influencing levels

of physical activity. With knowledge of the task at hand, an influential process that has been postulated to improve performance is attentional focus (Nideffer, 1981). Equally, Vanessa, Unity, and Ashley acknowledged distractions from family members as influencing levels of physical activity. Waitplace and Pam, both single without children, did not have family distractions. However, they did have other distractions limiting their physical activity levels. For Pam, work distractions temporarily influenced her physical activity level. Waitplace was often distracted by computer games instead of “doing [an exercise] videotape.”

Attention control is an important aspect of performance development in various sport and non-sport situations (Nideffer, 1989) and may influence an individual's ability to adhere to a physical activity program. Evaluating an individual's attentional and interpersonal style may be the first step in improving overall attention and concentration concerning physical activities. By being aware of individual attentional strengths and weaknesses, predicting potential distractions before they occur, and controlling physiological and psychological reactions to these distractions, individuals may learn to diminish the negative impact of distractions on physical activity.

Interventions for promoting change in physical activity levels must focus on a task-oriented approach. As a solution to the problem of fitness misconceptions, educational programming should be directed at deconstructing many of the misconceptions that exist. Education programming with information on the appropriate task at hand is the first step. Incorporating attention control training may also influence current levels of physical activity.

Action. Danyelle and Marie discussed the need to balance the difficulty levels of their classes and instructions when working with different groups of women as a way to positively influence physical activity involvement. Unity, Nettie, Pam, and Tia, all active coparticipants, had set goals in order to help maintain current levels of physical activity. Unity stated, “I have a certain routine that I have set up...I do 30 min at 3 mph.” Nettie was more specific. She focused on measuring her heart rate throughout her aerobic exercise. Iris, Vanessa, and Waitplace, inactive coparticipants, did not have a set plan or goals in terms of their physical activity participation. Furthermore, Iris and Waitplace commented on not taking action unless there was purpose or an incentive. Goals with a sense of personal identity that are based on a value system give activities purpose and meaning (Bandura, 2001). Without such goals, there is no purpose.

The benefits of developing a process orientation and the effectiveness of process goals have been well documented (Filby, Maynard, & Graydon, 1999). Process goals are most effective when used within a hierarchy of goals that include both performance and outcome goals. Programming should include process, performance, and outcome goals based not only on an individual's current stage of change but also on individual, social environmental, and physical environmental factors that may influence behavior change. The results also indicate a need for programming to focus on mastery, self-improvement, and effort.

Adherence. In terms of physical activity, adherence is described as regular physical activity participation for six months or more (Schlicht, Godin, & Camaione, 1999). Consistency and change and frustration with lack of results were two interacting themes

that emerged from the data influencing an individual's adherence to physical activity involvement. All four of the facilitators emphasized seeing results as a strong influence on adherence with their African American female clients. In order to see results, several of the coparticipants discussed consistency and change in routine as a factor ultimately influencing adherence. Danyelle and Pam recognized this need to change. Pam, in the maintenance stage, stated, “Making sure you know you can't exercise and always do the exact same things and have any progress. You're not going to continue to lose weight. You're not going to adjust how you look.” Nettie added, “I always was a walker. But once you get used to walking at a certain level, it's really not doing anything for you.”

Conversely, the four facilitators discussed frustration with lack of results as also influencing adherence among their African American female clients. Christel stated, “I think what probably not motivates them to come back, or to come as often, is the whole fact that they don't see the results they get.” Divine noted, “Sometimes it's because they don't see the physical results soon enough. If you don't see the results, you just want to stop. That's what I get from the people I come across.” Danyelle and Marie agreed and discussed further the influence of society on this frustration as well as on fitness misconceptions influencing this frustration. This frustration, with lack of results, is a good example of how several influences from the ecological perspective may interact with each other having an impact on physical activity levels. This frustration, as an influence on adherence, may come from the interactional nature of: physical inabilities (individual influence), not fitting in the aerobic fitness genre (social environmental influence), change of season affecting walking conditions (physical environmental influence), an attitude of I can't (attitude influence), misconceptions of the task at hand (attention influence), and no goals or purpose to pursue (action influence).

In the same way, consistency and change as an influence on adherence may also come from the interactional nature of: physical abilities (individual influence), family support (social environmental influence), propinquity and type of facility (physical environmental influence), self-determination (attitude influence), knowledge of the task at hand (attention influence), and outcome, performance, and process goals to pursue (action influence). In creating new programming to increase adherence to physical activity, it is important to consider all the influences on an individual's level of physical activity.

Strategies for Promoting Change

The following section provides additional strategies for promoting change in physical activity levels among adult African American women from the coparticipants' own perspectives. Categories of strategies for promoting change include: (a) individual strategies, (b) facilitator strategies, and (c) environmental strategies.

Individual Strategies. An individual's motivation toward the health benefits of physical activity is associated with physical activity participation (Fleury & Lee, 2006). Several of the coparticipants commented on focusing on the health aspects of physical activity as a strategy to promote change in behavior. This strategy included a focus on feelings during and after physical

activity. Nettie's strategy, "out of everything", was a focus on how she felt. Danyelle often recommended this strategy to her clients. She emphasized her clients' internal feeling as opposed to their external appearance. This strategy may also counteract other negative factors influencing physical activity. For example, a focus on one's own feelings may limit a focus on chasing an unattainable image presented by the media. Additionally, this focus on feelings may also mitigate derailment efforts from family or friends. A potential downside to this strategy is the different generational perspectives on health that might exist with some African American women. These generational differences were presented in terms of younger women being more concerned with body image and older women more concerned with health. An intervention targeting health outcomes might be presented differently to different generations.

All of the active coparticipants indicated preparation as an additional strategy influencing their physical activity levels. Unity's strategy was "just setting aside time for it. Planning it, I am going to do this, planning it." Nettie also had a plan that she followed to maintain her activity levels. Pam planned time for her activity and prepared appropriate foods to eat. Strategies for preparation can be disseminated via group programming in educational classes, as well as via the distribution of education materials. Materials may include free calendars to plan and record progress as well as interactive websites. Similar to other programming suggestions, information on preparation should be culturally appropriate and practical to use.

Facilitator Strategies. When attempting to influence motivation and ultimately behavior change, it is important to include individuals in the decision making process (Selder, 1992). Danyelle and Christel recognized the need to give their clients a choice when trying to influence physical activity behavior change. Christel noted, "The more they feel like they are part of that process, they will stay. They'll stay. The Black clientele in my class, they stay." Danyelle, Divine, and Marie also discussed empathy and guidance as strategies for promoting behavior change with their clients. Additionally, Christel and Danyelle discussed being real and honest with their clients as a strategy for promoting change. Danyelle commented further on being real with her clients, "letting them know the reality of the situation. Letting them know everything up front, so they can take it in." Christel agreed, "Tell people what they really have to do and they're going to make a choice. They're going to make a choice, they're going to decide to do it or not to do it."

When working with African American women, Danyelle commented on sharing personal experiences. She noted, "it's always better when you have an actual personal experience." Christel shared similar experiences with her clients. She stated, "You have to really prove yourself. They got to know that you come from where they have come from." Marie shared personal experience with her clients by having a "regular body type." She stated, "I think that helps. People aren't intimidated." Christel and Danyelle also talked about the importance of selecting the appropriate music when teaching classes for their clients. Christel referred to music selection as "crucial." Similarly, Pittman (2001) acknowledged music and dance as important aspects of coparticipants' lives and an influence on physical activity behavior.

Facilitators can improve the effectiveness of their classes and training by incorporating the following strategies: (a) give clientele a choice in what activities they will pursue, (b) be empathetic and provide appropriate guidance, (c) be real and honest with clientele at all times, (d) share personal experience, and (e) provide culturally appropriate music based not only on culture, but also age group.

Environmental Strategies. Environmental approaches complement physical activity behavior change, adding to the more frequently used individual behavior and lifestyle modification strategies (French, Story, & Jeffery, 2001; Powell, Slater, Chaloupka, & Harper, 2006). Christel had offered workout space in her own home as well as discounted personal training sessions as a strategy to increase the number of African American women participating in physical activity in her neighborhood. Christel acknowledged, "If they can have more affordable facilities it would be best. That is what I am trying to provide through my training. Local space that they can come to." In addition to these incentives, Christel suggested similar incentives from health and fitness clubs. Marie, Christel, Unity, and Waitplace discussed community programming as a strategy to promote behavior change. Marie addressed the need to increase options for African American women living in the inner city. Marie had a few suggestions in terms of programming options. The first suggestion involved programs in local community centers. A second suggestion involved mothers and their children together in one program. Christel described requirements for such a program to work for African American women.

They need a reason to stay. They need to know, if they stay what they are going to get out of it. Outside of [losing weight] because losing weight is a long term goal. Even though they don't talk about it like it is, they know it is. You can't wake up tomorrow and be 20 pounds lighter. They need something else. They need to come in and know whatever is playing over the speakers is all right. It's hot. They'll come in if they like the radio station. They'll come in if they see at least some Black people. If they don't see some Black people, they are not going to go. It's just not happening. They also need to see other people that are in shape, but not so in shape that they feel like everyone is looking at them.

Unity and Waitplace offered the option of having community programs located within local churches. Unity recommended the church as "a big influence. It is not only religion, but it is social and other areas. So I see the church, that's one area where the focus could be put. Just go in and try to engage them in exercise and stuff like that."

Facilitators and community leaders can improve the effectiveness and outreach of their programming by incorporating the following environmental strategies: (a) affordable facilities and training for all members of the community with an emphasis on African American females and their children and (b) initiating culturally appropriate community programs through community centers and local churches. For example, a church in a community could offer a culturally sensitive fitness program directed by a female African American exercise leader. The leader would need to provide genuine guidance and empathy and share personal experiences with physical activity. The program could be offered to both church members as well as local members of the community.

Additionally, programming could be provided to both adults and children. Music could also be incorporated into this program. Aerobics classes utilizing appropriate upbeat gospel or worship music may increase or maintain attendance in such a program. Missionary workers and church leaders may also use this program as a source of outreach to local community members.

Conclusion

Physical inactivity resides at the top of the public health agenda and calls attention to the need to eliminate the gap between those who are active and those who are not (Crespo, 2000). Physical activity objectives from the Surgeon General's report and Healthy People 2010 reflect a national health agenda directed at "the progression from simply assessing health status to proposing preventive interventions directed at both individuals and the social and physical environments in which they live" (McElroy, 2002, p. 89). The purpose of this study was to qualitatively identify individual, social environmental, and physical environmental influences on physical activity that can be applied in interventions tailored to the adoption and maintenance of physical activity in adult African American women. Bridging research to applied work, the data from this study serves as an initial step in the development of interventions aimed at reducing the proportion of adults who engage in no leisure-time physical activity and increasing the proportion of adults who engage regularly in moderate physical activity.

Dr. Jeffrey M. Cherubini teaches at Manhattan College, New York

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Appendix A. Interview Guide for Inactive/Active Co-participants

Physical activity is influenced by many factors. Individual factors influencing physical activity may include gender, ethnicity, culture, religion or spirituality, education, and health. Please tell me about yourself. Be as specific or general as you would like.

- Your personal characteristics? Your age today? Who you are?
- Your relationship status? Family status? Children? Grandchildren?
- Your education, highest degree earned in school, occupation?
- Your current level of health?

What individual factors seem to be the strongest influences on your current level of physical activity and exercise?

Physical activity may also be influenced by social factors. For example, obligations at work and at home, family and friends, and cultural traditions. Tell me about your social environment. Be as specific or general as you would like.

- Family, significant other?
- Friends, neighbors, co-workers?
- Your roles and responsibilities at home, work, school, and/or with friends?

What social factors appear to be the strongest influences on

your current level of physical activity and exercise?

In addition to individual and social factors, physical activity may also be influenced by environmental factors. For example, neighborhood characteristics, accessible facilities within the community, and work, school, or health care provider incentives. Tell me about the physical environment in which you live. Be as specific or general as you would like.

- What do you believe are supports/barriers to physical activity in your neighborhood? How is this affected by your gender? How does this impact you?
- Do you have convenient and accessible places to be physically active or to exercise? If yes, how close are these places to your home?
- Where do you (would you) actually participate in physical activity or exercise?
- Does your work, school, or health care provider offer any incentives to be physically active or exercise? How does this impact you?

What environmental factors appear to be the strongest influences on your current level of physical activity and exercise?

For the following questions, please think about your own personal experience during the past month regarding your current level of physical activity or exercise participation.

- What is your attitude regarding physical activity?
- What is your motivation toward being physically active?
- How important is being active to you? Why?
- What would you most want to accomplish from being active? What do you expect to get out of being active?
- Are you reasonably sure that you can successfully participate in being physically active? Why/why not?
- In general, what level of effort is needed on your part in order to be physically active? How often do you give this level of effort? Why/why not?
- Do you make commitments to yourself and/or others to be physically active or to exercise? If yes, what? Do you keep them? Why/Why not?
- What do significant others (partner, family, friends, etc.) in your life think about physical activity or exercise? Do they want you to exercise? How does this affect you? What does this mean to you?
- What emotions do you feel when you are being physically active and/or exercising?

- Do you have a plan for being physically active? If yes, what is it and what specifically do you need to focus on? If no, why?
- If you become distracted from actually participating in physical activity, are you able to refocus your attention quickly? What strategies do you use? How does this affect you?

- Regarding physical activity or exercise, do you set goals for yourself? If no - why? If yes – why, how, in what way? Do you achieve the goals? Why or why not?
- Is it easy for you to be physically active or is it a challenge? Explain why, how?
- How frequently do significant others (partner, family, friends, co-workers) participate in physical activity? What type?
- Do significant others encourage you or provide support for you to be physically active and exercise? If yes, in what way? If no, how are they not showing support? How does this affect you?
- What type of feedback do you receive when participating in physical activity? Is it from others, yourself, or both? How does this affect you?

We have been talking about several influences on physical activity and exercise.

- Out of everything, what most influences (positively or negatively) your current level of physical activity and exercise?
- What strategies have you found useful or not useful in terms of influencing past or present levels of physical activity and exercise?
- Is there anything that I should have asked you that you think I didn't? Any other thoughts or comments?

Physical activity/Exercise background information:

- Please briefly describe your physical activity and/or exercise history within the past 5 years.
- Please describe your current physical activity and exercise participation.
- During the last month, what is the average number of days you participated in physical activity per week?
- During the last month, what is the average number of hours you participated in physical activity per week?

Appendix B. Interview Guide for Facilitator Co-participants

Please tell me about your own personal experiences with physical activity and exercise. Be as specific or general as you would like.

Please tell me about your experiences with facilitating physical activity programs. Be as specific or general as you would like.

Physical activity is influenced by many factors. Individual factors influencing physical activity may include gender, ethnicity, culture, religion or spirituality, education, and health. Please tell me about individual factors influencing the African American

female clients you work with in terms of adopting and maintaining physical activity and exercise. Be as specific or general as you would like.

What individual factors appear to be the strongest influences on physical activity and exercise participation?

Physical activity may also be influenced by social factors. For example, obligations at work and at home, family and friends, and cultural traditions. Tell me about social factors influencing the African American female clients you work with in terms of adopting and maintaining physical activity and exercise. Be as specific or general as you would like.

What social factors appear to be the strongest influences on physical activity and exercise participation?

In addition to individual and social factors, physical activity may also be influenced by environmental factors. For example, neighborhood characteristics, accessible facilities within the community, and work, school, or health care provider incentives. Tell me about environment factors influencing the African American female clients you work with in terms of adopting and maintaining physical activity and exercise. Be as specific or general as you would like.

What environmental factors appear to be the strongest influences on physical activity and exercise participation?

We have been talking about several influences on physical activity and exercise.

- Out of everything, what most influences (positively or negatively) your clients' current levels of physical activity and exercise?
- What strategies have you found useful or not useful in terms of influencing levels of physical activity and exercise?
- Is there anything that I should have asked you that you think I didn't? Any other thoughts or comments?

Facilitator Information

- Your age today?
- Your education, highest degree earned in school?
- Fitness/Exercise Certifications?
- Current occupation? Number of clients and/or classes per week? ■

Predictors of Elevated Blood Lipids in a Lipid Screening Program

by Rodney G. Bowden, Dawn Ella M. Rust, and Paul M. Kingery

Abstract

The purpose of this study was to discover what cardiovascular risk factors (CVD) were associated with total capillary cholesterol, venous total cholesterol, and risk ratio cholesterol, and if the types of cholesterol testing methods measured different aspects of CVD risk. Capillary and venous samples were collected from screening participants (N=285). Other measures included: Demographic information, skinfold body composition, diastolic blood pressure, self-reported aerobic activity, and smoking status. Results revealed that each type of cholesterol testing method had a different level of precision and seem to measure different aspects of risk; thus, allowing practitioners the ability to predict CVD risk more readily.

High blood cholesterol increases the risk for heart disease, the leading cause of death in the United States and is a major modifiable risk factor (Levinson & Maciejko, 1996; Pejic, Jamieson, & Saseen, 2007; Morbidity and Mortality Weekly Report, 2000; National Cholesterol Education Program, 2002). Data from laboratory (Gould, Davies, Alemao, Yin, & Cook, 2007), clinical (Israili, Lyoussi, Hernández-Hernández, & Velasco, 2007), and epidemiological (Ingelsson et al., 2007) studies have demonstrated the link between total cholesterol and health, claiming that the likelihood a person will develop and die from cardiovascular disease (CVD) is directly related to the level of their blood cholesterol. In addition to total cholesterol, Low Density Lipoprotein Cholesterol (LDL-C) and High Density Lipoprotein Cholesterol (HDL-C) have been identified as independent risk factors for cardiovascular disease, including ratios of total cholesterol to HDL-C (risk ratio) (Kingery, 1996; National Cholesterol Education Program, 2002; Pejic et al., 2007). Finally the emerging risk factors of large HDL, LDL particle number and size have been associated with CVD (National Cholesterol Education Program, 2002).

In 1985, the National Heart, Lung, and Blood Institute initiated the National Cholesterol Education Program (NCEP) to educate the public on the relationship between blood cholesterol and heart disease. Later in 1996, the United States Preventive Services Task Force (USPSTF) was convened by the U.S. Public Health Service to rigorously evaluate clinical research in order to assess the merits of preventive measures. The USPSTF recommended inclusion of both total cholesterol and high-density lipoprotein cholesterol (HDL-C) in all screenings and only using total cholesterol if HDL-C is unobtainable. The USPSTF also recommended measuring LDL-C as high levels of LDL-C have been associated with CVD (Bowden, 2001; Bowden, Kingery, & Brizzolara, 2000; Fridinger, Jackson, & Anderson, 1992). Finally, in 2001, NCEP recommended that all adults age 20 and over have their cholesterol level checked at least once every five years.

Contemporary cholesterol screening has involved either capillary or venous samples with capillary cholesterol screening

typically drawing blood from the tip of the finger while venous samples are drawn from the antecubital vein found in the bend of the elbow (National Cholesterol Education Program, 2002). Studies have compared capillary blood and its accuracy in predicting cholesterol levels to the use of venous blood but few studies have attempted to ascertain if different measures of cholesterol are in fact measuring different aspects of risk (Bowden, 2001; Bowden et al., 2000; National Cholesterol Education Program, 2002). Total cholesterol, risk ratio cholesterol, HDL-C, and LDL-C, which are measured from venous samples, are considered more precise than a capillary sample primarily due to the use of serum rather than whole blood and a larger sample associated with a venous draw (Fridinger et al., 1992; National Cholesterol Education Program, 2002). Though these measures are considered more accurate in prediction of outcomes, we believe that each type of cholesterol measure may provide a differentiated risk prediction.

With an increased interest in the link between cholesterol and heart disease, research involving risk factors that are associated with elevated cholesterol has emerged; more specifically research examining elevated LDL-C and low HDL-C has increased (Pejic et al., 2007). Major risk factors for high cholesterol include cigarette smoking, hypertension (blood pressure = 140/90 or higher), family history of premature coronary heart disease, and age (men 45 years and older and women 55 years and older). Additional risk factors include a diet high in saturated fat and cholesterol, physical inactivity, overweight, type II diabetes, and being male (Brizzolara et al., 1999; Campos, Moye, Glasser, Stampfer, & Sacks, 2001; Cooper et al., 1986; Everett, 1989; McArdle, Pechar, Katch, & Magel, 1991; National Cholesterol Education Program, 2002; Stamford, 1987).

Cholesterol assessment and detection of CVD risk factors is a process that has equivocal findings in the literature regarding the identification of risk factors that are associated with different assays of cholesterol measurement (Taylor & Lopez, 2004). The decisive factor in the acceptance of cholesterol screening as a means of risk prediction is the question of precision and accuracy with different cholesterol measurement technologies. Literature on the accuracy of portable devices is also equivocal and has been a cause for concern since the 1980s (Rubin, McMurray, Harrell, Carlson, & Bangdiwala, 2003). A clearer understanding of which type of cholesterol measure is the best predictor of CVD risk would improve the likelihood that appropriate interventions are chosen and could assist in early detection of disease and treatment. Due to the equivocal findings regarding the precision of cholesterol screening technologies and the identification of risk predictors and the sparse literature attempting to define the dichotomy of cholesterol measurement, the purpose of this study was to discover what CVD risk factors were associated with total capillary cholesterol, venous total cholesterol, and risk ratio cholesterol, and if these types of cholesterol testing methods are measuring different aspects of CVD risk.

Method

An announcement and a registration form were distributed with employee paychecks announcing a health screening program at a southern university with approximately 8,000 faculty and staff. Employees (N=1,400) volunteered to participate in the health-screening program and acquire their risk for chronic disease. A convenience sample was created with approximately 15 employees scheduled for each screening date with walk-ins allowed at the health assessment site as space allowed. Participants who volunteered to participate in the cholesterol screening portion (N=285) were used in the analysis for this study. Participants were asked to complete a questionnaire while sitting to allow recovery before their blood pressure screening. Upon completion of the questionnaire, participants had their blood pressure taken, followed by body fat measurement using a skinfold protocol, and finally had capillary and venous samples collected by a licensed phlebotomist. Capillary and venous samples were acquired from the participants at the same time. All participants followed the same protocol during each scheduled assessment site. Data was collected by research assistants with a minimum of two months training in all aspects of the study methodology. Participants age 18 and older were informed of the requirements of the study and signed informed consent statements in compliance with the Human Subjects Guidelines for the university.

Capillary Cholesterol

The standard blood measures included “finger-stick” or total capillary cholesterol using the Boeringer-Mannheim Reflotron. The Reflotron was cleaned and calibrated according to manufacturer specifications prior to use each day. Reagent test strips were checked for accuracy using the Abell-Kendall reference method (the AK method). The AK method is recognized as an integral part of the National Reference System for Cholesterol (CDC, 2004). Following a 12-hour fast two drops of blood (30 microliters) were collected in a capillary tube with the contents immediately pipetted onto the cholesterol reagent strip. The strip was then inserted into the Reflotron to obtain a reading. Increased capillary total cholesterol for this study was defined as 200mg/dL and above based on NCEP guidelines (National Cholesterol Education Program, 2002).

Venipuncture Cholesterol

After collecting the capillary sample, venous samples were collected and centrifuged with the serum immediately placed in a cooler and sent to Quest Diagnostics (Dallas, TX) for assay. Approximately 20 milliliters of blood was collected from each participant after fasting for 12 hours using standardized venipuncture techniques in the antecubital vein in the bend of the elbow. As is standard with phlebotomy, the antecubital vein used for the blood draw was dependent upon which vein (left or right arm) was most prominent. Lipid analysis was conducted using an AU 5400 (Olympus America Inc, Center Valley, PA) clinical chemistry analyzer. Increased total venous cholesterol for this study was defined as 200mg/dL and above and increased venous risk ratio cholesterol was defined as 3.5 (i.e., 3.5 non-HDL cholesterol molecules to every 1 HDL cholesterol molecule) and above based on NCEP guidelines (National Cholesterol Education

Program, 2002). Assays conducted for each cholesterol measure were able to be used as a means to assure adherence to a 12 hour fast. Chylomicron levels are commonly used as means to ascertain fasting in clinical practice as a fasted participant will have 0 mg/dL for this exogenous cholesterol measure (Al-Shayji et al, 2007). All participants had 0 mg/dL for Chylomicrons in the assay ready report in this study and were considered compliant.

Skinfold Body Fat Estimation

Skinfold thickness was measured using Lange (Cambridge Instrument, Cambridge, MA, USA) calipers. The sum of three sites was used with measurements from the chest, abdomen, and thigh in males and triceps, suprailliac, and thigh for females. Three measurements at each site were performed with the reported measurement being an average of three trials. A complete round of measurements was completed, followed by second trial, and then followed by a third trial. Body fat levels were determined using this protocol and with the formulas by Jackson and Pollock (1978). Non-essential body fat (beyond 16% for males and 25% for females) was used in this study. Non-essential fat percentage is the amount of body fat that is above what has been identified in the literature (Brizzolara et al., 1999; Cooper et al., 1986; Frost & Havel, 2001; Kamigaki, Siscovick, & Schwartz, 2001; McArdle et al., 1991) as healthy levels of body fat. If a female has 30% body fat, her non-essential body fat level would be 5% ($30\% - 25\% = 5\%$). By using non-essential fat percentage we were able to control for gender and use body fat levels as a single measure in the analysis rather than splitting by gender.

Additional Measures

Additional predictor variables included in the study were age, gender, diastolic blood pressure, self-reported aerobic activity, and smoking status. Blood pressure was measured on the left arm with trained technicians using an aneroid mercury column sphygmomanometer and stethoscope while the participant was sitting. Data for age, gender, and smoking status were collected through a questionnaire administered during the visit to the screening site and were self-reported. The questionnaire specifically asked for age in years and was matched with a database containing the age of participants that was provided by the university. Secondly, gender and race were acquired by having respondents check the appropriate box that corresponded with their gender and race. Racial categories were created using the National Center for Health Statistics (NCHS) race categories. Finally, smoking status was acquired using the National Health and Nutrition Examination Survey (NHANES) criteria. Specific questions asked were: Have you 1) smoked in the last 30 days, 2) smoked in the last year, 3) not smoked in the last year, or 4) never smoked. Participants were considered smokers if they answered yes to responses 1 and/or 2. Self-reported exercise levels were reported as a one week average based on a one month recall and recorded in a log book to record minutes in exercise for the week.

Analysis

A Kolmogorov-Smirnov test of normality was calculated for total capillary cholesterol, venous total cholesterol, and risk-ratio cholesterol. A step-wise discriminant analysis (Wilks' method)

was conducted to ascertain risk predictors for each measure of cholesterol. All analyses were calculated using SPSS Version 11. Significance was determined a priori at $\leq .05$.

Results

Participants averaged 47.0 years of age ($SD=9.57$) with most being white (91.9%) and male (68.5%). The remaining participants were Hispanic (3.7%), African American (0.7%), other (3.7%) and female (31.5%). Demographics are reported in Table 1.

Table 1. Demographics of the study population

<u>Gender</u>		
Male		195 (68.5%)
Female		90 (31.5%)
<u>Race</u>		
African American		20 (.7%)
Caucasian		262 (91.9%)
Hispanic		11 (3.7%)
Other		11 (3.7%)

A Kolmogorov-Smirnov test of normality was calculated for total capillary cholesterol ($KS=1.27$, $p=0.79$), total venous cholesterol ($KS=.99$, $p=.28$), and risk ratio cholesterol ($KS=1.27$, $p=.08$) revealing insufficient evidence that the distributions were not normal.

Table 2. Descriptive results for low* versus high* cholesterol measures and other variables

Variable	Low Risk Category	High Risk Category
	Capillary (n=127)	Capillary (n=158)
Total Cholesterol	174.61 (18.85)	240.59(44.66)
Diastolic BP (mean)	76.0 (6.91)	79.5 (12.87)
Non-essential Fat Percentage (Mean)	15.8 (13.22)	18.0 (15.52)
Smokers (%)	6.7	8.1
	Venous (n=79)	Venous (n=206)
Total Cholesterol	181.22 (13.03)	244.86 (33.93)
Diastolic BP (mean)	74.6 (19.07)	79.2 (7.8)
Non-essential Fat Percentage (Mean)	15.7 (4.91)	17.5 (6.80)
Smokers (%)	5.6	8.2
	Risk Ratio (n=64)	Risk Ratio (n=221)
Ratio (HDL:Total)	2.89 (.39)	4.98 (1.15)
Diastolic BP (mean)	75.0 (3.43)	78.7 (6.98)
Non-essential Fat Percentage (Mean)	14.5 (2.98)	17.7 (10.38)
Smokers (%)	12.5	6.2

* Low capillary/venous total cholesterol < 200 mg/dL
 High capillary/venous total cholesterol \geq 200 mg/dL
 Low risk ratio < 3.5
 High risk ratio \geq 3.5

The health promotion program screened 285 benefits-eligible faculty and staff who had both a capillary and venous blood cholesterol sample allowing comparisons between cholesterol measurements in the same participants. Cholesterol average values and standard deviations are presented in Table 2.

A discriminate analysis of participants' total capillary cholesterol, total venous cholesterol, and risk ratio cholesterol was calculated with risk categories based on NCEP guidelines. Age was the highest discriminator between increased and low total capillary cholesterol followed by diastolic blood pressure and non-essential fat percentage. Significant discriminators also were found with total venous cholesterol. Age was the highest discriminator, followed by diastolic blood pressure, non-essential fat percentage, smoking status. Two variables were found to be significant predictors of high and low venous risk ratio cholesterol. Gender was the highest discriminator, followed by non-essential fat percentage. Results of the discriminant analysis are presented in Table 3.

Table 3. Discriminate analysis of the factors that discriminate between low versus increased capillary cholesterol, low versus increased total venous cholesterol, and low versus increased cholesterol risk ratio (N=285).

Cholesterol Measure	Variable	Multivariate Analysis Wilk' Lambda	p-value
<u>Total Capillary Cholesterol</u>			
	Age	.912	<.0001
	Diastolic BP	.889	<.0001
	Non-essential Fat (%)		
	Percentage	.880	<.0001
<u>Total Venous Cholesterol</u>			
	Age	.928	<.0001
	Diastolic BP	.902	<.0001
	Non-essential Fat		
	Percentage	.895	<.0001
	Smoking	.890	<.0001
	Gender	.886	<.0001
<u>Venous Cholesterol (HDL:Total)</u>			
	Gender	.909	<.0001
	Non-essential Fat		
	Percentage	.838	<.0001

Discussion

Significant predictors were found by discriminant analysis that can classify individuals as high risk on each measure of cholesterol based on NCEP guidelines and are common risk factors associated with elevated cholesterol levels in previous literature (Bowden, Kingery, & Rust, 2006). Such factors included age, gender, diastolic blood pressure, non-essential fat percentage, self-reported aerobic activity, and smoking status. Though cholesterol risk factors are well established, the novel findings of our study is the unique set of risk factors associated with each type of cholesterol measurement revealing cholesterol technologies that are measuring different aspects of risk. Literature concerning the calculation of risk and differences in measures of cholesterol is equivocal

suggesting that distinctive predictors of disease associated with each type of cholesterol measure may be indicative of modalities of measurement that are differentiated and unique.

The only common risk factor identified by the discriminant analysis for total capillary, total venous, and risk ratio cholesterol was non-essential fat percentage. Being overweight has been demonstrated to be a weak predictor for high cholesterol (Fontani et al., 2001) specifically LDL-C but active weight loss has been associated with decreases in LDL-C (Noakes & Clifton, 2004). Our finding seems to suggest being overweight (beyond 16% for males and 25% for females) is predictive of high cholesterol in all three cholesterol measurement techniques used in this study. This is a novel finding as body fat has not been a great predictor of high cholesterol in previous studies (National Cholesterol Education Program, 2002; Prichard, 2003).

The most unusual finding concerned smoking status, which is a major risk factor for elevated cholesterol and heart disease (ASCM, 2006,) but was a significant predictor for total venous cholesterol only in this study. Smoking has been associated with decreases in HDL-C cholesterol and increases in LDL-C cholesterol (Gami et al., 2007), which we believed would cause smoking status to be a predictor for each measure of cholesterol. Venous cholesterol assays are performed using approximately 20 milliliters of blood while capillary cholesterol uses 30 microliters of blood. By including more blood in the venous sample, lipoprotein measures are considered more precise. Therefore, higher precision associated with venous cholesterol versus capillary cholesterol measurement could explain why smoking was not a predictor for capillary cholesterol. A larger sample, in this case a blood sample, helps to explain more statistical variation and may increase the sensitivity of measurement to detect smokers (Brizzolara et al., 1999; Bowden et al., 2006; Kamigaki et al., 2001; Khoo, Tan, & Liew, 1997; Luria, Erel, Sapoznikov, & Gotsman, 1991). Additionally, the increased sensitivity of risk ratio would cause one to suspect smoking to be a predictive risk factor of risk ratio cholesterol, but this was not found to be true in this study. The lack of significance for smoking as a predictor of high capillary cholesterol and risk ratio may suggest measures that are not sensitive enough for use in screening programs. These finding may suggest the need for the use of LDL-C or calculated HDL-C as means of prediction and the discontinued use of capillary cholesterol and risk ratio levels.

Age was found to be a significant predictor of high and low total capillary and total venous cholesterol. Bowden and others (2006) found that total cholesterol increases with age and our study agrees with those findings. Yet, age was not a predictor for venous risk ratio cholesterol in this study. Literature suggests that older, active people (especially males and post-menopausal women) can have total cholesterol levels above 200 mg/dL while simultaneously having normal HDL-C levels and normal levels of large HDL-C (National Cholesterol Education Program, 2002). Total cholesterol acquired through capillary blood or venous blood may not be able to differentiate between a person with an elevated total cholesterol level but normal HDL-C level and may disproportionately place active people in the high cholesterol group. When HDL-C is measured and a comparison is made between older and younger participants, age may be less of a predictor due to misclassification of older, active people as high risk. Risk ratio cholesterol may

present a more complete risk profile, eliminating age as a factor that discriminates between low versus high-risk ratio cholesterol as this measures uses HDL-C in calculating the ratio and would theoretically control for aerobic activity levels.

Gender was a significant predictor of high total venous and venous risk ratio cholesterol but not for total capillary cholesterol. Research suggests women until they reach menopause have higher levels of HDL-C and may explain why gender was identified with total venous and venous risk ratio cholesterol due to their higher sensitivity.

Lastly, diastolic blood pressure was identified as a significant predictor of high total capillary and total venous cholesterol but not venous risk ratio which is a finding that is difficult to explain. Research findings (CDC, 2004; NCEP, 2002) concerning the relationship between cholesterol, blood pressure and CVD are equivocal though some scientists support a strong relationship with these variables (Beoger et al., 2007). CVD is associated with diastolic blood pressure which caused us to speculate that it would be a predictor variable for risk ratio cholesterol. The present study may suggest this increased risk with total capillary and venous cholesterol may be due in part to a relationship specifically with total cholesterol and less likely with HDL-C and may help support a more independent relationship with diastolic blood pressure and total cholesterol.

Finally, the only variable that did not predict high or low cholesterol levels for either measure was self-reported aerobic activity. Numerous studies have demonstrated an improvement in cholesterol profiles with regular aerobic exercise (Thompson et al., 2004; Wegge et al., 2004; Woo et al., 2004). It is widely accepted that aerobic exercise improves lipid profiles primarily through increased HDL-C levels, lowered LDL-C levels and improved risk ratio levels. Reasons for this variable not being identified through the discriminant analysis are most likely due to exercise recall error and the self-report means of data collection.

Implications for Practice

Cholesterol is measured in various ways using capillary methods, but also can be measured through venous samples. Each cholesterol measure has different precision and seems to measure different aspects of risk as demonstrated by the similar, yet unique, set of risk predictors for each of the cholesterol measures used in this study. The complete absence of smoking as a risk factor for capillary and risk ratio cholesterol suggests these measures are not sensitive enough to identify smoking as high risk. Capillary cholesterol has been identified as having low prediction accuracy, yet the same cannot be said for risk ratio. Why so few risk factors were identified for risk ratio by a discriminant analysis is troubling and suggests the need to use other forms of cholesterol testing methods which include LDL concentration, LDL size, and large HDL which are emerging risk factors identified by NCEP. Variation in each measurement of cholesterol may suggest the need for more accurate cholesterol screening methods such as nuclear magnetic resonance analysis (NMR), which measures cholesterol molecule concentration and size to accurately reflect participant risk (Bowden, Hebert, Wilson, Gentile, & Lanning, 2006). At the present NMR is an expensive technique that NCEP has not recommended. But the findings of this study suggest that traditional

measures of cholesterol may be measuring different aspects of risk with each measure missing some key risk factors for CVD and thereby have less utility for screenings. By expanding the use of newer technologies, practitioners may enhance their ability to predict CVD in their patients and clients by having a more complete and accurate picture of risk. Based on the results of our study and the established risk factors used in this that failed to predict high or low values with each cholesterol measure, cholesterol screenings may need to include a more comprehensive screening that includes more expensive, but more predictive technologies.

The sample was delimited by the homogeneity of the participants due in part to voluntary participation and is evidenced by the demographics presented in Table 1. All participants were from faculty and staff positions at a major university; most were white and male. Additionally future research should compare the emerging cholesterol measures of lipoprotein particle count and size in comparison with risk ratio, HDL-C, LDL-C, and total venous cholesterol measurement. More research is needed to fully understand the differences in cholesterol measurement, their implications for cholesterol management, and their prediction of disease outcomes. Finally, recruitment through a randomized procedure would increase generalizability.

Rodney G. Bowden teaches at Baylor University, Dr. DawnElla M. Rust is on the faculty at Stephen F. Austin State University and Dr. Paul M. Kingery teaches at the University of Hawaii at Manoa.

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Contraceptive Use Among Female Undergraduates of a Nigerian University

by *Chinwe Lucy Marchie*

Abstract

There is generally low rate in the use of contraception among Nigeria females, which could be attributed to culture. This study present report on contraceptive use by female undergraduates. The population of the study was made up of all female Nigerian undergraduates in a particular University. The participants were randomly selected from faculty of Education and social science. A questionnaire survey design was employed for the study. The data was analysed using descriptive statistics of frequency and percentages. The result showed that female undergraduate mostly use safe period (40.2%) as a contraceptive device, while in significant number (11.5%) use condom. The paper concluded by prescribing the use of condom as a method of contraception by sexually active female undergraduates and abstinence for those who can wait.

There is high rate of teenage pregnancy and unsafe abortion in developing countries. The high rate which researchers identified could be significantly reduced if University students knew about a preventive measure they could adopt to avoid unwanted consequences.

They need to know about birth control method, such as condom, which is worn by the male. The condom prevents pregnancy and also prevents transmission of sexually transmitted infections (STI), like HIV/AIDS, among others.

In Nigeria, contraceptive use among adolescents is low (Okonofua, 1995 and Odujirin, 1991). This low rate could be attributed to ignorance because topic of contraception and sexual health is seldom discussed at home or outside their homes and schools. University students who are mostly adolescents and young adults indulge in unprotected sexual activities because they lack adequate reproductive health information. In contrast, some reports found that young people have enough information to prevent unwanted pregnancy and infection but they are either unable or unwilling to apply this information to their everyday life. This was confirmed by Sunmola, Dipeolu, Babalola, (2007) who found a wide disparity between contraceptive knowledge and use. In their findings, contraceptive knowledge rates were between 41.9% and 63.8% while usage rate was between 0.7% and 12.5%. The consequences of the non-usage include infection, whose complications can subsequently lead to infertility and even death. The use of condom as a method of contraception for sexually active undergraduates is very important in order to curb serious, social, economic and health problems. This study presents data on knowledge and use of contraceptives among undergraduates female students of a University in Nigerian Southern Capital City.

Methodology

A survey research design was employed in this study. The population of the study was made up of all female undergraduates

of University of Benin, Benin-City, Nigeria. Participants were randomly selected from the Faculty of Education and Faculty of Social Sciences. These faculties were used because they have large number of female students. The stratified random sampling technique was used to select 870 female students from the departments in the two faculties as sample for the study. The female students were randomly selected from all levels, 100 – 400, the instrument used for the study was a questionnaire on the use of contraceptive developed by the researcher and validated by experts in the field of Health education for content and construct validity. The instrument was pre-tested using twenty-five female undergraduates (Not part of the study sample). A test re-test reliability estimate (two weeks interval) of 0.81 was obtained.

The questionnaire was in two sections. Section A was concerned with demographic data on the respondents, while section B sought information on the knowledge and use of contraceptive. The questionnaire was administered to 870 samples of female students in their various classes and retrieved immediately and this lasted for one week. The completed questionnaires were coded in a computer and subsequently analyzed using descriptive statistics of frequency and percentages.

Results

The results of the study are presented in tables 1,2,3,4 and Figure 1. A total of 870 respondents aged between 19 –24 years participated in this study. Eight hundred and sixty respondent (98.85%) is aware of contraception. Only ten of them (1.15%) exhibited some ignorance – Table 2. Six hundred and eighty respondents use one form of contraception or the other-Table 3 and these included: Oral contraceptives (6.90%), intrauterine device-IUD (8.06%), condom (11.5%).

A good number of respondents (40.2%) use safe period as a method of contraception. Few of the respondents (11.5%), practice abstinence while 21.8% of them did not answer the question – Figure 1. Majority of the respondents (37.93%) had first intercourse between the ages of 19 and 21. Good number (31.03%) had it earlier, other respondents had first intercourse even much earlier, between these ages: 10 – 12 (1.15%), 13 – 15 (3.45%). Only few respondents (2.10%) had the first intercourse after twenty-one years Table 4.

The result clearly indicated considerable discrepancies between awareness and proper use of contraception.

Discussion

Different types of contraception were identified to be used by female undergraduates. Out of 870 students, 680, had used one form of contraception or the other. The one mostly used was safe period (40.2%) followed by abstinence 11.5%. Condom was used by 11.5% while oral pills was used by 6.90%. The low rate in the use of condom may have been as a result of ignorance on the best type of contraception to use (Table 5).

The global rise, in sexually transmitted infections (STIS), especially HIV has opened up a new area of public discourse since

1990s and this has brought the act of sex itself into the limelight. In order to save life especially that of adolescents who are more vulnerable to the infections, many national leaders are starting to openly talk about sexuality, which used to be a taboo.

Worldwide, more than one in 10 adults acquire an STI each year and some 33 million new infections occur annually (Ashford, 2001). Rates of acquisitions of STI and human immunodeficiency virus (HIV) among adolescents remain unacceptably high, highlighting the need for continued prevention efforts (American Academy of Paediatrics, 2005).

Nigeria contributes 10% of the global AIDS burden, while the Federal Ministry of Health has affirmed that 60% of new infections are found in age group 10 –24 years. The reason for this can partly be deduced from this study, where the use of condom as a method of contraception was very low among female Undergraduates, where most of them claimed to use safe period. Condom method could have been more appropriate because of its dual role (prevention of pregnancy and infection). This dual utility of condom could possibly justify its promotion and accessibility.

Therefore a national awareness campaign on importance of condom use especially by sexually active adolescents is necessary. The odds of transmission of infections are reduced to zero if condoms are used correctly and consistently (Akerele and Egbochukwi 2001). Poor use of condom during intercourse

Table 4. Percentage Distribution of Respondents on Age at First Intercourse. (N = 870)

Age	Number of subjects	Percentage (%)
10 –12	10	1.15
13 –15	30	3.45
16 –18	270	31.03
19 –21	330	37.93
21	20	2.10
No response	210	24.14
Total	870	100.00

BAR CHART SHOWING TYPES OF CONTRACEPTIVES

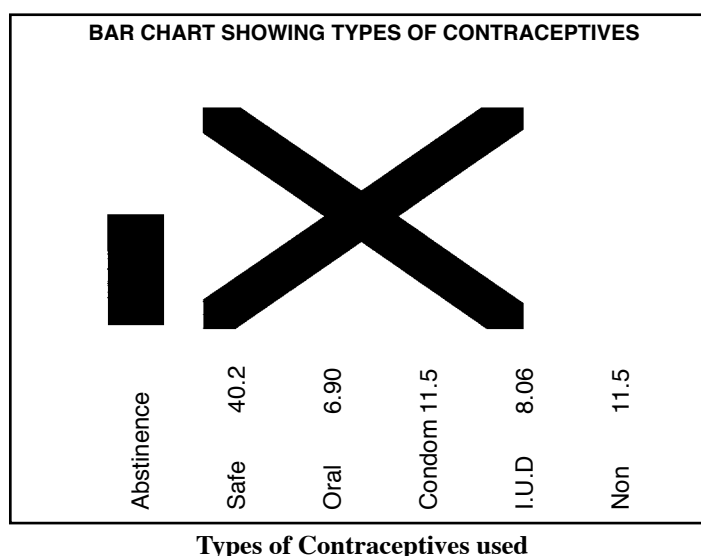


Table 1. Marital Status of Respondents (N = 879)

Marital Status	Number of subjects	Percentage (%)
Single	700	80.46
Married	170	19.54
Total	870	100.00

Table 2. Percentage Distribution of Respondents by Awareness of Contraception (N = 870)

Responses	Number of subjects	Percentage (%)
Are you aware of contraception		
Yes	860	98.85
No	10	1.15
Total	870	100.00

Table 3. Percentage Distribution of Respondents to use of Contraception (N = 870)

Responses	Number of subjects	Percentage (%)
Do you use any type of contraception?		
Yes	680	78.16
No	190	21.84
Total	870	100.00

by female adolescent was reported by center for disease control for the period of 1991 – 1997. The reason given was that most of them are sexually active with older partners who would not want to inconvenience themselves wearing condom or who don't have anything to do with their lives again. Unfortunately, in Nigeria cultural setting, it is unacceptable for woman to be seen in possession of condoms. There is even controversy revolving around the emphasis on the use of condoms as the primary strategy of sex education, despite the fact that the rate of HIV/AIDs and other STDs have remained dangerously high or have increased. In situations where abstinence until marriage and fidelity to an uninfected spouse has been the primary message, the rate of HIV/AIDs and STDs have dramatically lowered. Another noteworthy observation was the age of their first intercourse as observed in this study, where female adolescents had first intercourse very early. This is inconformity with a study conducted by Oloko and Omoboye (1993). They reported that 40% of secondary students in Lagos state, Nigeria experienced very early sexual intercourse. This view was also shared by Adeganga, Morenike, Sunday and Adebayo (2002). The results from different researchers emphasized the need for liberalization in the use of condom by sexually active females which our culture has not imbibed. The use of condom is safer because of its dual role prevention of adolescents pregnancy and reduction in the transmission of sexually transmitted infections,

especially HIV/AIDs, At the world's AIDs conference in July, 2004 in Kampala, Yoweri Museveni, president of Uganda, shocked many people when he insisted that Uganda lowered its rate of HIV/AIDs by 70% in the past decade through abstinence and fidelity and not condoms. The position that abstinence and fidelity are key to stopping the spread of HIV/AIDs, has received support hinged on evidence based studies by World Health Organisation, the Bush administration and UNAIDS.

This paper however, suggests the use of condom by sexually active female undergraduates and abstinence for those who can wait.

Dr. Chinwe Lucy Marchie Is On The Faculty At The School of Nursing, University of Benin Teaching Hospital, Nigeria

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Choices of After-School Physical Activity by Middle School Children

by Wenhao Liu, Jianyu Wang, and Furong Xu

Abstract

Generally, children's physical activity participation during after-school periods reflects children's choices of physical activity. To understand middle school children's choices of after-school physical activity, the Self-Administered Physical Activity Checklist were administered to 187 middle school children (86 boys and 101 girls). Descriptive and inferential statistics were used to identify differences in physical activity choices and yielded the following findings. While lifetime physical activities ranked the top in the numbers of participation, competitive sports were the first contributor to children's after-school physical activity amounts, and this observation was related to the abundant structured competitive sports but limited structured lifetime physical activities available. In addition, the children spent significantly more time in moderate physical activities than vigorous physical activities, but had roughly the same energy expenditure from the both. Finally, structured physical activity participants demonstrated significantly larger physical activity amounts than those who did not participate in structured physical activity.

Overweight and obesity are serious health concern for both children and adults. Data from two administrations of the National Health and Nutrition Examination Survey (1976-1980 and 2003-2004) indicated a rapid increase in the prevalence of childhood overweight in the United States during a roughly 25-year period. For children aged 2-5 years, the prevalence of overweight increased from 5.0% to 13.9%; for those aged 6-11 years, the prevalence increased from 6.5% to 18.8%; and for those aged 12-19 years, the prevalence increased from 5.0% to 17.4% (Center for Disease Control and Prevention [CDC], 2007a; Ogden et al., 2006). During the same period (1976-1980 to 2003-2004), the prevalence of obesity among adults in the United States increased from 15.0% to 32.9% (CDC, 2007b; Ogden et al., 2006).

Overweight children have a higher probability of increase in cardiovascular risk factors, are at greater risk for diabetes, and tend to have higher levels of fasting glucose and insulin related to body fatness, physical inactivity, or low fitness levels (Lohman, Going, & Metcalfe, 2004). Further, overweight children are more likely to become obese adults (Raitakari, Juonala, & Viikari, 2005; Yang et al., 2007), who are inclined to develop a variety of chronic diseases leading to premature death or discounted quality of life.

Physical activity is one of the key factors related to overweight and obesity (Lohman, Going, & Metcalfe, 2004). While numerous studies have been conducted to investigate children's physical activity pattern and amount, and many interventions have been implemented to promote children's physical activity, limited attempts have been made to understand types of physical activity in which children are involved. As with amounts of physical activity, types of physical activity are related to health benefits differently. All official guidelines or recommendations for physical activity

participation state both amounts and types of physical activity that should be performed (National Association for Sport and Physical Education [NASPE], 2004; Pate et al., 1995; Sallis & Patrick, 1994). Additionally, physical activities vary in their availability, affordability, and attainability, and types of physical activity engaged are therefore related to physical activity amount and carryover effect (Hovell, Sallis, Kolody, & McKenzie, 1999; U.S. Department of Health and Human Services [USDHHS], 2000).

While individual sports and physical activities are more flexible and feasible to be carried out, team sports, on the other hand, rely more on adequate number of participants to take place. Lifetime physical activities, because of their higher carryover effect into adulthood, are encouraged and considered to have lifelong health benefits as opposed to competitive activities (Corbin, 2001; Darst & Pangrazi, 2002; Sallis & Patrick, 1994). Compared with unstructured physical activities (free-time physical activities), structured physical activities (organized physical activities) are usually exclusive, less available, more expensive (CDC, 1997), and less likely to lead to lifelong participation in physical activity (Hovell et al., 1999). With respect to physical activity intensity, vigorous activities have larger health benefits than moderate activities, whereas moderate activities are more feasible and attainable, especially for sedentary people, and may achieve considerable health benefits with longer duration and higher frequency (Pate et al., 1995; USDHHS, 2000).

Gender is a factor influencing children's types or choices of physical activity (USDHHS, 2000). It is reported that boys are more likely to participate in competitive team sports, whereas girls tend to engage in sports not usually included in the curriculum and games that focus on personal goals (Busser, Hyams, & Carruthers, 1996; Shropshire & Carroll, 1998). It is also found that boys tend to choose strength training; however, girls prefer activities like dance, aerobics, yoga, and walking (Grunbaum et al., 2002; Leslie, Owen, & Sallis, 1999). Further, boys tend to get more involved in vigorous activities compared with girls (Corbin, Pangrazi, & Masurier, 2004; Grunbaum et al., 2002). This difference in activity intensity between genders has also been reported in Mota and Esculcas' (2002) study, with the finding that significantly more girls than boys belong to the sedentary and low-intensity group.

To better understand children's physical activity participation and its association with obesity, there is a need to further investigate children's choice of physical activity. Choosing to participate in lifetime sports versus competitive sports is an aspect deserving investigation. Lifetime sports, relative to competitive sports, are more likely to contribute to lifelong participation in physical activity because of their higher likelihood of carryover into adulthood (Darst & Pangarzi, 2002). Further, previous research has not included household physical activities or chores when addressing children's choice of physical activity. Many indoor and outdoor chores are classified as moderate-intensity activities (Ainsworth et al., 2000; Craig et al., 2003), which have metabolic equivalent (MET) values of 3 to 6 (Ainsworth et al., 2000). Chores

are also considered as lifetime physical activities, constituting the base level of the physical activity pyramid for both adults (Corbin & Lindsey, 2004) and children (NASPE, 2004).

Moreover, little research, if any, has addressed the impact of availability of different structured sports and physical activities on children's choices of physical activity. School-based structured sport programs usually emphasize competitive team sports, and this could underserve students who are less skilled, less physically fit, or not attracted to competitive sports (CDC, 1997). Structured activity programs in communities often require transportation, fees, or equipment, and might prevent children from low-income families from participating (CDC, 1997). Finally, most relevant literature focuses on choices of physical activity only, and fails to report physical activity amount on specific activities in which children are involved. Further studies including frequency and duration of specific activities are called for in order to obtain a more comprehensive picture and make a more accurate estimate of children's physical activity choices (Hovell et al., 1999).

Generally, children's physical activity participation during after-school periods reflects children's choices of physical activity. This study was designed to broaden the investigation in children's choices of after-school physical activity. Physical activities were categorized into different types and examined based on the following three classifications. The first classification was mode of physical activity, which included lifetime sports, locomotor activities, chores, competitive sports, and developmental games/plays. The second one was intensity of physical activity, which had moderate- and vigorous-intensity activities. The third one was structure of physical activity and it contained structured and unstructured activities. Physical activity amounts (minutes and energy expenditure in METs) and participation proportions in physical activities chosen by children were examined and compared within genders, between genders, or between structured physical activity participants and those who did not participate in structured physical activity (unstructured physical activity participants).

Method

Participants

Five hundred and fourteen students enrolled in physical education classes at three middle schools in a suburban area of the northeastern region of the United States were given the opportunity to participate in the study. Two hundred and twenty-three students returned informed consent forms with their parents' signatures. Measures of physical activity were given to all these 223 students. Students who reported zero minutes of participation in after-school physical activity for the previous days and those who failed to complete the measures three times were excluded from the study. Complete and valid data were obtained for 187 students (86 boys and 101 girls). Caucasian constituted 90.4% of the sample, Latino 4.8%, African American 2.7%, and Asian 2.1%. Mean ages for the entire sample, boys, and girls were 12.67, 12.73, and 12.61 years, respectively.

Instruments

The Self-Administered Physical Activity Checklist (SAPAC; Sallis et al., 1996) was used to assess participants' amount and type of physical activity engaged. The SAPAC is a previous-day

recall physical activity checklist developed especially for school children. It contains a wide range of physical activity, including many child-related physical activities. Some examples of physical activity items are *active games* (chase, tag, and hopscotch), *ball plays* (four square, dodge ball, and kickball), *outdoor play* (climbing trees, hide and seek, etc.), *water play* (in swimming pool, lake, or ocean), *indoor chores* (mopping, vacuuming, sweeping), and *outdoor chores* (mowing, raking, and gardening) in addition to other popular sports in school settings such as basketball and football. Some physical activity items in the SAPAC are grouped with similar activities, such as those just mentioned above. Other physical activity items are for a single sport, such as basketball and volleyball. There are a total of 24 physical activity items listed in the SAPAC. Three blank spaces are provided for reporting engaged activities that were not included in the list.

The SAPAC has cells for participants to report minutes spent in specific activities, and is accompanied with ready-to-use MET values for each activity item based on the *Compendium of Physical Activities* (Ainsworth et al., 2000), which allows for the calculation of physical activity energy expenditure in MET. The SAPAC's test-retest reliability of .65 and validity of .60 against heart rate monitors were reported by the developers (Sallis et al., 1996). Moreover, the SAPAC was adopted for the project of the Child and Adolescent Trial for Cardiovascular Health (Lindsay et al., 2006; Nader et al., 1999) and other studies at public school settings (Chen & Kennedy, 2005; David, 2004; Prochaska, Sallis, Griffith, & Douglas, 2002).

Data Collection

In late spring the SAPAC was administered three times to each participant in a two-week period. Administration days were three different weekdays except Monday to make sure the previous day was a school day. With the help of the physical education teachers, physical education classes were rearranged and merged so the participants could gather in a pre-scheduled testing room for the measures during their physical education classes. The SAPAC protocol was strictly followed to guide the participants through the measures step by step. The participants were asked to recall physical activities they had from the dismissal of the school to the time they went to bed the previous day, and reported only activities that lasted at least five minutes. They were also instructed to report the time (minutes) they were actually active and not to include the time they were resting or waiting for play. In addition, if a physical activity was a structured physical activity for which they reported minutes of participation, they then were required to write a letter "S" next to the physical activity, indicating participation in a structured physical activity. During the SAPAC administrations it was made clear that physical activities with adult organizers or trainers were structured physical activities, and those played spontaneously in free time were not structured physical activities.

Data Treatment and Analysis

In addition to the 24 physical activity items listed in the SAPAC, participation in lacrosse, an interscholastic sport in two of the three schools, was reported by some girls. Thus, there were 25 physical activity items included in the data analysis and they were categorized in three different classifications (Table 1). The

first classification was based on mode of physical activity. The following five modes of activity were identified: (a) locomotor activities (numbers 1 to 4), (b) lifetime sports (numbers 5 to 10), (c) chores (numbers 11 & 12), (d) competitive sports (numbers 13 to 22), and (e) developmental games/plays (numbers 23 to 25). Developmental games/plays were activities in which children, but not adults, tended to participate as a kind of free-time play. In addition, the first three types of physical activity (locomotor activities, lifetime sports, and chores) were considered as lifetime physical activities, which were likely to be carried over through one's lifetime.

The second classification was based on intensity. Physical activities with MET values of 3 to 6 were moderate-intensity activities and those with more than 6 METs were vigorous-intensity activities (Ainsworth, 2000; Pate et al., 1995). Nine of the 25 activity items were in the vigorous physical activity category. These activities included running, swimming laps, skating, football, soccer, hockey, combatives, and lacrosse. The remainder fell in the moderate physical activity category (Table 1). The third classification included structured and unstructured

physical activities depending on whether there were adult activity organizers or trainers. The structured physical activities were also referred to as organized physical activities. The unstructured physical activities were free-time physical activities.

Physical activity minutes, energy expenditure from physical activity expressed as METs, and participation proportions for each physical activity item and category were variables derived from the SAPAC. Energy expenditure in METs was calculated via the formula: minutes of the physical activity divided by 60 and then timed by MET value of the physical activity (Sallis et al., 1996). The value of physical activity minutes and METs for each participant was the mean out of the three SAPAC administrations, representing the daily after-school physical activity amount in school days. Descriptive analyses of physical activity amounts (minutes and METs) and participation proportions were conducted for each physical activity item and category. Inferential statistic tests were conducted to examine differences in physical activity amounts (minutes and METs) and participation proportions in each physical activity item and category between genders and, whenever appropriate, within genders. These inferential statistic

Table 1. Numbers of Participants, Proportions of Participants (POP), Rankings, and Binomial Test Results for Each Specific Physical Activity by Gender

Activity	METs	Boys (n = 86)		Girls (n = 101)		Binomial	
		n (POP ^a)	Rank	n (POP)	Rank	p	ES ^b
1. Bicycling	4.0	36 (.71)	1	15 (.29)	13	.001	.25
2. Mixed walking/running	6.0	18 (.38)	8	29 (.62)	5		
3. Walking	3.3	23 (.37)	6	39 (.63)	2		
4. Running	8.0	31 (.45)	3	38 (.55)	3	.001	.42
5. Swimming laps	7.0	3 (.38)	20	5 (.62)	18		
6. Exercise ^c	8.0	33 (.44)	2	42 (.56)	1		
7. Weight lifting	4.5	29 (.88)	4	4 (.12)	19	.001	.46
8. Skating	9.7	6 (.86)	17	1 (.14)	23		
9. Badminton/tennis	5.7	1 (.25)	23	3 (.75)	21		
10. Dance	4.5	0 (0)	24	19 (1.00)	9	.001	.46
11. Outdoor chores	4.6	26 (.52)	5	24 (.48)	6		
12. Indoor chores	3.5	12 (.29)	14	30 (.71)	4		
13. Gymnastics	4.0	13 (.37)	13	22 (.63)	7	.001	.46
14. Basketball	6.0	14 (.48)	11	15 (.52)	13		
15. Baseball/Softball	5.0	21 (.55)	7	17 (.45)	12		
16. Football	8.0	6 (.86)	17	1 (.14)	23	.001	.46
17. Soccer	7.0	18 (.60)	8	12 (.40)	16		
18. Volleyball	3.0	2 (.33)	21	4 (.67)	19		
19. Hockey	8.0	2 (.67)	21	1 (.33)	23	.001	.46
20. Ball play ^d	5.0	14 (.52)	11	13 (.48)	15		
21. Combatives ^e	8.0	7 (.54)	16	6 (.46)	17		
22. Lacrosse	8.0	0 (0)	24	22 (1.00)	7	.001	.46
23. Active games ^f	5.0	8 (.31)	15	18 (.69)	10		
24. Outdoor play ^g	5.0	18 (.50)	8	18 (.50)	10		
25. Water play ^h	6.0	4 (.67)	19	2 (.33)	22		

Note. Only *p* values indicating significant differences were listed.

^aThe sum of the proportion of participant for both genders equals 1 for any given physical activity item. ^bES is the effect size.

^cExercise includes push-ups, sit-ups, and jumping rope. ^dBall play includes four square, dodge ball, and kickball. ^eCombatives includes judo, competitive karate, and competitive wrestling. ^fActive games include chase, tag, and hopscotch. ^gOutdoor play includes climbing trees and hide and seek. ^hWater play is the play that happens in pool, ocean, or lake.

tests included binomial tests, one-way repeated-measures analysis of variance, paired-samples *t* tests, and one-way multivariate analysis of variance (MANOVA). Further, a two-way MANOVA was employed to examine the physical activity variables between genders and between structured physical activity participants and those who did not participate in any structured physical activity (unstructured physical activity participants). SPSS version 12.0 was utilized for all the data analyses.

Results

Participation Numbers, Frequencies, and Proportions

Table 1 shows numbers of participants, proportions of participants, rankings, and binomial test results for the 25 physical activity items by genders. The rankings were based on the numbers of participants. The top six activities with most participants for the boys were bicycling, exercise (push-ups, sit-ups, and jumping rope), running, weight lifting, outdoor chores, and walking. The girls' top six activities were exercise, walking, running, indoor chores, mixed walking/running, and outdoor chores. The top six choices for both genders were all lifetime physical activities, but with some differences in specific activities. For example, bicycling and weight lifting were among the top six for the boys only and indoor chores were among the top six for the girls only. In addition, there were seven activities (swimming laps, skating, badminton/tennis, football, volleyball, hockey, and water play) that were found to have very limited participants by both genders. Further, two activities, dance and lacrosse, were found to have female participants only (Table 1).

Binomial tests were used to examine differences in proportions of participants in each of the 25 physical activity items between genders. Due to the limited participants in the seven activities just mentioned above, the binomial tests were conducted for the remaining 18 activity items only. Using the Bonferroni method, each binomial test was conducted at a significance level of .0028 for controlling Type I error ($.05 \div 18 = .0028$). The ratio of boys to girls in this study was 86:101, or .46:.54, which was used as test proportions (.46 for the boys and .54 for the girls) for the binomial tests. Significant differences ($p < .0028$) in the proportions of participants between genders were found for five activities. Specifically, boys demonstrated significantly higher participation proportions than did girls in bicycling and weight lifting. Girls showed significantly higher participation proportions than did boys in dance, lacrosse, and indoor chores (Table 1).

Table 2 indicates frequencies of participation, proportions of participation, and rankings for physical activity categories that were associated with the three classifications of physical activity (mode of physical activity, intensity of physical activity, and structure of physical activity). The values of frequency were mean frequencies out of the three SAPAC measures, representing daily frequencies of physical activity participation in each physical activity categories. The boys had a total of 345 frequencies of participation in physical activity with an average of 4.01 for each boy. The corresponding numbers for the girls were 400 and 3.96. The boys participated in seven structured physical activities (gymnastics, basketball, baseball, football, soccer, hockey, and combatives) and the girls participated in eight ones (swimming, dance, gymnastics, basketball, softball, soccer, combatives, and

lacrosse). Binomial tests identified no significant differences in the participation proportions in any physical activity category between genders. With respect to the mode of physical activity, the rankings in frequencies of participation were the same for both genders: locomotor activities, competitive sports, lifetime sports, chores, and developmental games/plays (Table 2). While locomotor activities, which were lifetime activities, ranked first, the frequencies of participation in lifetime sports were lower than those in competitive sports.

Table 2. Frequencies of Participation (FOP), Proportions of Participation (POP), and Rankings in Each Activity Category by Gender

Activity Category	Boys (FOP = 345)		Girls (FOP = 400)	
	<i>n</i> (POP ^a)	Rank	<i>n</i> (POP)	Rank
Mode				
Locomotor activities	108 (.47)	1	121 (.53)	1
Competitive Sports	97 (.46)	2	113 (.54)	2
Lifetime sports	72 (.49)	3	74 (.51)	3
Chores	38 (.41)	4	54 (.59)	4
Developmental games/plays	30 (.44)	5	38 (.56)	5
Intensity				
Moderate activities	114 (.50)		115 (.50)	
Vigorous activities	231 (.45)		285 (.55)	
Structure				
Structured activities	35 (.44)		44 (.56)	
Unstructured activities	310 (.49)		329 (.51)	

Note. Modes of physical activity only were involved in ranking.

^aThe sum of the proportion of participation for both genders equals 1 for any given physical activity category.

Physical Activity Amounts (Minutes and METs)

Table 3 lists the means, standard deviations, and rankings of minutes and METs for the 25 physical activity items. The top six activities with the largest mean values of minutes for the boys were baseball, soccer, bicycling, outdoor chores, weight lifting, and running. For the girls, lacrosse, softball, running, gymnastics, dance, and outdoor chores were top six activities. Competitive sports played an important role in physical activity minutes for both genders. Specifically, baseball and soccer were in the first two places for the boys; lacrosse, softball, and gymnastics ranked first, second, and fourth for the girls in activity minutes. As for energy expenditure, the top six activities with the largest mean values of METs for the boys were soccer, running, baseball, exercise, bicycling, and outdoor chores. For the girls the top six activities were lacrosse, running, softball, soccer, exercise, and mixed walking/running (Table 3). Again, competitive sports (soccer and baseball for the boys and lacrosse, softball and soccer for the girls) contributed greatly to the children's energy expenditure.

Table 4 contains minutes, METs, and rankings for the physical activity categories that are associated with the three classifications of physical activity (mode of physical activity, intensity of physical activity, and structure of physical activity). With respect to the mode of physical activity, the rankings of minutes and METs for both genders were the same: competitive sports, locomotor

Table 3. Means, Standard Deviations, and Ranking for Physical Activity Minutes and METs by Gender

Activity	Boys (n = 86)						Girls (n = 101)					
	Minutes			METs			Minutes			METs		
	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>	Rank
1. Bicycling	15.93	31.34	3	1.06	2.08	5	3.66	10.17	16	.24	.68	18
2. Mixed walking/running	7.09	23.07	11	.71	2.31	8	9.11	20.66	8	.91	2.07	6
3. Walking	8.20	23.79	7	.45	1.31	14	6.63	11.25	12	.36	.62	13
4. Running	12.12	25.22	6	1.62	3.36	2	12.47	24.33	3	1.68	3.26	2
5. Swimming laps	.58	3.55	22	.07	.41	22	3.66	20.92	16	.43	2.44	12
6. Exercise ^a	8.06	14.63	8	1.07	1.95	4	6.93	11.64	11	.92	1.55	5
7. Weight lifting	12.73	23.99	5	.98	1.80	7	.54	2.99	21	.04	.22	23
8. Skating	4.36	17.35	15	.70	2.81	9	.20	1.99	24	.23	.32	19
9. Badminton/tennis	1.40	12.94	20	.13	1.23	21	.50	3.28	22	.05	.31	22
10. Dance	0	0	24	0	0	24	11.20	29.87	5	.84	2.24	8
11. Outdoor chores	13.66	28.72	4	1.05	2.20	6	10.15	28.50	6	.78	2.19	9
12. Indoor chores	3.84	15.24	16	.22	.89	17	8.21	18.03	10	.47	1.05	11
13. Gymnastics	6.80	24.92	12	.45	1.66	14	11.44	30.49	4	.76	2.03	10
14. Basketball	6.49	22.41	13	.65	2.24	11	8.96	32.58	9	.90	3.26	7
15. Baseball/Softball	17.50	40.10	1	1.46	3.34	3	16.68	42.69	2	1.39	3.56	3
16. Football	3.02	14.46	17	.40	1.93	16	.10	1.00	25	.01	.13	25
17. Soccer	17.33	40.83	2	2.02	4.76	1	9.90	31.76	7	1.16	3.70	4
18. Volleyball	.47	3.40	23	.02	.17	23	1.29	7.30	19	.06	.37	20
19. Hockey	1.28	9.92	21	.17	1.32	19	.30	2.99	23	.04	.40	23
20. Ball play ^b	7.62	22.03	10	.63	1.84	13	3.86	14.40	15	.32	1.20	16
21. Combatives ^c	4.88	18.47	14	.65	2.46	11	2.08	9.49	18	.28	1.27	17
22. Lacrosse	0	0	24	0	0	24	22.92	49.23	1	3.06	6.56	1
23. Active Games ^d	1.80	6.41	19	.15	.53	20	3.91	10.31	14	.33	.86	14
24. Outdoor play ^e	7.91	20.71	9	.66	1.73	10	3.96	10.23	13	.33	.85	14
25. Water play ^f	1.86	9.64	18	.19	.96	18	.59	4.2	20	.06	.42	20

^aExercise includes push-ups, sit-ups, and jumping. ^bBall play includes four square, dodge ball, and kickball. ^cCombatives includes judo, competitive karate, and competitive wrestling. ^dActive games include chase, tag, and hopscotch. ^eOutdoor play includes climbing trees and hide and seek. ^fWater play is the play that happens in pool, ocean, or lake.

activities, lifetime sports, chores, and developmental games/plays. When mean differences in minutes and METs between genders were examined with the one-way MANOVA, no difference was identified in any of the nine physical activity categories.

One-way repeated-measures analysis of variance (multivariate test) was adopted to examine the differences in minutes and METs across the five types of physical activity (lifetime sports, locomotor activities, chores, competitive sports, and developmental games/plays) that were associated with the mode of physical activity within genders. The overall *F* tests yielded a significant type effect in both minutes and METs for both genders. Specifically, the results for the boys were Wilks' $\Lambda = .52$, $F_{(4, 82)} = 19.34$, $p < .001$, multivariate $\eta^2 = .49$ for minutes; and Wilks' $\Lambda = .52$, $F_{(4, 82)} = 19.39$, $p < .001$, multivariate $\eta^2 = .49$ for METs. For the girls the statistics were Wilks' $\Lambda = .47$, $F_{(4, 97)} = 26.95$, $p < .001$, multivariate $\eta^2 = .53$ for minutes; and Wilks' $\Lambda = .49$, $F_{(4, 97)} = 25.23$, $p < .001$, multivariate $\eta^2 = .49$ for METs. Pairwise comparisons with paired-samples *t* tests were conducted as follow-up tests to the significant overall *F* tests. Ten pairwise comparisons were involved for either minutes or METs for each gender. Additionally, comparisons in minutes or METs between moderate and vigorous activities

and between structured and unstructured activities were needed for each gender. Therefore, twelve paired-samples *t* tests were conducted for minutes or METs for each gender respectively. The Bonferroni method was used for controlling the Type I error, and the significance level was set at .004 (.05 \div 12 = .004) for each paired-samples *t* test.

The results of the paired-samples *t* tests were listed in Table 5 (the means and standard deviations for each activity type are available in Table 4). With respect to the mode of physical activity, it reveals that the girls spent significantly more minutes and METs in competitive sports than all the other four types of activities. In addition, the girls spent significantly more minutes and METs in locomotor activities and lifetime sports than developmental games/plays. The corresponding results for the boys were similar to those of girls, except the difference in minutes was not significant between competitive sports and locomotor activities. With respect to the intensity of physical activity, both genders demonstrated significantly higher values of minute in moderate activities than vigorous activities. As for the structure of physical activity, the boys, but not girls, spent significantly more minutes and METs in unstructured physical activity than structured physical activity.

Table 4. Means, Standard Deviations, and Ranking for Each Physical Activity Category by Gender

Activity Category	Boys (n = 86)						Girls (n = 101)					
	Minutes			METs			Minutes			METs		
	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>	Rank
Mode												
Locomotor activities	43.34	58.84	2	3.85	5.32	2	31.87	38.74	2	3.18	4.27	2
Competitive sports	65.38	68.42	1	6.46	6.88	1	77.52	76.26	1	7.98	8.38	1
Lifetime sports	27.48	34.87	3	2.96	3.89	3	23.03	39.50	3	2.31	3.97	3
Chores	17.50	34.30	4	1.27	2.48	4	18.27	35.02	4	1.25	2.51	4
Developmental games/plays	11.57	23.96	5	1.00	2.06	5	8.47	17.74	5	.71	1.49	5
Intensity												
Moderate activities	113.64	98.68		8.82	7.94		100.60	76.75		7.85	6.30	
Vigorous activities	51.63	61.44		6.71	7.83		58.55	75.71		7.59	9.82	
Structure												
Structured activities	42.91	64.39		4.35	6.48		75.14	78.81		7.73	8.57	
Unstructured activities	122.36	94.92		11.18	8.79		84.01	68.30		7.71	6.41	

Note: Modes of physical activity only were involved in ranking.

Table 5. Paired-Samples *t*-Test Results for Types of Physical Activity by Gender

Paired Activities	Boys (n = 86)						Girls (n = 101)					
	Minutes			METs			Minutes			METs		
	<i>t</i>	<i>p</i>	<i>d^a</i>	<i>t</i>	<i>p</i>	<i>d</i>	<i>t</i>	<i>p</i>	<i>d</i>	<i>t</i>	<i>p</i>	<i>d</i>
Mode of physical activity												
Locomotor activities vs. competitive sports	-2.33			-2.97	.004	.32	-6.20	.000	.62	-6.17	.000	.61
Locomotor activities vs. lifetime sports	-2.25			-1.33			-1.53			-1.45		
Locomotor activities vs. chores	3.53	.001	.38	4.00	.000	.43	2.73			4.00	.000	.40
Locomotor activities vs. developmental games/plays	5.43	.000	.59	5.29	.000	.57	5.56	.000	.55	5.42	.000	.54
Competitive sports vs. lifetime sports	-4.63	.000	.50	-4.11	.000	.44	-6.01	.000	.60	-5.8	.000	.58
Competitive sports vs. chores	5.51	.000	.59	6.30	.000	.68	6.64	.000	.66	7.40	.000	.74
Competitive sports vs. developmental games/plays	7.00	.000	.75	7.15	.000	.77	8.98	.000	.89	8.63	.000	.86
Lifetime sports vs. chores	1.86			3.37	.001	.36	.89			2.25		
Lifetime sports vs. developmental games/plays	3.53	.001	.38	4.22	.000	.46	3.42	.001	.34	3.89	.000	.39
Chores vs. developmental games/plays	-1.40			-.86			-2.68			-1.96		
Intensity of physical activity												
Moderate activities vs. vigorous activities	4.84	.000	.52	1.73			3.74	.000	.37	.22		
Structure of physical activity												
Structured activities vs. unstructured activities	-6.36	.000	.69	-5.81	.000	.63	-.84			-.02		

Note. Only *p* values indicating significant difference are listed.

^aEffect size.

Roughly speaking, the paired types of physical activity that had significant differences in minutes and/or METs were similar for both genders. That is, the children had a higher physical activity amount in competitive sports than the remaining four types of physical activity (lifetime sports, locomotor activities, chores, and developmental games/plays) within the mode of physical activity. Additionally, the children spent more minutes in moderate activities than vigorous activities, but spent roughly the same METs in the both activity categories.

Structured versus Unstructured Physical Activity Participation

Participants were asked to write a letter "S" to the structured physical activity for which they reported time (minutes) of participation on the previous days during the SAPAC administrations. All the self-claimed structured physical activity participants wrote the letter "S" at least twice out of the three SAPAC administrations and were identified as structured physical activity participants. Thirty-five out of the 86 boys were participants of seven different structured physical activities, which were all competitive sports (gymnastics, basketball, baseball, football, soccer, hockey, and combatives). Forty-four out of the 101 girls participated in eight structured physical activities, six of which were competitive sports (gymnastics, basketball, softball, soccer, combatives, and lacrosse) and two of which were lifetime sports (swimming and dance). The 2×2 (gender \times structure of physical activity) MANOVA was conducted to examine differences in physical activity amount (minutes and METs) between genders and between the structured physical activity participants and the unstructured physical activity participants. The following six variables were involved in the examinations: overall after-school physical activity minutes and METs, competitive sports minutes and METs, and lifetime activity minutes and METs. Competitive sports contained the sports numbering 13 to 22 in Table 1. Lifetime activities were locomotor activities, lifetime sports, and chores, numbering 1 to 12 in Table 1. Descriptive statistics for the two-way MANOVA are listed in Table 6.

The omnibus test of the two-way MANOVA indicated no interaction between the two factors of gender and structure of physical activity, Wilks' $\Lambda = .98$, $F_{(6, 178)} = .48$, $p = .82$. No significant main effect of gender was identified either, Wilks' $\Lambda = .97$, $F_{(6, 178)} = .97$, $p = .45$. The main effect of structure of physical activity, however, was statistically significant with Wilks' $\Lambda = .55$, $F_{(6, 178)} = 24.68$, $p < .001$, and $\eta^2 = .45$. To determine which variables were significantly different between the structured physical activity group and the unstructured physical activity group, univariate F tests were conducted as a follow-up test to the significant main effect of the structure of physical activity. It was found that the structured physical activity participants demonstrated significantly larger amounts than did the unstructured physical activity participants in four variables. These four variables are: (a) overall after-school physical activity minutes, 213.95 vs. 111.62 in means; (b) overall after-school physical activity METs, 21.31 vs. 9.84; (c) competitive sports minutes, 120.43 vs. 24.98; and (d) competitive sports METs, 12.46 vs. 2.27. The statistic results of the univariate F tests for the above four variables are: (a) $F_{(1, 183)} = 58.61$, $p < .001$, $\eta^2 = .24$; (b) $F_{(1, 183)} = 71.94$, $p < .001$, $\eta^2 = .28$; (c) $F_{(1, 183)} = 138.48$, $p < .001$, $\eta^2 = .43$; and (d) $F_{(1, 183)} = 138.00$, $p < .001$, $\eta^2 = .43$. In fact, the structured physical activity group demonstrated twice as many minutes and METs in the overall after-school physical activities and roughly five times as many minutes and METs in competitive sports as the unstructured physical activity group did. No difference, however, was identified in lifetime sports minutes and METs between the two groups.

Discussion

This study examined children's choices of after-school physical activity. The results indicated that both genders shared some encouraging similarities in after-school physical activity choice. All the top six choices of specific physical activity with most participants were lifetime physical activities for both boys (bicycling, exercise, running, weight lifting, outdoor chores, and walking) and girls (exercise, walking, running, indoor chores,

Table 6. Descriptive Statistics for the Two-Way MANOVA

Group	<i>n</i>	After-School PA ^a		Competitive Sports		Lifetime Activities	
		Minutes	METs	Minutes	METs	Minutes	METs
		<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>
Gender × Structure of PA							
Male structured PA	35	229.62±128.23	22.56±12.11	128.13±65.69	13.02±6.49	89.16±88.73	8.48±8.40
Male unstructured PA	51	127.13±84.03	11.37±7.67	28.20±34.60	2.58±3.16	87.81±73.03	7.83±6.75
Female structured PA	44	205.60±96.46	20.64±11.00	116.33±74.47	12.16±8.42	82.35±67.41	7.89±6.93
Female unstructured PA	57	91.20±67.88	7.82±5.79	20.73±28.19	1.86±2.54	59.73±56.69	5.07±4.54
Gender							
Male	86	165.27±113.51	15.53±10.94	65.38±68.42	6.46±6.88	88.31±78.72	8.07±7.36
Female	101	159.16±102.57	15.44±11.17	77.52±76.26	7.98±8.34	73.17±63.96	6.74±6.21
Structure of PA							
Structured PA	79	213.96±108.48	21.31±11.37	120.43±71.40	12.46±7.78	84.72±75.09	8.09±7.44
Unstructured PA	108	111.62±79.14	9.84±7.11	24.98±32.05	2.27±2.91	75.69±67.60	6.64±6.03
^a Physical activity.							

^aPhysical activity.

mixed walking/running, and outdoor chores). With respect to the mode of physical activity, locomotor activities, which were lifetime activities, ranked first in the numbers of participation, and were followed by competitive sports, lifetime sports, chores, and developmental games/plays for both genders. The large numbers of participants in lifetime physical activities reflected the desired outcome in terms of appropriate types of activity chosen (CDC, 1997; NASPE, 1992, 2004).

Gender differences were noticeable as well with regard to the lifetime physical activities chosen. Bicycling and weight lifting were among the top six choices for the boys only, and indoor chores were for the girls only. The gender differences became more obvious as identified with binomial tests. While significantly more boys than girls participated in bicycling and weight lifting, significantly more girls than boys participated in dance, lacrosse, and indoor chores. In fact, there was not a single boy participating in dance and lacrosse. These findings are basically consistent with the previous studies (Grunbaum et al., 2002; Leslie et al., 1999) that boys tend to choose strength training and girls prefer activities like dance, aerobics, yoga, and walking.

While lifetime physical activities occupied the top six positions in the numbers of participation, competitive sports contributed significantly to the children's physical activity amounts. The top two activities in which the children spent the greatest number of minutes were all competitive sports for both boys (baseball and soccer) and girls (lacrosse and softball), with another competitive sport (gymnastics) in the fourth place for girls. Energy expenditure in METs displayed the same pattern. Soccer and baseball were in the first and third places in METs for the boys, and lacrosse, softball, and soccer were in the first, third, and fourth places for the girls. Further, when specific physical activities were grouped into the five categories based on mode of physical activity, competitive sports ranked first in the children's physical activity minutes and METs. The inferential tests indicated that the children spent significantly more minutes and METs in competitive sports than lifetime sports, locomotor activities, chores, and developmental games/plays, with the exception of the boy's minutes in locomotor activities.

The discrepancy in the rankings between the numbers of participation (lifetime physical activities had the largest numbers of participation) and physical activity amounts (competitive sports had the largest activity amounts) was due to striking contrast between the amounts of time spent in lifetime physical activities and competitive sports. Although many more children participated in lifetime physical activities, the time engaged in these physical activities was relatively short. By contrast, while fewer children were engaged in competitive sports, they spent relatively large amounts of time in these competitive sports. This observation was related to the findings of participation in structured competitive sports. All the seven structured physical activities (gymnastics, basketball, baseball, football, soccer, hockey, and combatives) in which the boys participated were competitive sports. Six (gymnastics, basketball, softball, soccer, combatives, and lacrosse) of the eight structured physical activities in which the girls participated were competitive sports. The large number of structured competitive sports ensured much larger amounts of physical activity in competitive sports compared with that in

lifetime physical activities, only two (dance and lacrosse) of which were structured ones. The limited number in structured lifetime physical activities hampered the enhancement of children's minutes and METs in lifetime physical activities.

Previous studies have suggested the similar problems regarding structured versus unstructured physical activities. Santos, Esculcas, and Mota (2004) reported that structured physical activities were characterized by team activities (they are usually competitive sports) and vigorous intensity. Unstructured physical activities were characterized by individual and dual activities (most of them are lifetime activities) and low to moderate intensity. The CDC (1997) also reported that structured sport programs usually emphasized competitive team sports. As a result, children who prefer lifetime sports and activities have primarily to participate in unstructured ones. Unstructured participation, as indicated in this study and previous studies, is characterized with limited participation time and energy expenditure.

Lifetime sports are encouraged for school students due to their carryover effect (Corbin, 2001; Darst & Pangrazi, 2002). It is reported that a considerable portion of the nation's secondary schools emphasize lifetime sports now, and that American Alliance for Health, Physical Education, Recreation and Dance has made great efforts in promoting lifetime sports via Lifetime Sports Education Project (Darst & Pangrazi, 2002). The results in this study, however, still suggest there is a room for improvement in this direction. More after-school structured lifetime sports and physical activities are needed.

Another finding in this study was that the children spent significantly more time (minutes) in moderate physical activities than vigorous physical activities, but spent roughly the same energy (METs) from the both. This observation is reasonable because vigorous physical activities have larger MET values (> 6) than moderate physical activities (3 to 6). Engagement in vigorous physical activities for limited time may result in relatively large amount of energy expenditure.

The results of this study also indicate the significant contribution of participation in structured physical activities to enhancing children's physical activity amount. The structured physical activity group demonstrated twice as large physical activity amount (minutes and METs) as the unstructured physical activity group did during after-school period. The result is consistent with Liu and Chepyator-Thomson's (2004) research in which organized sports participants reported significantly larger amount of physical activity minutes and METs than those who did not participate in any organized sports during after-school period. Given little contribution of physical education classes to meeting daily requirement of physical activity amounts (McKenzie, 2003), engagement in structured physical activities during after-school period may play an important role in enhancing school children's daily physical activity level.

The results of this study, however, do not reflect a comprehensive picture of children's physical activity choices due to the small sample and not including physical activity participation during weekend. In addition, seasonality could be a concern (Booth, 2000). Given the weather condition in the northeastern region of the United States, administration of the questionnaire in only one season (late spring) could not adequately reflect a comprehensive

view of physical activity habits of school children in that area. Further research is needed for better understanding the issue.

In summary, this study revealed the following findings. Lifetime physical activities ranked top in the number of participation, but competitive sports were the first contributor to the children's after-school physical activity amounts (minutes and METs). The children spent more time in moderate physical activities than vigorous physical activities, but had roughly the same energy expenditure from the both. Further, the structured physical activity participants demonstrated significantly larger physical activity amounts than unstructured physical activity participants. The contribution of this study to the body of knowledge is the findings that the children spent more time and energy in competitive sports than any other type of physical activity during after-school period, and this observation was related to the availability of abundant structured competitive sports but limited structured lifetime physical activities.

The present study suggests following implications. Providing after-school structured physical activity programs may be one of the most important interventions to promoting children's physical activity amount. Current physical activity recommendation for children suggests an accumulation of as least 60 minutes, and up to several hours of daily physical activity (NASPE, 2004). This amount of physical activity could not be fulfilled with physical education programs alone, especially when physical education programs have fallen to a nationwide marginalized condition. After-school spontaneous (free-time) physical activity lacks educational function and contributes limited additional physical activity amounts. Secondly, after-school structured programs need to contain more lifetime sports and activities. This will not only provide physical activity opportunities for children who prefer lifetime sports and activities and improve their current physical activity level, but also enhance the carryover effect of physical activity participation when they become adults. Finally, for children who may not enjoy any sort of sports, non-sport activity programs such as fitness clubs or jogging clubs should be provided.

Obesity and sedentary lifestyle should be treated as chronic diseases. That is, constant, year-round, and multiple-level interventions, supervisions, and personal contacts should be systematically provided for obese and sedentary individuals to ensure a long-term success in physical activity promotion (Perri & Corsica, 2002). Public schools and communities are one of such physical activity intervention providers at a unique level that may set a successful base for lifespan physical activity participation for children.

Dr. Wenhao Liu teaches at Slippery Rock University, Slippery Rock, PA, Dr. Jianyu Wang is on the faculty at California State University, Bakersfield, CA. and Dr. Furong Xu teaches at the University of Rhode Island, Kingston, RI.

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INTERNATIONAL
OLYMPIC
COMMITTEE

The President



RECEIVED JUL 17 2007

To:
IOC Members
IOC Honorary Members
IOC Honour Members
IOC Commissions
International Olympic Summer
and Winter Sports Federations
International Recognised
International Federations
National Olympic Committees
Olympic Games Organising
Committees
Recognised Organisations
TOP Partners

Lausanne, 7 July 2007

Ref. No C/F/M/MH/MdH/CJO/COM/OR/FR/TOP/132/2007/JRO/cpcy

Call for Contributions for the 2009 Olympic Congress

Dear Sir or Madam,

During the 119th Session of the International Olympic Committee in Guatemala City, I presented to the IOC members the progress made in the organisation of the Olympic Congress, which will take place from 3 to 5 October 2009 in Copenhagen.

Furthermore, I launched an appeal inviting you to contribute to the Congress without delay.

Thus, you will find attached two founding documents of the Congress. One is the Regulations, which establish the framework in which the Congress will lie. The other is the call for contributions, which presents the themes and sub-themes that will be addressed during the Congress.

As you will see in the Regulations, the Congress will take place in several phases.

The first, which begins today, is devoted to collecting contributions from Olympic Family members through an extranet totally dedicated to this purpose. This phase will last until 31 December 2008.

In parallel to the Olympic Family consultation, a vast public consultation will be launched for certain themes and will last for the whole of 2008. At the end of this phase, the main trends will be extracted.

The beginning of 2009 will be devoted to summary work, as well as the publication of the Proceedings.

Finally, we will be in Copenhagen to discuss all together the main trends derived from the consultation phase while evaluating the main recommendations which we will be able to make for the future of the Olympic Movement.

INTERNATIONAL OLYMPIC COMMITTEE

Château de Vidy, 1007 Lausanne, Switzerland, Tel +41 21 621 6111 / Fax +41 21 621 6216 / www.olympic.org



You will understand, given the approach that we have chosen for this Congress, that your participation is crucial and that your contributions are essential to the future of the Olympic Movement. I am counting on you!

Best regards,

A handwritten signature in black ink, reading "Jacques Rogge". The signature is fluid and cursive, with the first name "Jacques" and the last name "Rogge" clearly distinguishable.

Jacques Rogge
IOC President

Encl. : 2009 Olympic Congress Regulations
Call for contributions



INTERNATIONAL
OLYMPIC
COMMITTEE

2009 Olympic Congress Regulations

Approved by the Executive Board on Thursday 26 April 2007
Patrice Cholley / PCY / Director General's Office
Original text in French



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Foreword

This is the reference document which governs all of the organisation of the Olympic Congress to be held in Copenhagen (Denmark) from 3 to 5 October 2009.

1. General organisation

In accordance with the provisions of the Olympic Charter, the President of the International Olympic Committee (IOC) has convened an Olympic Congress in Copenhagen from 3 to 5 October 2009.

The Congress is organised by the IOC, which delegates the preparation to the 2009 Congress Commission, chaired by the IOC President. The IOC President also chairs the Olympic Congress itself.

Extract of the Olympic Charter

In force as from 1 September 2004, pp: 13-14

"[...] Rule 4: Olympic Congress"

The Olympic Congress gathers representatives of the constituents of the Olympic Movement, at intervals determined by the IOC; it is convened by the IOC President; its role is consultative.

Bye-Law to Rule 4

1 The Olympic Congress is convened by the President, upon decision of the Session, and organised by the IOC at a place and on a date determined by the Session. The President shall preside and determine the procedure.

2 The Olympic Congress is attended by the members, Honorary President, honorary members and honour members of the IOC, the delegates representing the IFs and the NOCs; it may also include representatives of organisations recognised by the IOC. In addition, the Olympic Congress is attended by athletes and personalities invited in their individual or representative capacity.

3 The IOC Executive Board determines the agenda of the Olympic Congress after consultation with the IFs and the NOCs. [...]"

2. Themes and sub-themes

At the first meeting of the 2009 Congress Commission held on 21 June 2006, the title of the Congress was chosen: **"The Olympic Movement in Society"**.

The Congress has five main themes, each of which has three sub-themes.

Themes and sub-themes

Theme 1 : The Athletes

1.1 Relationship between the athletes, the clubs, federations and the NOCs

1.2 Health protection in training and competition

1.3 The social and professional life of athletes during and after elite competition

Theme 2 : Olympic Games

2.1 How to keep the Games as a premier event?

2.2 Olympic values

2.3 Universality and developing countries

Theme 3 : The Structure of the Olympic Movement

3.1 The autonomy of the Olympic Movement

3.2 Good governance and ethics

3.3 The relationships between the Olympic Movement and its stakeholders

Theme 4 : Olympism and Youth

4.1 Moving towards an active society

4.2 Is competitive sport still appealing?

4.3 Youth sport events

Theme 5 : The Digital Revolution

5.1 A new management of sports rights

5.2 How to increase the size of the sports audience?

5.3 Communication with stakeholders in the digital age

3. Composition of the Congress

3.1. Congress participants

IOC members, honorary members and honour members;

Representatives of the International Federations;

Representatives of the National Olympic Committees;

Athlete representatives;

Representatives of Organising Committees for past and future Games of the Olympiad and Olympic Winter Games (2006 – 2008 – 2010 – 2012 – 2014);

Representatives of the athletes' support staff (coaches, doctors and medical staff);

Representatives of the referees, judges and technical officials;

Representatives of the IOC's Olympic Partners;

Media representatives.

3.2. Observers

Representatives of sports organisations or other guests of the Congress Chairman.

4. The various stages of preparation for the 2009 Congress in Copenhagen

	2007						2008												2009									
	07	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10
Call for contributions																												
Opening of virtual Congress																												
Olympic family virtual Congress																												
Contribution to the Congress by the public																												
Close of virtual Congress																												
Selection of contributions																												
Writing of summaries																												
Publication of contributions																												
Drafting of recommendations and draft of final document																												
Communication of list of speakers																												
2009 Olympic Congress																												

4.1. Call for contributions

At the 119th IOC Session, taking place from 4 to 7 July 2007 in Guatemala City, the virtual Congress concept will be presented to all the IOC members. **During the Session, the call for contributions will be made formally by the IOC President, in the form of a communication to the whole Olympic family.** The present document is a set of rules for the whole project, and a reference document for the call for contributions.

4.2. The virtual Congress

At the 119th IOC Session, taking place from 4 to 7 July 2007 in Guatemala City, the virtual Congress concept will be presented to all the IOC members. The virtual Congress will last from **1 October 2007 to 31 December 2008.**

Two initiatives will be launched in parallel:

1. After the call for contributions, the first initiative consists in opening the Congress extranet to all the Congress participants defined in article 3. Anyone registered for the Congress ([Annex 1](#)) and recognised by the various constituents of the Olympic Movement thus has the possibility of sending contributions to the Congress secretariat from **1 October 2007 to 31 December 2008 at the latest.** Contributions must be in French or English, and sent in electronic format based on the model defined by the Congress secretariat ([Annex 2](#)). They must not be longer than 1,000 words (two A4 pages). A maximum of two contributions per person will be taken into consideration, provided that the contributions are not on the same theme. All contributions will be submitted to the editorial committee, which will summarise and shorten them where necessary to avoid redundancies and any overlapping. They will be published on the extranet once they have been certified, and can be consulted by all registered Congress participants who have received their extranet access codes. The extranet for the virtual Congress will be accessible as of **1 October 2007; it will be closed on 31 December 2008 at the latest.** Contributions may be consulted until the time of the Congress, but none will be taken into consideration after 31 December 2008.

2. After the call for contributions, the second initiative consists in opening an area on the IOC website for the public. This area will list all information on the purpose of the Congress and will present some themes and sub-themes. Using an electronic document with a pre-defined format (Annex 3) the public will be able to send the IOC a contribution, in French or English, on one or more of the Congress themes and sub-themes. A maximum of two contributions per person will be taken into consideration, provided that the contributions are not on the same theme. They must not be longer than 1,000 words (two A4 pages). A selection of contributions from the public will be submitted by the Congress secretariat to the members of the editorial committee, who will decide which are worth publishing in the Congress proceedings. The public may send contributions by electronic mail to the address indicated on the IOC website from **1 January to 31 December 2008 at the latest**.

4.3. Congress contributions

At the end of the virtual Congress, the contributions submitted during this phase which have been published on the extranet will then be bound to form volume 1 of the Congress proceedings. Wherever possible, this volume will be sent to all the Congress participants or distributed to them upon their arrival in Copenhagen.

4.4. Summaries and recommendations

After the virtual Congress, the editorial committee will analyse the various contributions to identify the main trends by theme and sub-theme. These summaries will be submitted to the members of the 2009 Congress Commission.

Based on the summaries produced by theme and sub-theme, the members of the 2009 Congress Commission will establish the main orientations for the recommendations to be included in the draft final document. The editorial committee will produce the draft of the final document.

4.5. The final document of the Congress

The final document of the Congress will consist of a succinct written declaration, in the form of recommendations, which will reflect the main thrust of the orientation which it is desirable to give to the work of the Olympic Movement.

After the three days of the Congress in Copenhagen, from 3 to 5 October 2009, the draft final document will be adapted in line with the discussions. It will be submitted to the members of the 2009 Congress Commission.

The IOC President will present the draft final document of the Congress to the Congress at its closing session.

4.6. The Olympic Congress in Copenhagen from 3 to 5 October 2009

The Congress format will be as follows:

The discussions on each theme and sub-theme will take place at the Olympic Congress to be held in Copenhagen from 3 to 5 October 2009.

The Congress timetable will be as follows.

Congress timetable

The Congress will be held over three days, in accordance with the programme below.

Day 1		Day 2		Day 3	
9h00-9h45	Opening ceremony	9h00-10h30	Theme 3 (Plenary session)	9h00-10h30	Theme 5 (Plenary session)
9h45-10h00	Break				
10h00-11h30	Theme 1 (Plenary session)	10h30-10h45	Break	10h30-10h45	Break
11h30-11h45	Break	10h45-12h00	Theme 3 Sub-themes 1, 2, 3 (Discussion sessions)	10h45-12h00	Theme 5 Sub-themes 1, 2, 3 (Discussion sessions)
11h45-13h00	Theme 1 Sub-themes 1, 2, 3 (Discussion sessions)	12h00-14h00	Meal	12h00-14h00	Meal
13h00-15h00	Meal	14h00-15h30	Theme 4 (Plenary session)	14h00-15h30	Adaptation of final document by the 2009 Congress Commission
15h00-16h30	Theme 2 (Plenary session)	15h30-15h45	Break	15h30-15h45	Break
16h30-16h45	Break	15h45-17h00	Theme 4 Sub-themes 1, 2, 3 (Discussion sessions)	15h45-17h00	Presentation of final document and end of the Congress
16h45-18h00	Theme 2 Sub-themes 1, 2, 3 (Discussion sessions)				

Each theme will be addressed during three hours (including break).

Plenary session for each theme

The work on each theme will begin with a 90-minute plenary session. During this session, the first speaker will give a 30-minute general presentation. Then, representatives of the IOC, the IFs, NOCs, the athletes OR the Organising Committees OR the media (tbd depending on the theme) will each give a 15-minute presentation to establish the general framework for the discussions. The Congress Chairman decides who will be the first speaker who opens the plenary session of each theme.

The plenary sessions will be organised as follows:

Timing	Plenary session for the theme		
00 mins -> 30 mins	First presentation by a keynote speaker		
30 mins -> 45 mins	An IOC representative		
45 mins -> 60 mins	An NOC representative		
60 mins -> 75 mins	An IF representative		
75 mins -> 90 mins	An athlete OR Organising Committee OR media representative (tbd depending on the theme covered)		
90 mins -> 105 mins	Break		
	Discussion sessions for each sub-theme		
105 -> 180 mins	Sub-theme 1	Sub-theme 2	Sub-theme 3

The theme will be covered in a plenary session held in a specific location. After the break, a discussion on each sub-theme will be organised in three different locations.

Discussion sessions for each sub-theme

The discussion sessions will last 90 minutes each. The three sub-themes will be addressed in parallel in three different rooms. Each session will be chaired by a moderator chosen beforehand by the 2009 Congress Commission. The discussion sessions on the sub-themes will take place as follows:

Timing	Timing	Discussion sessions for sub-themes 1, 2 and 3
	105 -> 115 mins (10 mins)	1 moderator
	115 -> 120 mins (5 mins)	1 IOC representative
	120 -> 125 mins (5 mins)	1 NOC representative
	125 -> 130 mins (5 mins)	1 IF representative
	130 -> 135 mins (5 mins)	1 athlete OR Organising Committee OR media representative (tbd depending on the theme covered)
	135 mins -> 180 mins (45 mins)	Discussions

The moderator will spend 10 minutes introducing the sub-theme. He or she will then give the floor to the representatives of the IOC, IFs, NOCs and the athletes OR the Organising Committees OR the media (tbd depending on the theme), who will have 5 minutes each. The moderator will then open the floor to discussion for 45 minutes by all the Congress participants present in the room.

The moderator will ensure the proper conduct of the discussion and manage speaking times.

The moderator will ensure that each Congress participant who wishes to speak has the chance to do so. He or she will also ensure that there is a fair balance of speakers from among the various Olympic family representatives.

When the moderator invites someone to speak, he or she will ask the person to introduce him or herself and speak in French or English, and to speak for no more than two minutes, to allow the maximum number of Congress participants to take the floor.

If he or she deems it necessary, the moderator may ask a representative of the IOC, the IFs, the NOCs and the athletes OR the Organising Committees OR the media (tbd depending on the theme), or a person taking part in the session, if he or she wishes to respond to the speaker. In such cases, the moderator will point out that the length of this response must not exceed two minutes.

The moderator may intervene at any time if he or she feels it necessary to reframe the discussion.

Access to the Congress

The Congress sessions are not public, and only duly accredited persons may take part in the discussions. Duly accredited media (press, radio and television) may follow all the work of the Congress.

All the discussions will be filmed and recorded.

After the Congress, the recordings may be consulted at the IOC Information Management Department.

4.7. Languages

The official languages of the Congress are French and English. All official documents will be distributed in these two languages only.

Simultaneous interpretation will be provided for the plenary sessions, in French, English, German, Spanish, Russian and Arabic.

Simultaneous interpretation will be provided for the discussion sessions in French and English. In the discussion sessions, speakers may speak only in French or English.

4.8. Congress proceedings

The Congress proceedings will be composed of:

- the contributions submitted by the Congress participants during the virtual Congress (volume 1);
- the official minutes of the Congress discussions;
- the final document of the 2009 Congress.

The drafting, publication and distribution of the Congress proceedings in French and English will be performed exclusively by the IOC.

Any dispute arising from these proceedings will be settled by the IOC Executive Board.

4.9. Follow-up to the Congress recommendations

The final document and recommendations of the Congress will be presented to the IOC Session.

4.10. Key dates

4 to 7 July 2007	Call for contributions for the 2009 Congress
1 October 2007	Opening of the virtual Congress
1 October 2007 to 31 December 2008	Receipt and publication of contributions on the extranet created for this purpose
1 January 2008 to 31 December 2008	Receipt of contributions from the public and selection of the most relevant documents
31 December 2008	Close of virtual Congress and collation of contributions
1 January 2009 to 31 May 2009	Writing of summaries
June 2009	Publication of volume 1 of the Congress proceedings containing all the contributions
1 June to 30 September 2009	<ul style="list-style-type: none">○ Drafting of recommendations and draft of final document○ Communication of official list of Congress speakers
3 to 5 October 2009	Olympic Congress

5. Roles and responsibilities

5.1. 2009 Congress Commission

The 2009 Congress Commission coordinates the entire project.

The 2009 Congress Commission is responsible for:

- establishing the general framework of the Congress;
- determining the themes and sub-themes of the Congress;
- validating the content of the Congress publications, as proposed by the editorial committee;
- approving the list of speakers at the Congress;
- drafting the recommendations;
- producing the draft of the final document.

5.2. The 2009 Congress editorial committee

The editorial committee coordinates all the content and presentations at the Congress.

The editorial committee for the 2009 Congress is responsible for:

- certifying the contributions published on the virtual Congress extranet;
- proposing to the 2009 Congress Commission all the contributions published in volume 1 of the Congress proceedings;
- helping to draft the recommendations;
- helping to produce the draft of the final document.

5.3. The 2009 Congress secretariat

The 2009 Congress secretariat endeavours to provide all the support needed for the efficient coordination of the whole project.

The 2009 Congress secretariat is responsible for:

- implementing the support needed for the efficient holding of the Congress;
- ensuring that the contributions are forwarded to the editorial committee;
- coordinating the publication of volume 1 of the Congress proceedings containing the contributions;
- assisting the moderators responsible for chairing the discussions;
- helping to draft the recommendations;
- helping to produce the draft of the final document.

The 2009 Congress secretariat is provided by the IOC.

6. Annex 1: Congress registration form

7. Annex 2: Model for contributions to the Congress from Congress participants

8. Annex 3: Model for contributions to the Congress from the general public

6. Annex 1: Congress registration form

7. Annex 2: Model for contributions to the Congress from Congress participants

8. Annex 3: Model for contributions to the Congress from the general public

ANNEX 1

Congrès olympique 2009 / 2009 Olympic Congress
Copenhagen - Danemark / Copenhagen - Denmark
3-5 octobre/ 3-5 October 2009

FORMULAIRE D'INSCRIPTION / REGISTRATION FORM	
<input type="checkbox"/> M./Mr <input type="checkbox"/> Mme/Mrs <input type="checkbox"/> Mlle/Ms	
Nom/Family name	Prénom/Given name
Organisation/Organisation	
Fonction/Function	
Adresse/Address	
Téléphone/Phone Fax	Téléphone mobile/Mobile Adresse électronique/E-mail
Nationalité/Nationality	
CONTRIBUTION AU CONGRÈS / CONTRIBUTION TO THE CONGRESS	
<p>Je souhaite contribuer au(x) thème(s) suivant(s) / I wish to contribute to the following theme(s):</p> <p>Thème(s) choisi(s) / chosen: <input type="checkbox"/> Theme 1 <input type="checkbox"/> Theme 2 <input type="checkbox"/> Theme 3 <input type="checkbox"/> Theme 4 <input type="checkbox"/> Theme 5</p> <p>Titre du sous-thème du thème choisi / Title of sub-theme of the chosen theme:</p> <p>Titre du sous-thème du thème choisi / Title of sub-theme of the chosen theme:</p> <p>Un congressiste ne peut pas contribuer à plus d'un sous-thème par thème. / A Congress participant may not contribute to more than one sub-theme per theme.</p> <p>Un congressiste peut proposer un maximum de deux contributions pour autant que celles-ci ne concernent pas le même thème. / A Congress participant may propose a maximum of two contributions, but not on the same theme.</p>	

ANNEX 1

Congrès olympique 2009 / *2009 Olympic Congress*
Copenhague - Danemark / *Copenhagen - Denmark*
3-5 octobre/ *3-5 October 2009*

<p>Je représente / <i>I am representing:</i></p>	<p><input type="checkbox"/> CIO / IOC Indiquez le nom de la personne de contact si vous n'êtes pas membre du CIO / <i>Indicate the name of the contact person if you are not an IOC member.</i></p> <p>_____</p> <p><input type="checkbox"/> CNO / NOC Indiquez le nom du CNO et de la personne de contact. <i>Indicate the name of the NOC and the contact person.</i></p> <p>_____</p> <p><input type="checkbox"/> FI / IF Indiquez le nom de la FI et de la personne de contact. <i>Indicate the name of the IF and the contact person.</i></p> <p>_____</p> <p><input type="checkbox"/> Athlètes/ Athletes Indiquez le nom de la personne de contact. <i>Indicate the name of the contact person.</i></p> <p>_____</p> <p><input type="checkbox"/> Comité d'organisation / Organising Committee Indiquez le nom du comité d'organisation et de la personne de contact. <i>Indicate the name of the Organising Committee and the contact person.</i></p> <p>_____</p> <p><input type="checkbox"/> Médias / Media Indiquez le nom du média représenté et de la personne de contact. <i>Indicate the name of the media organisation and the contact person</i></p> <p>_____</p> <p><input type="checkbox"/> Autre / Other, veuillez préciser / <i>please specify:</i></p> <p>_____</p>
<p>Signature du congressiste / <i>Congress participant's signature</i></p>	

ANNEX 2

Congrès olympique 2009 / *2009 Olympic Congress*
Copenhague - Danemark / *Copenhagen - Denmark*
3-5 octobre/ *3-5 October 2009*

CONTRIBUTION AU CONGRÈS 2009 / *CONTRIBUTION TO THE 2009 CONGRESS*

Cette contribution ne peut être prise en considération que si le formulaire d'inscription au Congrès (ANNEXE 1 de l'appel à contribution) a été dûment rempli et retourné au secrétariat du Congrès. / *This contribution can be taken into consideration only if the Congress registration form (ANNEX 1 of the call for contributions) has been duly completed and returned to the Congress secretariat.*

Nom / <i>Family name</i>	
Prénom / <i>Given name</i>	
Organisation représentée / <i>represented</i>	

Je souhaite contribuer au thème suivant / *I wish to contribute to the following theme:*

Thème choisi / *Theme chosen:*

Sous-thème choisi / *Sub-theme chosen:*

Texte original en / *Original text in :*

Titre de la contribution / *Title of contribution*

Résumé de la contribution / *Summary of contribution*

150 mots maximum / *150 words maximum*

Contribution

1 000 mots maximum / *1,000 words maximum*

ANNEX 3

Congrès olympique 2009 / 2009 Olympic Congress
Copenhagen - Danemark / Copenhagen - Denmark
3-5 octobre/ 3-5 October 2009

CONTRIBUTION DU PUBLIC AU CONGRÈS 2009 / CONTRIBUTION BY THE PUBLIC TO THE 2009 CONGRESS

Nom / Family name	
Prénom / Given name	
Sexe / Sex	
Nationalité / Nationality	
Adresse / Address	
Pays / Country	
Téléphone	
Téléphone mobile	
Adresse électronique / Email address	
Je souhaite contribuer au thème suivant / I wish to contribute to the following theme:	
Thème choisi / Theme chosen:	
Sous-thème choisi / Sub-theme chosen:	
Texte original en / Original text in :	
Titre de la contribution / Title of contribution :	
Résumé de la contribution / Summary of contribution :	
150 mots maximum / 150 words maximum	
Contribution	
1 000 mots maximum / 1,000 words maximum	



INTERNATIONAL
OLYMPIC
COMMITTEE

Call for contributions to the 2009 Congress

Created 21 May 2007 and updated 19 June 2007
Patrice Cholley / PCY / Director General's Office
Original text in French

Foreword

This document complements the **Olympic Congress Regulations** which were approved by the IOC Executive Board on 26 April 2007 and which govern all organisational aspects of the Olympic Congress, to be held in Copenhagen (Denmark) from 3 to 5 October 2009.

The aim of this document is to define areas of study in order to guide those called upon to contribute to each theme and sub-theme at the Congress.

At the first meeting of the 2009 Congress Commission, held on 21 June 2006, it was decided that the title of the Congress would be; "**The Olympic Movement in Society**".

The Commission then set out five main themes, each with three sub-themes.

Themes and sub-themes

Theme 1 : The Athletes

- 1.1 Relationship between the athletes, the clubs, federations and the NOCs
- 1.2 Health protection in training and competition
- 1.3 The social and professional life of athletes during and after elite competition

Theme 2 : Olympic Games

- 2.1 How to keep the Games as a premier event?
- 2.2 Olympic values
- 2.3 Universality and developing countries

Theme 3 : The Structure of the Olympic Movement

- 3.1 The autonomy of the Olympic Movement
- 3.2 Good governance and ethics
- 3.3 The relationships between the Olympic Movement and its stakeholders

Theme 4 : Olympism and Youth

- 4.1 Moving towards an active society
- 4.2 Is competitive sport still appealing?
- 4.3 Youth sport events

Theme 5 : The Digital Revolution

- 5.1 A new management of sports rights
- 5.2 How to increase the size of the sports audience?
- 5.3 Communication with stakeholders in the digital age

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1. Theme 1 : The Athletes

Theme 1	The Athletes
Sub-theme 1.1	Relationship between the athletes, the clubs, federations and the NOCs
Background of the sub-theme	Athletes are supported by a structure composed of various bodies, including clubs, national and international federations and NOCs. These bodies each have a number of key roles and responsibilities to the athletes and vice versa. The Olympic Movement should evaluate whether the existing structures are still satisfactory or whether adjustments should be made in order to better protect the interests of both the athletes and the various bodies involved in the support structure.
Focus of study	<p>Elite athletes What rights, roles and responsibilities do athletes have in relation to clubs, national and international federations and NOCs, as well as the sports events in which they participate?</p> <p>Roles and responsibilities vis-à-vis elite athletes In what areas do clubs, federations and NOCs have a responsibility towards elite athletes? Should the areas of responsibility that clubs, federations and NOCs have towards athletes be more clearly defined?</p> <p>Are elite athletes sufficiently represented within the management structures of clubs, federations and NOCs?</p> <p>Elite athletes, amateur athletes and individuals who participate in sport and physical activity (Sport for all) What are the roles and responsibilities towards individuals who participate in sport and physical activity?</p> <p>Communication between athletes How can communication between athletes be improved?</p>

Theme 1	The Athletes
Sub-theme 1.2	Health protection in training and competition
Background of the sub-theme	Athletes' health is one of the key concerns of the Olympic Movement. Issues for consideration in this area include education, information, treatment, prevention and anti-doping. The Olympic Movement should evaluate where improvements still need to be made in terms of the protection of athletes' health.
Focus of study	<p>The role of sports bodies Which sporting and non-sporting bodies are best placed to communicate with athletes on issues relating to their health?</p> <p>Athletes' health Should athletes receive continued education and training throughout their career regarding the implications of practising their chosen sport on their long-term health?</p> <p>Should the general approach to training and competition be reviewed, particularly where young athletes are concerned? What role should parents contribute?</p> <p>Athletes' bodies Should new technical rules and new technologies be subject to more in-depth risk assessments regarding their impact on athletes' bodies before they are introduced into a particular sport?</p>

Theme 1	The Athletes
Sub-theme 1.3	The social and professional life of athletes during and after elite competition
Background of the sub-theme	From the very start of their career in sport, athletes should be given the opportunity to prepare for life after elite competition. Athletes should be able to live life with as much continuity and stability as possible at both social and professional levels. The Olympic Movement should re-evaluate its position regarding the retraining of athletes.
Focus of study	<p>Athletes' life Should athletes receive specific support or assistance in achieving a level of stability or continuity (both social and professional) during and after elite competition?</p> <p>Agents' status What should be the role of an agent?</p> <p>Should agents be given a status that meets specific criteria before they are allowed to manage an athlete's career?</p> <p>Should agents be trained to strike the right balance between support for an athlete in "commercial" matters and support in the "social" sphere?</p> <p>The role of sporting and non-sporting bodies Which bodies are best qualified to provide athletes with continuity over the different stages of their social and professional life?</p> <p>To what extent should the different partners of the Olympic Movement, whether they are involved directly with sport or not, be more involved in the different stages of athletes' social and professional lives?</p>

2. Theme 2 : Olympic Games

Theme 2	Olympic Games
Sub-theme 2.1	How to keep the Games as a premier event?
Background of the sub-theme	Athletes, referees, judges, spectators, organisers, volunteers, the media, commercial partners and members of the public experience the Olympic Games as an extraordinary event. Since the first Olympic Games of the modern era were held in Athens, Greece in 1896, the Olympic Movement has consistently worked to improve the organisation of the event, taking into account all aspects of the environment in which it is held.
Focus of study	<p>Olympic Games By which criteria do we measure the Olympic Games as a premier event?</p> <p>Development of the Olympic Games What initiatives are necessary in order to ensure that future Games continue to be viewed as a premier event?</p>

Theme 2	Olympic Games
Sub-theme 2.2	The Olympic values
Background of the sub-theme	One of the fundamental principles of Olympism is that Olympism is a philosophy of life, exalting and combining in a balanced whole the qualities of body, will and mind. Blending sport with culture and education, Olympism seeks to create a way of life based on the joy found in effort, the educational value of leading by example and a respect for fundamental universal ethical principles. The Olympic Movement should evaluate whether the Olympic Games still help to promote the Olympic ideals and whether the Olympic values continue to contribute to the success of the Olympic Games.
Focus of study	<p>Awareness of the Olympic values Are the Olympic Games still in the service of Olympism, a philosophy of life, exalting and combining in a balanced whole the qualities of body, will and mind? To what extent does Olympism still blend sport with culture and education?</p> <p>Promotion of the Olympic values What is the best way of promoting Olympic values?</p> <p>Other performance criteria Should performance criteria other than victory itself be taken into consideration and rewarded?</p>

Theme 2	Olympic Games
Sub-theme 2.3	Universality and developing countries
Background of the sub-theme	The principle of universality is based on the ability of a maximum number of countries in the world to participate in all the major sports events organised by the members of the Olympic Movement. This principle largely depends on the success of the Olympic Family assisting with the design and implementation of policies which promote universality in developing countries.
Focus of study	<p>Universality What does the notion of the "universality of the Olympic Games" mean?</p> <p>What characterises the universality of the Olympic Games? What are the criteria of universality?</p> <p>How can it be improved?</p> <p>The roles and responsibilities of the Olympic Movement What are the roles and responsibilities of the bodies that comprise the Olympic Movement as far as international development is concerned?</p>

3. Theme 3 : The Structure of the Olympic Movement

Theme 3	The Structure of the Olympic Movement
Sub-theme 3.1	The autonomy of the Olympic Movement
Background of the sub-theme	One of the fundamental principles of the Olympic Charter is that the administration and management of sport must be controlled by independent sport organisations. Moreover, part of the role of the IOC is to take measures aimed at strengthening the unity and protecting the independence of the Olympic Movement. At the same time, the IOC collaborates with competent public or private organisations and authorities to place sport at the service of humanity and thus promote peace. The Olympic Movement should determine whether satisfactory conditions are in place to guarantee its independence, whilst ensuring that this process does not harm relations with the competent public or private organisations and authorities.
Focus of study	<p>Autonomy What does the notion of the "autonomy of the Olympic Movement" represent?</p> <p>Autonomy with regard to the different stakeholders (commercial partners, media, etc.) From whom and in relation to what should the Olympic Movement be autonomous?</p> <p>Autonomy within the Olympic Movement What limitations do the bodies that comprise the Olympic Movement face in terms of protecting their autonomy?</p> <p>To what extent does the political, legal or financial dependence of the bodies that comprise the Olympic Movement vis-à-vis other bodies limit their autonomy?</p> <p>Collaboration with governments and governmental organisations How can the Olympic Movement cooperate best with different governments and supranational governmental organisations?</p>

Theme 3	The Structure of the Olympic Movement
Sub-theme 3.2	Good governance and ethics
Background of the sub-theme	The principles of good governance and ethics should be an integral part of the organisation, administration and management of sport. Transparency and integrity are essential values which must be embraced by all bodies associated with the Olympic Movement.
Focus of study	<p>Good governance What does the notion of "good governance" mean in the context of the Olympic Movement?</p> <p>Ethics What does the notion of a code of "ethics" for the Olympic Movement mean?</p> <p>Training Are sports administrators sufficiently trained in the disciplines of governance and ethics?</p>

Theme 3	The Structure of the Olympic Movement
Sub-theme 3.3	The relationship between the Olympic Movement and its stakeholders
Background of the sub-theme	As well as its component bodies, the Olympic Movement has dealings with various sporting and non-sporting organisations. The Olympic Movement works in close collaboration with governments, media and different commercial and non-commercial partners. The Olympic Movement should evaluate whether its current relations with these organisations are satisfactory or whether there is room for improvement.
Focus of study	<p>Stakeholders Are the relations between the Olympic Movement and its various stakeholders (governments, media, commercial partners, public opinion, etc.) working effectively to deliver the objectives of the Olympic Movement?</p> <p>Rights and obligations Are the rights and obligations of the different stakeholders in relation to the Olympic Movement always respected and vice versa?</p>

4. Theme 4 : Olympism and Youth

Theme 4	Olympism and Youth
Sub-theme 4.1	Moving towards an active society
Background of the sub-theme	In many countries, there is a sharp decline in physical activity and an increased rate of obesity. Sports participation amongst young people is in decline, with a major dropping out of sport during teenage-years.
Focus of study	<p>Sport and physical activity What are the reasons of the decline in physical activity and sport participation in young people? What measures can be addressed to reverse this trend?</p> <p>What does physical activity mean to young people? How can young people be encouraged to participate in sport and physical activity?</p> <p>Does sporting competition amongst young people help them to resist the ills and temptations that are endemic in today's society?</p> <p>Sport and education What role should sport play in the education system?</p> <p>Which sporting values should be promoted within the education system?</p> <p>Should the educational values of sport be right at the centre of the education system?</p> <p>In educational terms, should participation be given greater importance than winning in sport? Why?</p> <p>The world of multimedia To what extent can the multimedia world influence the involvement of young people in sport?</p> <p>Are sporting video games a means of encouraging young people to become more active? If so, how and why?</p>

Theme 4	Olympism and Youth
Sub-theme 4.2	Is competitive sport still appealing?
Background of the sub-theme	Young people's expectations are different to those of the older generation. Many different organisations are trying to meet the diverse needs of young people. The Olympic Movement should decide what it can do to ensure that competitive sport remains appealing.
Focus of study	<p>Young people and sport What is the appeal of competitive sport?</p> <p>Are clubs and federations able to attract and keep young people in competitive sport? How to achieve that?</p> <p>Is there an effective administrative framework in place to support the involvement of young people in competitive sport?</p> <p>Which sports are currently most appealing to young people and why?</p> <p>How does the Olympic Movement best foster competitive sport for all?</p>

Theme 4	Olympism and Youth
Sub-theme 4.3	Youth Sport events
Background of the sub-theme	The current format of sports events meets the expectations of certain types of audience. The Olympic Movement should organise sports events that meet the highest expectations of young people in order to promote physical activity and competition, and to highlight the personal and societal benefits that it can bring.
Focus of study	<p>Young people's interest in sport events</p> <p>What motivates young people to watch and participate in sporting events?</p> <p>Through competition, what measures must be taken to respect the physical, mental and social development of a young person?</p> <p>How will Youth Olympic Games and World Championships develop and mature in the future?</p> <p>Should the Olympic Movement create and organise events for young people, whether sports-related or not? If so, how? If no, why?</p>

5. Theme 5 : The Digital Revolution

Theme 5	The Digital Revolution
Sub-theme 5.1	A new management of sports rights
Background of the sub-theme	Technological advances in general and the digital revolution in particular continue to affect the way in which images of sport are transmitted. The Olympic Movement should consider whether the current model for managing media rights is still suitable, bearing in mind both the technological advances and the way in which the public interacts with sporting events.
Focus of study	<p>The digital revolution</p> <p>To what extent has the digital revolution already changed the way rightsholders broadcast the Games?</p> <p>What are the benefits and dangers of the digital revolution, particularly in relation to the current model?</p> <p>How should the IOC consider reviewing its management of sports rights?</p>

Theme 5	The Digital Revolution
Sub-theme 5.2	How to increase the size of the sports audience?
Background of the sub-theme	The current digital revolution offers great potential for development of the way in which images are transmitted, as well as for greater diversification of content to different audiences. Bearing in mind the development of new media, the Olympic Movement should decide what content could be offered to image producers and broadcasters in order to reach a growing audience and consider the wider consequences.
Focus of study	<p>Service diversification How should the Olympic Movement develop new ways of ensuring that the majority of television viewers and Internet users can access the Olympic Games?</p> <p>Should the IOC plan new Games-related content in order to increase audiences? If so, what kind of content?</p> <p>Digital media To what extent can new media help to increase audience sizes?</p> <p>How can digital media help to increase airtime in order to give television viewers and Internet users greater access to the different events that take place during the Olympic Games?</p>

Theme 5	The Digital Revolution
Sub-theme 5.3	Communication with stakeholders in the digital age
Background of the sub-theme	Digital media provide greater and varied opportunities for communication with the different bodies that comprise the Olympic Movement. The IOC, IFs, NOCs, athletes, OCOGS, commercial and non-commercial partners and media should evaluate the advantages they can gain from the methods of communication that are now available to them.
Focus of study	<p>Digital media How should the Olympic Movement take advantage of the digital revolution in order better to serve the different stakeholders?</p> <p>What should be the Olympic Movement's position in relation to virtual communities?</p> <p>Convergence of content production How is the printed press going to position itself in relation to moving images, bearing in mind the fact that it is increasingly relying more and more on new technologies and digital media for the dissemination of its content?</p> <p>Is the convergence of content production going to wipe out the specific characteristics of the various media (news agencies, printed press, moving images, Internet)? How should the IOC respond to this situation?</p>