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What does a role model Australian primary school Health and Physical Education (HPE) programme look like?

Lynch, TJ

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The 53rd International Council Health, Physical Education, Recreation, Sport and Dance (ICHPER-SD) Anniversary World Congress & Exposition - Sport & Exercise for Health, Fitness & Wellness.

International Council Health, Physical Education, Recreation, Sport and Dance (ICHPER-SD)

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The 53rd ICHPER·SD Anniversary World Congress

Dec 19 – 22, 2011

**Fairmont Nile City Hotel
Cairo, Egypt**



**INTERNATIONAL COUNCIL FOR HEALTH,
PHYSICAL EDUCATION,
RECREATION, SPORT,
AND DANCE**

**English
Proceedings**

THEME

**Sport & Exercise for
Health, Fitness & Wellness**

The 53rd ICHPER-SD Anniversary World Congress

Sponsored by the Sport Science Association (SSA) of Egypt

Fairmont Nile City Hotel and Convention Center
Cairo, Egypt
December 19-22

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Table of Contents

	Page
KEYNOTE ADDRESSES	
Confronting the Pandemic of Obesity: A 21 st -Century Public Health Crisis <i>Mohammad R. Torabi, Alice K. Lindeman, & Emily J. Dawkins</i>	6
Physical Activity Promotion for the Enhancement of Health, Fitness and Wellness of Elderly People <i>Yoshiro Hatano</i>	24
SPORTS SCIENCE	
Determination of Incidences and Causes of Atrial Fibrillation in Master Swimmers and Health Related Issues <i>Tim Henrich, Gregory Soukoup, Bob Pankey, Bill Carleton, Shishu Zang & Heather Barton-Weston</i>	33
Effects Of Circuit Strength Training Program On Percent Body Fat And Lean Body Weight Of College Men And Women <i>Esan, James Adebayo</i>	40
Effects of Weather Conditions on the Performance of Marathon Runners and Race Walkers at the 13th IAAF World Championships, Daegu 2011 <i>Yoko KAJIWARA, Shinichiro ONO, Saburo YOKOKURA, Masami HIRASHITA, Kazuhiko KIMURA & Hiroki FUWA</i>	50
Effect of Exercise Induced Fatigue on Standing Balance Performance <i>Fabunmi, A. A., Lesi, F. E. A., Akosile, C. O.</i>	60
Physical and Physiologic Characteristics of Nnamdi Azikiwe University Athletes: Pre-participation Assessment <i>Emeahara, G.O., Agbanusi, E.C., & Odo, E.O</i>	66
Effect of False Start Rule Change on Start Reaction Time of World Championships in Athletics <i>Saburo YOKOKURA, Yoko KAJIWARA, Shinichiro ONO, Masami Hirashita, Hiroki FUWA & Kazuhiko KIMURA</i>	74
Correlation of Body Mass Index and Flexibility among Selected Badminton Players in Northern Nigeria <i>Abdullahi Yahaya</i>	80
Effects of Aerobic and Progressive Resistance Exercise on Running Mechanism of Primary School Children in Nigeria <i>A.O. ABASS and M.O. MOSES</i>	89

Creatine Phosphate and Ascorbic Acid Administration on Motor Performance of Male Athletes in Lagos State, Nigeria <i>Isiaka Oladele OLADIPO & Abimbola Victor OGUNLEYE</i>	97
Noise Levels and its Effect on the Motor Flow of one of the Composition Requirements "CR" on the Balance Beam <i>Maha Amin</i>	107
Kinematics Differences of Push and Landing Stages of Yurchenko With a Two and a Half Twisting Layout on a Vault Horse with Its Counterpart on the Floor Exercise Apparatus <i>Hisham Omar, Maha Ameen & Soha Abed-el-Aal</i>	120
The Effect of Training Using a Sand Playground to Improve Some Physical Fitness Components and Physiological Responses For Soccer Players <i>Mohamed Mahmoud Zyada & Mohamed Hosny Mostafa</i>	132
The Relationship of Body Mass Index with Cardiorespiratory Fitness of Football Players <i>Ehab Ahmed Elmetwally Mansour</i>	141
PHYSICAL EDUCATION AND PEDAGOGY	
What Does a Role Model Australian Primary School Health and Physical Education Program Look Like? <i>Timothy Lynch</i>	149
Creative Thinking and Creative Teaching <i>Peter Chen</i>	161
SPORTS AND OLYMPISM	
Traditional Turkish Oil Wrestling and its Olympic Values for Society <i>Hasan Kasap</i>	165
DANCE	
Dance Teacher Education: A Framework for the Development of an Undergraduate Dance Concentration with Licensure <i>Beverly Allen</i>	171
HEALTH	
Osteoarthritis: Can Exercise Help Suffers to Cope with it, Remain Active and Live a Good Quality Of Life? <i>Veronica C. Igbanugo</i>	181
Sports and Physical Activity as a Part of Healthy Lifestyle <i>C.O. Olorok</i>	186
Exercise Behavior as Correlate of Selected Health Indicators among Female Nurses in a Suburb in Lagos Nigeria <i>Rafiu O. Okuneye, Tony Dansu & Bidemi Idowu</i>	193

Stress as a Cardiovascular Disease Risk Factor Among Selected Senior Staff of Bayero University, Kano <i>Lawal Ibrahim Yazid</i>	203
Analysis of Family Structure on Children's Health and Well-Being <i>Shishu Zhang, Gregory Soukup & Tim Henrich</i>	211
The Impact of Sex Education Intervention on Knowledge of Male Undergraduates Towards the Use of Family Planning Methods in Ogun State, Nigeria <i>Francisca C. Anyanwu & Olufunmilayo N. Hannah Oyenuga</i>	221
Preferred Anti Ageing Strategies Among the Ogus and Aworis in a Suburban Area of Lagos State Nigeria <i>Dansu A., Okuneye R.O., Idowu B. B., & Abiola Molayoto</i>	227
Exercise Maximization for Wellness among Civil Servants in Lagos, Nigeria <i>M.A.C. Onwuama</i>	235
SPORT MANAGEMENT	
Towards Achieving The Millenium Development Goals In Nigeria Through Sports <i>ODEDEYI Olatunji O. & ODUYALE, Olutola</i>	244
Influence of Managerial Policy on Enhanced Performance of Oyo State Athletes at the Nigeria National Sports Festival (1998-2008) <i>K.O. Omolawon</i>	248
PHYSICAL ACTIVITY	
A Practical Study of the Relationship Between Exercise on School Yard Equipment and Physical Ability of Elementary School Children <i>Ryuichi Komata</i>	253
Age and Gender as Determinants of Participation in Physical Recreation Activities Among Members of Selected Recreation Clubs in Ibadan Metropolis, Nigeria <i>E.O. Morakinyo & Balogun I.I.</i>	261
The Relationship between Internet Related Behaviors and Academic Achievement among HKHE Undergraduates of the University of Lagos <i>Idou Samson Keinde, & Alexander Afolabi Agoro</i>	268
Regular Aerobic Activity as a Panacea for Promotion of Optimum Health <i>C.M. Adewunmi, C.O. Amechi & G.S. Jibola</i>	276

Perception of Persons with Disability on Physical Activities as an Antidote to Attaining Optimal Health and Well Being-The Nigeria Experience <i>OYENIYI, Patrick Oladepo</i>	283
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SPORT PSYCHOLOGY

Motives for Participation in Competitive Sport by Nigerian College Athletes <i>Olanrewaju Adeola Ipinmoroti</i>	288
--	-----

Personal and Environmental Factors as Correlates of Team Cohesion among Players of Selected Amateur Soccer Clubs in Oyo State, Nigeria <i>Andrew Olu FADOJU</i>	293
--	-----

Sport Participation Motives as Predictors of Motivation Outcomes among University Athletes <i>Philip Osamende Omoregie & Gloria Abimbola Obajimi</i>	303
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Confronting the Pandemic of Obesity: A 21st Century Public Health Crisis

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Abstract

To achieve optimum health, the mind, body, and environment must be in balance. Without this balance, a community cannot promote health and wellness in its people. Globally and regionally, in a time of increasing food insecurity, we concurrently witness increments in rates of obesity and physical inactivity. This imbalance affects not only risk for chronic illness, health care cost, and quality of life but also genetic expression for chronic disease in current environments. This presentation will address the contributions of food behavior, physical activity, genetics, and environment in the development of obesity. Guidelines and recommendations for diet, activity, and exercise will be given. Attention will be directed toward gender, regional, and life-stage influence on these recommendations.

Having good health is very different from only being not sick. - *Seneca The Younger, 50 AD*

Introduction

Obesity involves much more than an imbalance of energy in and energy out. If it were that simple, eating less and exercising more would result in an energy balance. Unfortunately, other factors enter the equation. We must consider what leads to obesity (environment, food supply, diet, economics, behavior, appetite regulation, and genetics) and what leads to the accompanying physical inactivity (environment, behavior, and motivation). The current energy imbalance has resulted in rising rates of obesity worldwide (i.e., “globesity”). Historically associated with developed countries, obesity is now found in communities with poverty and limited access to food (food deserts). The intent of this paper is to address how rates of obesity and physical inactivity are increasing throughout the world and to address efforts to understand and control factors that contribute to this rise. Health and fitness educators know that obesity carries with it significant cost to the individual, family, and community. Health educators can make a difference in their communities by combining a greater understanding of the components of obesity with guidelines to eat well, stay active, and incorporate physical activity.

Obesity: Prevalence, Causes, Contributions, and Costs

Prevalence

George Bray (2004), a leading U.S. investigator in the etiology and treatment of obesity, proposes that the “the genetic background loads the gun, but the environment pulls the trigger” (p. 115). Universally, obesity is defined as a body mass index (BMI) ≥ 30 . At this value, there are increased health and financial burdens. For some populations with a small frame size (e.g., China), this BMI cutoff can underestimate overfatness and relative disease risk. For populations with a large frame size (e.g., Tonga), overfatness and disease risk may be slightly underestimated. For global evaluation, a BMI ≥ 30 defines obesity (Rush et al., 2004; Swinburn et al., 2011).

Worldwide, obesity has more than doubled since 1980. World Health Organization (WHO, 2010) estimates for men for 2010 range from 0.0% (Eritrea) to 81.9% (Nauru), and for women, they range from 0.0% (Ethiopia) to 81.9% (Nauru). Tables 1 and 2 provide trends and projected obesity prevalence of regions defined by the WHO (2010). Figures 1-6 provide a visual representation of the variance in regions for both men and women. For each region, the country with the lowest and highest prevalence of obesity is shown. As noted in the figures, prevalence rate between genders is indistinguishable at times.

Table 1. Trends and Projected Obesity in Lowest Prevalence Countries by WHO Region: 2002–2015.

WHO Region	Countries with Lowest Prevalence ^a		Obesity Rate (%)							
	Obese Men ^b	Obese Women ^b	Men				Women			
			2002	2005	2010	2015	2002	2005	2010	2015
Africa	Eritrea	Ethiopia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	DRC	Eritrea	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.2
	Rwanda, Uganda, CAR (tie)	DRC	0.1	0.1	0.1	0.1	0.9	1.1	1.7	2.4
Eastern Mediterranean	Somalia	Afghanistan	0.5	0.6	0.8	1.1	1.6	2.0	2.9	4.2
	Afghanistan	Somalia	0.5	0.6	1.0	1.5	3.1	3.7	4.9	6.4
	Pakistan	Pakistan	1.0	1.3	1.9	2.9	4.1	5.0	6.9	9.3
Southeast Asia	Bangladesh	Sri Lanka	0.1	0.2	0.3	0.4	0.1	0.2	0.5	1.3
	Sri Lanka	Bangladesh	0.3	0.3	0.3	0.3	0.1	0.3	1.1	2.2
	Indonesia	Nepal	0.3	0.3	0.3	0.4	0.2	0.4	1.7	1.3
Western Pacific	Vietnam	Cambodia	0.0	0.0	0.1	0.3	0.1	0.2	0.5	1.3
	Cambodia	Vietnam	0.1	0.2	0.7	2.1	0.3	0.5	1.1	2.2
	Philippines	Japan	1.3	1.3	1.4	1.4	2.3	2.2	1.7	1.3
European	Tajikistan	France	3.7	4.2	5.2	6.5	8.9	9.6	10.9	12.3
	Moldova	Denmark	5.1	5.7	6.9	8.3	9.0	9.9	11.4	13.0
	Kyrgyzstan	Estonia	7.5	7.5	7.5	7.5	12.6	12.6	12.6	12.6
Americas	Haiti	Honduras	0.7	1.1	1.9	3.1	17.6	19.3	22.1	25.1
	Honduras	Ecuador	6.8	7.5	8.8	10.3	20.4	22.0	24.9	27.9
	Jamaica	Guyana	5.1	6.7	9.9	14.0	20.7	22.3	25.2	28.1

(World Health Organization, 2010)

^a Reported in ascending prevalence

^b Men and women aged 30-100

Table 2. Trends and Projected Obesity in Highest Prevalence Countries by WHO Region: 2002–2015.

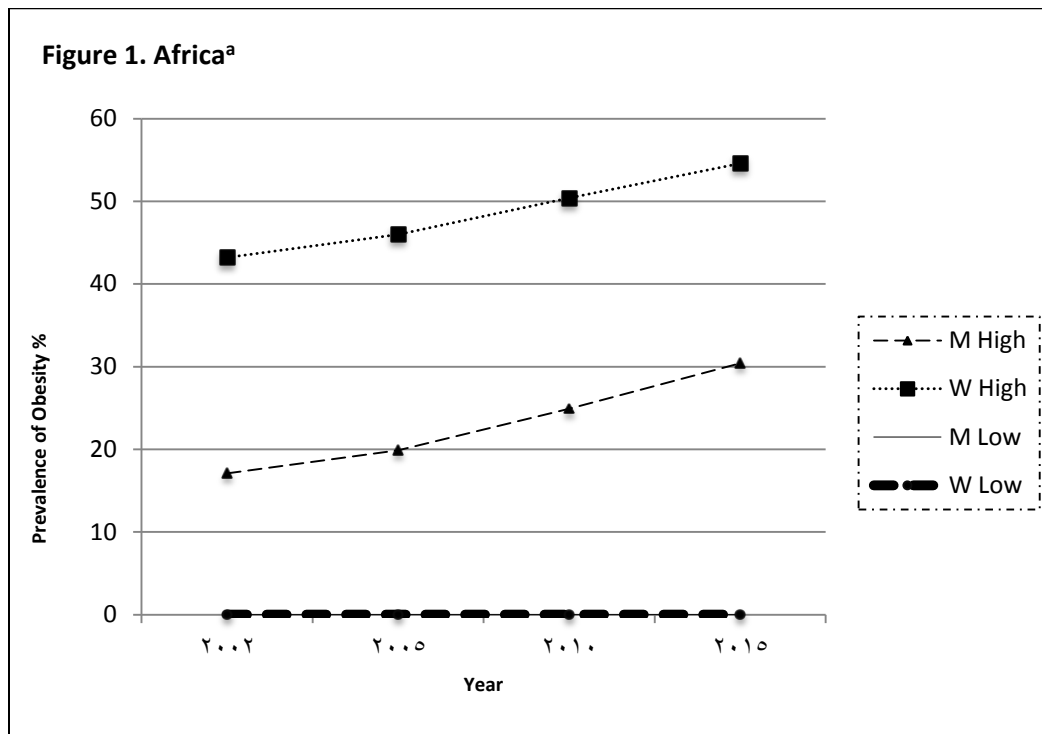
WHO Region	Countries with Highest Prevalence ^a		Obesity Rate (%)							
	Obese Men ^b	Obese Women ^b	Men				Women			
			2002	2005	2010	2015	2002	2005	2010	2015
Africa	Seychelles	Seychelles	17.1%	19.9%	24.9%	30.4%	43.2%	46.0%	50.4%	54.6%
	Cameroon	S. Africa	8.7	10.4	13.6	17.4	34.3	46.3	48.1	49.8
	S. Africa	Lesotho	9.1	9.8	11.1	12.5	40.0	41.1	42.9	44.7
Eastern Mediterranean	Kuwait	Kuwait	37.3	37.3	37.3	37.3	61.5	64.7	66.6	68.4
	Saudi Arabia	Egypt	29.0	29.8	29.8	29.8	50.9	57.0	59.4	61.6
	UAE	UAE	29.2	29.2	29.2	29.2	48.1	49.8	52.4	55.0
Southeast Asia	Maldives	Maldives	6.9	8.4	11.2	14.6	30.0	32.5	36.8	41.1
	TL	TL	8.4	9.1	10.4	12.0	18.7	20.2	22.9	25.8
	Bhutan	Bhutan	7.4	8.1	9.4	10.9	17.4	18.9	21.6	24.5
Western Pacific	Nauru	Nauru	79.2	80.2	81.9	83.3	79.6	80.5	81.9	83.1
	Micronesia	Micronesia	69.0	70.7	73.2	75.6	75.3	76.6	78.5	80.1
	Tonga	Tonga	64.0	65.9	68.8	71.5	78.2	79.3	80.8	82.2
European	Malta	Malta	32.4	34.0	36.6	39.2	47.5	48.7	50.6	52.5
	Austria	Turkey	28.3	30.7	33.1	35.6	43.6	44.1	44.1	44.1
	Greece	Andorra	28.9	30.5	33.1	35.7	33.9	35.6	38.2	40.7
Americas	USA	Barbados	37.6	42.3	50.0	57.2	53.2	57.0	62.7	67.6
	Argentina	Trinidad & Tobago	37.4	41.3	47.8	54.0	50.8	54.7	60.7	65.9
	Mexico	Dominica	26.0	30.3	37.0	43.8	50.0	54.0	60.0	65.3

(World Health Organization, 2010)

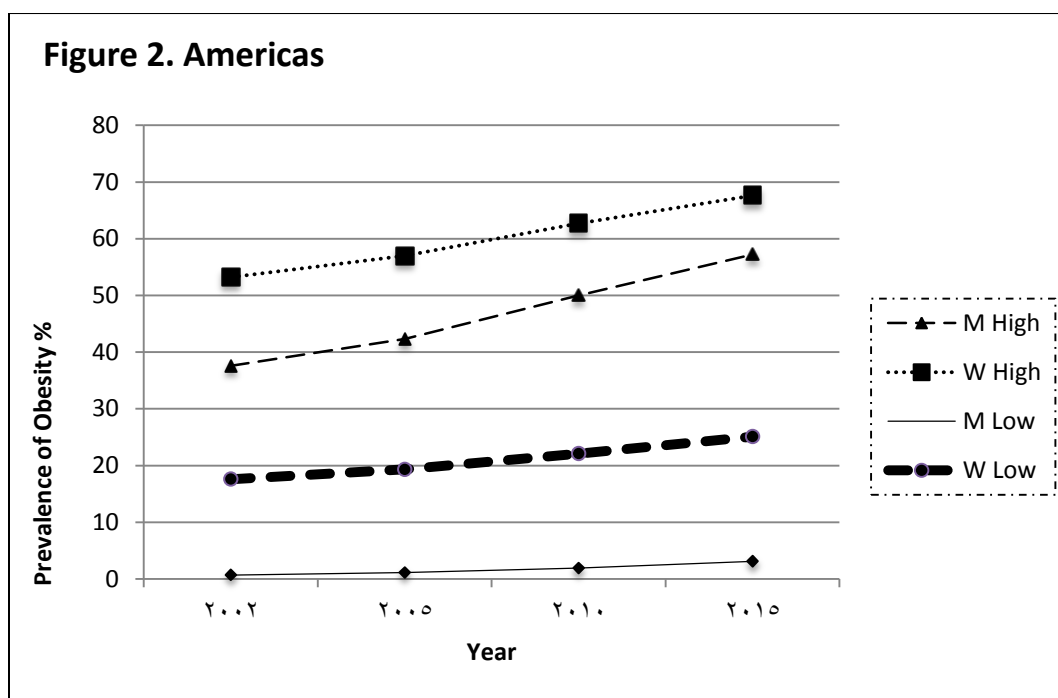
^a Reported in descending prevalence

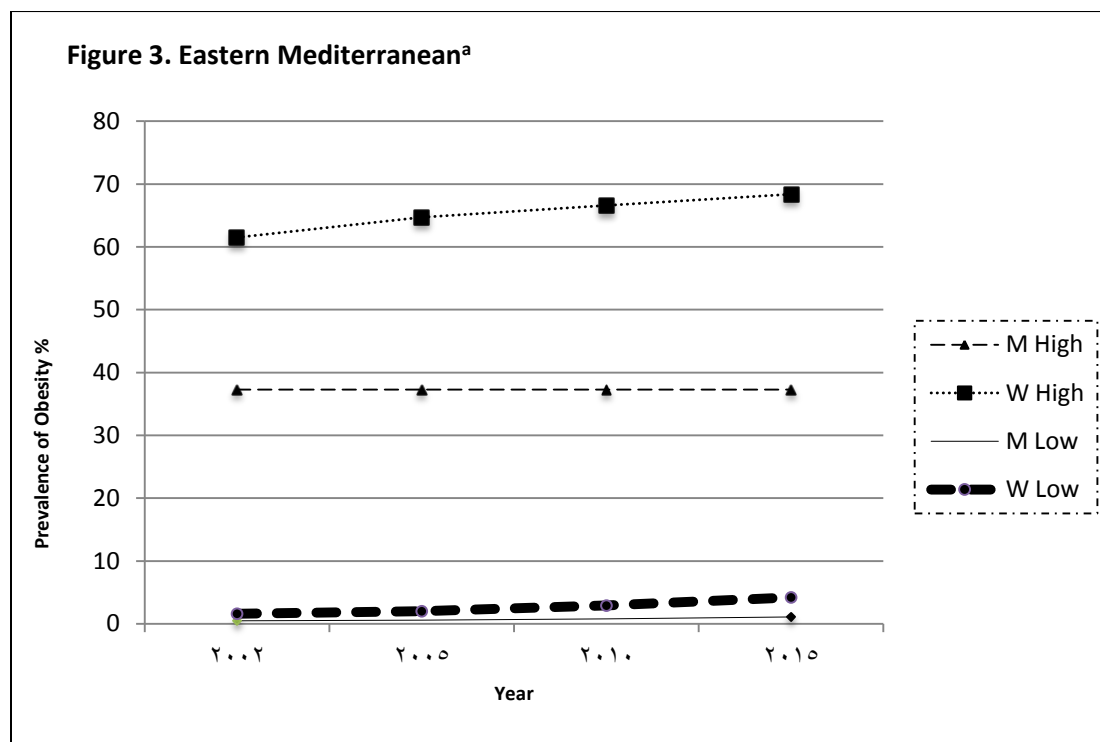
^b Men and Women aged 30-100

Figures 1 through 6. Obesity Trends and Projection by Gender in Countries With Highest and Lowest Prevalence in Who Regions.



^a Men's and women's low prevalence rates are indistinguishable. (World Health Organization, 2010)





^a Men's and women's low prevalence rates are indistinguishable. (World Health Organization, 2010)

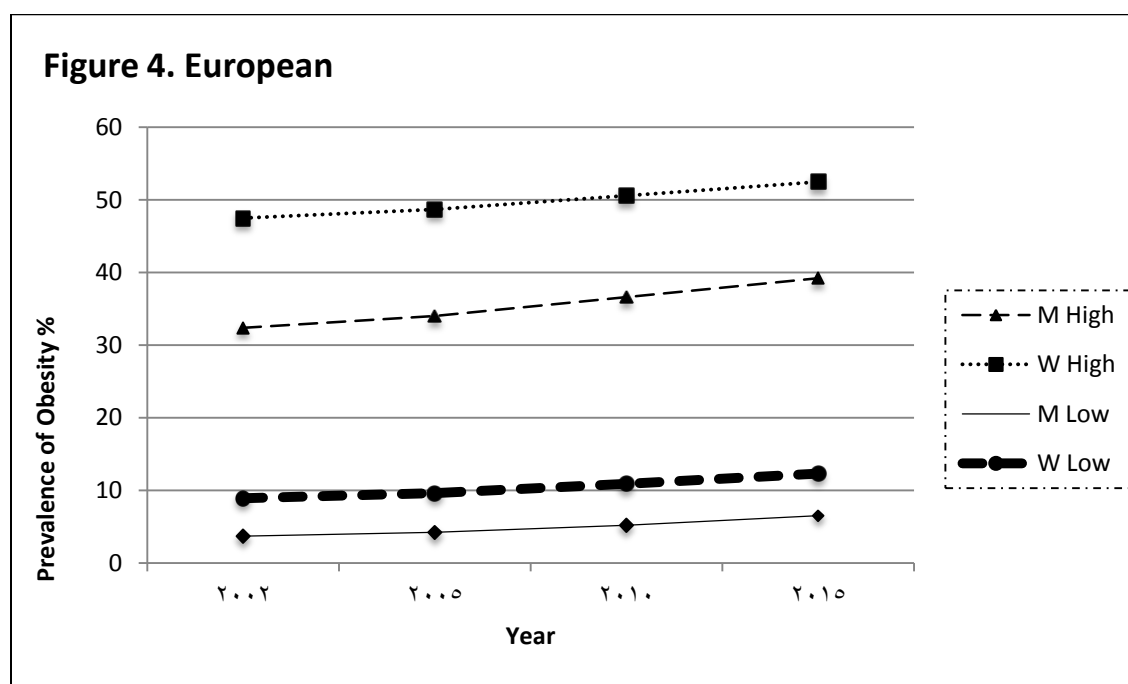
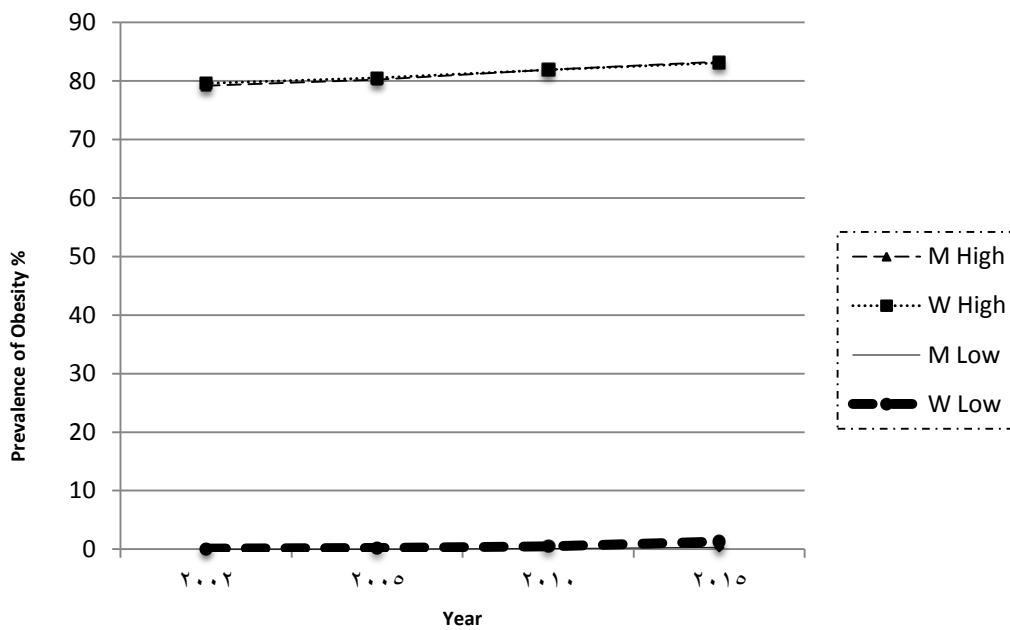
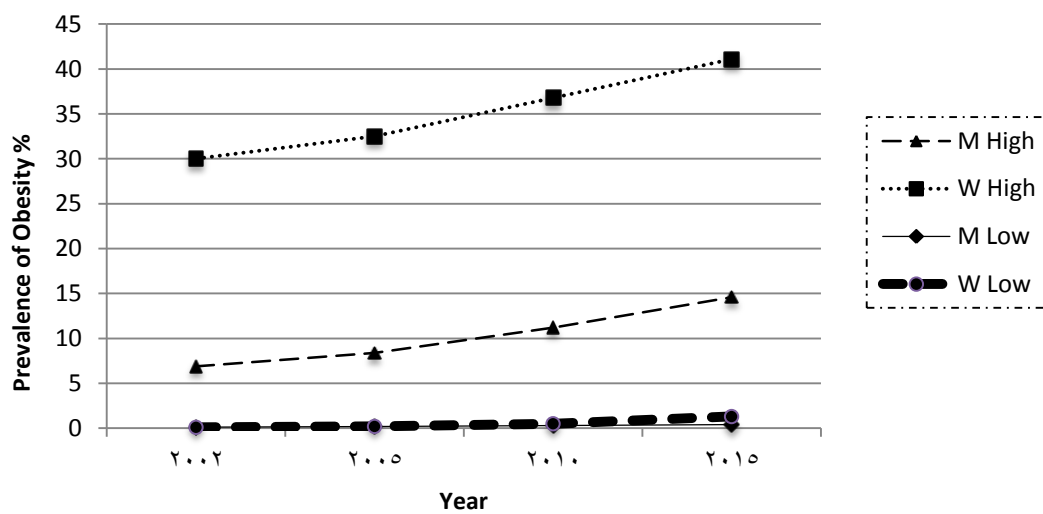


Figure 5. Western Pacific^a



^a Men's and women's low prevalence rates are indistinguishable. (World Health Organization, 2010)

Figure 6. Southeast Asia



Cause: Physical Inactivity

According to Steven Blair (2009), a leading U.S. researcher of physical activity and fitness, physical inactivity is one of the most important public health problems of the 21st century. Its importance is not related to prevalence but rather in that it is undervalued and underappreciated by both public health and medical professionals. Bull and Bauman (2011) assert that policymakers often have a narrow view of physical activity as part of obesity prevention, not embracing its wide-reaching effects on mental health, bone density, social stigma, and so on.

The WHO (2011c) reports that, worldwide, physical inactivity is the fourth leading risk factor for mortality. Inactivity accounts for 6% of deaths, matching the risk of high blood glucose. Only high blood pressure (13%) and tobacco use (9%) account for more (WHO, 2011a). Physical activity is not to be confused with sport. Where sport involves purposeful exercise and training for an activity, physical activity is associated with leisure activities (i.e., any movement produced by skeletal muscles that uses energy). Sport is categorized as physical activity but so is dancing, cooking, or walking to the market.

Physical activity for adults, as defined by the WHO (2010), is “physical activity that includes recreational or leisure-time physical activity, transportation (walking or cycling), occupational (work), household chores, play, games, sports or planned exercise, in the context of daily, family, and community activities” (p. 8). The following is the recommended minimum for adults to be considered physically active:

1. ≥ 150 minutes of moderate-intensity aerobic physical activity per week, often described as \geq five 30-minute bouts/week *or*
2. ≥ 75 minutes of vigorous-aerobic physical activity per week, often described as \geq three 20-minute bouts/week *or*
3. an equivalent combination of both moderate- and vigorous-intensity activity.
4. Aerobic activity bouts should be ≥ 10 minutes in duration.

Why are adults physically inactive? One influence may be perception of the environment (Humpel, Owen, & Leslie, 2002). Humpel and colleagues (2002) reviewed 19 studies examining the relationship between perceived environmental attributes and physical activity. They were able to identify five categories of environmental features and describe how each is associated with physical activity. Table 3 lists some of those features. The environmental attributes are categorized as positive (+), neutral (0), or negative (-) in the ways they contribute to physical activity.

Table 3: Environmental Attributes and Physical Activity.

Attribute	Associations with physical activity	
	Positive (+)	Negative (-) or neutral (0)
Accessibility of facilities	Accessible cycle path, local park Frequently travel past facility Park, beach, shopping within walking distance	Busy street to cross (-) Too far to bike path (-) Residential neighborhood (-) Lack of facilities (-)
Opportunities for activity	Coastal residence Local clubs available Awareness and satisfaction with facilities	Lack of safe place to exercise (0) Lack of equipment (-)
Weather		Poor or lack of good weather (0)
Safety	Safe footpaths Neighborhood feels safe from crime Streetlights	Lack or presence of sidewalks (0) Heavy traffic (0)
Aesthetics	Friendly neighborhood Enjoyable scenery Near home	Appeal (0)

(Humpel et al., 2002)

From this review, the researchers concluded that physical and perceived features of the environment are associated with physical activity behavior. Of note, features often considered negative, such as poor weather or lack of sidewalks, actually had a neutral association. Sitting, especially prolonged sitting, appears to be a significant contributor to physical inactivity and to obesity (Bauman et al., 2011; Hamilton, Healy, Dunstan, Zderic, & Owen, 2008). Hamilton and colleagues (2008) consider “too much sitting” a distinct health hazard independent of physical inactivity. Today, people sit too much. They sit at work, at meals, travelling, talking on the phone, surfing the web, engaging in social conversation, and, as most are aware, during screen time. Using the International Physical Activity Questionnaire (IPAC; Rosenberg, Bull, Marshall, Sallis, & Bauman, 2008), Bauman and colleagues (2011) sampled populations from 20 countries during 2002-2004 to assess usual weekday hours spent sitting. The median sitting time for the total population was 300 minutes, with the mean 346.2 ± 203.6 minutes or roughly 5-6 hours per day. Sitting time was divided into quintiles, ranging from 0-170 minutes (0-3 hours) per day to 540-1020 minutes (9-17 hours) per day. Table 4 provides examples of countries in which a larger percent of their populations were in the lowest (0-3 hours) and highest (9-17 hours) quintiles.

Table 4. Select Countries With Least and Most Sitting Time (Bauman et al., 2011).

Country	% Population sitting time per day	
	0-3 hours (Quintile 1)	9-17 hours (Quintile 5)
Brazil	42.8 %	2.6 %
Portugal	50.4	4.2
India	39.2	6.3
Saudi Arabia	4.5	25.9
Norway	7.9	27.2
Japan	8.6	34.9

(Bauman et al., 2011)

Differences were determined when results were adjusted for age, gender, and education: (a) Older adults (≥ 40 years) were 20% less likely to be in Quintile 5; (b) No differences were found by gender; and (c) People with postsecondary education (≥ 13 years of schooling) were 35% more likely to sit nine hours per day compared to those with 12 or fewer years of education. These results indicate that higher education may lead to jobs requiring more sitting and that young adults, raised in a culture of electronic devices, were more likely to sit longer than their over 40 counterparts. Globally, in 2008, 31% of adults were physically inactive, with men at 28% and women 34%. Physical inactivity varied by WHO (2011c) region. The highest prevalence was found in the regions of the Americas (40% for men, 50% for women) and the Eastern Mediterranean (36% for all adults). The South East Asia Region had the lowest prevalence (15% for men, 19% for women). In all regions, fewer men were physically inactive than women. Table 5 provides a more detailed profile of the regions.

Table 5. Prevalence of Physical Inactivity by WHO Regions, 2008.

WHO Region	Countries ^a in Region and Physical Inactivity Prevalence (%)			
	Highest		Lowest	
	Country	Prevalence (%)	Country	Prevalence (%)
Africa	Swaziland	69	Mozambique	7.1
	Namibia	58.5	Comoros	8.2
	South Africa	53.4	Benin	9.1
Eastern Mediterranean	Saudi Arabia	68.6	Tunisia	35.9
	Kuwait	64.5	Iran	37.0
	UAE	62.5	Pakistan	40.4
Southeast Asia	Bhutan	52.3	Bangladesh	4.7
	Maldives	30.0	Myanmar	12.7
	Indonesia	29.8	Nepal	15.5
Western Pacific	Cook Islands	72.0	Mongolia	9.4
	Micronesia	66.3	Cambodia	11.2
	Malaysia	61.4	Viet Nam	15.3
European	Malta	71.9	Greece	15.6
	Serbia	68.3	Estonia	17.2
	United Kingdom	63.3	Netherlands	18.2
Americas	Argentina	68.3	Guatemala	16.2
	Dominican Republic	60.0	Dominica	24.4
	Cuba	54.4	Canada	33.9

(World Health Organization, 2011b)

^a Data included from member states of the United Nations only.

From Table 5, it can be seen that some countries (Canada, Pakistan, Iran, and Tunisia) that reported a low prevalence for their region had higher rates than countries that denoted a high prevalence for their region (Maldives and Indonesia). Some countries of interest not in the highest or lowest three in their region include Japan, China, and Australia (60.2%, 31%, 37.9%, respectively, in the Western Pacific Region).

Obesity results from a continued energy imbalance. Too many energy-dense foods and too little physical activity promote weight gain if one is genetically predisposed. In 1989, Sobal and Stunkard conducted an extensive review of studies on socioeconomic status (SES) and

obesity in developing countries. The case for a high prevalence of obesity associated with high (developed) SES countries had already been established. From their review, Sobal and Stunkard concluded that obesity in developing countries would not become a disease of all people but rather of only those with high SES. Between 1989 and 2003, studies could not support this conclusion. Monteiro and colleagues (2004) reviewed those more recent studies. From this review they concluded that (a) Obesity in developing countries is a disease of all people, regardless of SES; (b) As a developing country's Gross National Product (GNP) increases, obesity prevalence is shifted to the lower SES populations; and (c) This shift in obesity toward lower SES occurs earlier for women than for men.

Table 6 describes the prevalence of obesity and physical inactivity among varying SES countries. The foundation of the table is obesity prevalence ($\text{BMI} \geq 30$) among men and women aged 30 and over. The next layer is the countries within WHO regions with the highest and lowest obesity prevalence (see Table 5; WHO, 2010). Finally, using data from the World Bank (2001), gross national income (GNI – formerly GNP) is gathered for each country. All data reflect 2010, except for a few countries for which GNI was for 2007-2009. Countries with no GNI data are noted. Simple WHO region averages were determined for (a) the three countries with the highest and lowest prevalence of obesity for men and women; (b) prevalence of physical inactivity for those countries; and (c) GNI for those countries with available data. The WHO regions Africa, Eastern Mediterranean, European, and Americas shared a higher prevalence of obesity with a significantly higher GNI. Perhaps this trend is the combination of more “prolonged sitting” (income-related) and the availability and adoption of the Western obesogenic diet.

Table 6. Obesity, Physical Inactivity, and GNI by WHO Regions, 2008.

WHO Region	Countries in WHO Regions							
	Lowest Prevalence of Obesity (%) ^a			Highest Prevalence of Obesity (%) ^a			% Physically Inactive Low/High ^b	Region GNI Low/High ^{b, d}
	Men	Women	X Obesity (%) M/F	Men	Women	X Obesity (%) M/F		
Africa	Eritrea	Ethiopia	0.1% M	Seychelles	Seychelles	16.5% M	40.7% L	\$10.37 L
	DRC Rwanda, Uganda, CAR (3-way tie)	Eritrea DRC	0.6% F	Cameroon South Africa	South Africa Lesotho	47.1% F	35% H	106.05 H
Eastern Mediterranean	Somalia ^c	Afghanistan	1.2 M	Kuwait	Kuwait	42.1 M	40.4 L	96.02 ^c L
	Afghanistan Pakistan	Somalia ^c Pakistan	4.9 F	Saudi Arabia UAE ^c	Egypt UAE ^c	59.5 F	65.2H	216.50 ^c H
Southeast Asia	Bangladesh	Sri Lanka	0.3 M	Maldives	Maldives	10.3 M	25.6 L	62.81 L
	Sri Lanka Indonesia	Bangladesh Nepal	0.3 F	TL Bhutan	TL Bhutan	27.1 F	52.3 H	1.73 H
Western Pacific	Viet Nam	Cambodia	0.7 M	Nauru ^c	Nauru ^c	30.0 M	27.6 L	71.23 L
	Cambodia Philippines	Viet Nam Japan	1.1 F	Micronesia Tonga	Micronesia Tonga	40.0 F	54.0 H	0.33 ^c H
European	Tajikistan	France	6.6 M	Malta	Malta	34.3 M	26.2 L	107.89 L
	Moldova ^c Kyrgyzstan	Denmark Estonia	11.6 F	Austria Greece	Turkey Andorra	44.3 F	44.5 H	333.93 H
Americas	Haiti	Honduras	6.9 M	United States	Barbados	46.1 M	45.2 L	18.76 L
	Honduras Jamaica	Ecuador Guyana	24.1 F	Argentina Mexico	Trinidad & Tobago Dominica	65.1 F	43.5 H	629.44 H

(The World Bank, 2001; World Health Organization, 2010, 2011b)

^a Reported in ascending (lowest prevalence listed first) and descending (highest prevalence listed first) order.

^b Reported as simple averages for low prevalence (L) and high prevalence (H) obesity for region. Results affected by absence of data.

^c Data not available.

^d Gross National Income (GNI) in millions of dollars (US)

Physical inactivity can affect physical and mental health, with the potential to exacerbate any current health condition. Globally, inactivity is a key behavior contributing to elevated blood cholesterol and glucose, high blood pressure, and obesity. Environmental factors considered to be incentives to physical activity include proximity of facilities, a safe and friendly neighborhood, local parks and bike/foot paths that are safe and accessible, and having shopping close by. Distance to facilities and lack of equipment are perceived as major barriers. Independent of these influences, prolonged sitting is a significant contributor to a sedentary lifestyle. Adults with higher education (sedentary jobs) or younger age (electronic devices) were more likely to sit for prolonged times than their counterparts (Bauman et al., 2011). Motivation, opportunity, intrinsic desire, and awareness of health benefits are key points to be stressed by health, fitness, and leisure professionals in promotion of increasing physical activity.

Cause: Food Behaviors

Food does not just nourish: it feeds the soul. The drive to eat is stimulated by innate cues, including lowered blood glucose and physiological hunger. The desire to eat, or one's appetite, is psychological. A person can experience a general desire to eat or a desire for a specific food or a specific amount of food. The senses—taste, texture, sight (availability), and smell—strongly influence appetite. Food customs and culture, social networks, and even routines or habits can drive one to eat. Early life experiences with food as a reward can produce emotional eating (Levitan & Davis, 2010).

Satiety meets the needs of both hunger and appetite: one no longer feels a desire to eat (Wardlaw, Smith, & Lindeman, 2011). Satiety generally occurs with distension of the stomach from consumed food as well as initial nutrient absorption in the small intestine. If a person eats very quickly, most likely more food will be consumed beyond the feeling of satiety. That person will leave the meal “stuffed.” In both Japanese and Western populations, eating quickly is associated with overweight (Koutatsu et al., 2008; Sakasi, Katagiri, Tsuji, Shimoda, & Amano, 2003). Koutatsu and colleagues (2008) determined that both eating quickly and eating until full were associated with overweight. These combined habits may significantly contribute to weight gain and becoming overweight.

Emotions can strongly influence food choices and eating behavior; in turn, eating behavior can strongly affect emotions. Environment and food availability influence what is consumed and how much. For an example of this, here is the story of TC, a college student. TC feels overwhelmed because he has not read the material nor studied adequately for the upcoming chemistry exam. He goes to his room and shuts the door for silence and privacy. Making sure he won't have to take a study break, he brings along a bag of cookies and a one-liter bottle of soda. The emotion (stress) stimulates his eating behavior (pleasure foods) and his environment (alone in his room with the door closed). He has created the ideal scenario for overeating. If TC had instead brought water and a plate of fruit into his room, there would be less chance that he would overeat. However, eating high-fat, high-sugar “comfort foods” that are highly palatable can meet his emotional and psychological drive to eat as well as fill any hunger he may feel (Levitan & Davis, 2010; Oliver, Wardle, & Gibson, 2000; Tatjana, Frijters, Bergers, & Defares, 1986).

Comfort foods may be used to induce positive emotions rather than lessen emotions or stress. Here lies the gender difference. Women are more likely to select comfort foods in reaction to negative mood states, whereas men turn to these foods to maintain or enhance positive emotions. For example, women may turn to highly palatable foods to decrease the tension of

their negative moods; men would select these foods to celebrate or enhance their good moods (Dubé, LeBel, & Lu, 2005; Levitan & Davis, 2010).

Consuming food if hungry, eating slowly, and stopping when feeling lightly full promote weight regulation. External cues can yield overeating and, hence, weight gain. Emotional and environmental cues can stimulate appetite, resulting in eating in the absence of hunger. Ignoring satiety cues and continuing to eat can produce a habit in which satiety is attained only with a large volume of food (Koutatsu et al., 2008). With any of these external cues altering the hunger-appetite-satiety balance, obesity can result.

Cause: Food Selection

What features of our diet contribute to obesity? Is it more so the food we select? As noted previously, when we choose to eat and how much can affect our intake and diet composition. Economic decisions (cost of food, eating at restaurants), availability (healthy foods, accessible markets), and nutrition knowledge/awareness can all influence food selection. One of the more popular approaches to understanding the role of diet is the ecological model (Glanz, Sallis, Saelens, & Frank, 2005). From this model, the two highly influential food and nutrition environments are the community and the consumer. These environs are in turn affected by government policies and other organizations (Glanz et al., 2005; Sallis & Glanz, 2009).

Community food environment is the distribution of food (i.e., food sources, most commonly stores and restaurants). These are the “brick-and-mortar” buildings in which food is provided. Food deserts, tracked in the United States and Great Britain, result when low-income neighborhoods or rural areas have low access to supermarkets and other sources of affordable nourishing foods (Morton & Blanchard, 2007). Accessible, affordable, and nearby sources of healthy and appealing food is associated with a better quality diet and less overweight and obesity in both adults and adolescents. An index of a healthy diet is the purchase of more fruits and vegetables and less fat by household members (Moore, Roux, Nettleton, & Jacobs, 2008; Morland, Roux, & Wing, 2006; Powell, Auld, Chaloupka, O'Malley, & Johnston, 2007; Sallis & Glanz, 2009; van der Horst et al., 2007).

Consumer food environment refers to the food available in the markets and restaurants (Glanz et al., 2005). Key for a good environment is available and affordable food, quality food, appropriate portion sizes, and nutrition information at the point of purchase. Stores may be present in the community, but if they are of poor quality and limited scope, consumers may have limited access to healthy foods, such as low-fat foods, fruits, and vegetables (French, Story, & Jeffrey, 2001; Kamphius et al., 2006; Sallis & Glanz, 2009). Restaurants that provide controlled portions, fresh fruit, vegetables that are not fried, and whole grain bread contribute to a healthy consumer environment (Glanz et al., 2005; Sallis & Glanz, 2009). These environs are easier to change than community environs. Without requiring government action, store and restaurant owners or corporations can independently change the foods offered, recipes, portion sizes, and consumer nutrition information (Sallis & Glanz, 2009).

When did obesity become an issue? Swinburn and colleagues (2011) suggest that, in highly developed countries, such as the United States, the sharp rise in obesity started in the 1970s. In the first half of the 20th century in the US, energy available in the food supply declined, mostly with reduced consumption of wheat. The American Medical Association (Anonymous, 1948) attributed this decline in energy intake in part to a decline in hard manual labor. Thus, less food (energy) was needed to be produced based on lower need. The American Medical Association also warned that, because of the association between energy output and available

energy in the food supply, if there was a rise in consumption of sugars, sweeteners, and fats, widespread obesity would result. During the 1970s, the U.S. food supply was flooded with refined-carbohydrate and high-fat products. As expected, with this sudden rise in food energy supply, widespread weight gain resulted, starting the obesity epidemic (Gerrier, Bente, & Hiza, 2004; Swinburn et al., 2011). People ate more because more appealing, convenient, and palatable food was available. In the 1980s, the same trend happened in Great Britain. An abundance of high-fat, high-sugar, and highly refined foods became available (Scarborough et al., 2011; Swinburn et al., 2011). These foodstuffs are commonly called “obesogenic” foods.

Dietary contribution to the rise of obesity in low-income and middle-income countries is through changed eating behavior. There has been a shift toward consuming inexpensive energy-dense foods that are rich in fat and sugars (an obesogenic Western diet) and a shift away from indigenous diets high in vegetables, fruits, and fish (Ahima, 2011; Mavoa & McCabe, 2008; Sibai et al., 2010).

Cost of Obesity

The indirect cost of obesity is increased risk for disease due to metabolic and physical body change. Obesity presents increased risk for chronic health conditions as well as resultant death. Hypertension, atherosclerosis, high blood glucose (type 2 diabetes), high blood cholesterol, some cancers (colon, endometrial, breast), sleep apnea, and disabilities (osteoarthritis) are all associated with obesity (Ahima, 2011; Flegal, Graubard, Williamson, & Gail, 2007; Gonzalez et al., 2010).

In the United States, 33.8% of adults in 2010 qualify as obese and another 34% as overweight (Centers for Disease Control and Prevention, 2011). The resultant health problems carry significant medical costs. These costs are categorized as direct and indirect (Wolf, 1998; Wolf & Colditz, 1998). Preventive, diagnostic, and treatment services due to obesity are direct medical costs. Indirect costs are those associated with morbidity and mortality associated with the disease. Morbidity costs relate to decreased work productivity due to absenteeism, restricted activity, and “sick days.” Future income loss from premature death composes mortality costs.

Obesity in the U.S. in 2008 dollars totaled \$147 billion in direct medical care costs (Finkelstein, 2009). This value is almost 10% of all medical expenses in the US. Compared to normal-weight adults who spend approximately \$3,400 per year for medical care, obese individuals spend an additional \$1,500.

Obesity Intervention

What can be done to control and reduce obesity? Any intervention programs must be conducted at the environmental and personal levels. In 2004, the WHO developed the Global Strategy on Diet, Physical Activity and Health. This strategy outlined recommendations to control obesity through promoting healthy diets and regular physical activity. Table 7 describes actions to provide supportive environments to reduce obesity.

Table 7. Techniques to Control and Reduce the Prevalence of Obesity.

Level of Action	Behaviors	
	Diet	Physical Activity
Individual	Limit energy intake from fats, sugars and refined grains. Cook. Increase intake of fruits and vegetables, including beans/legumes Limit exposure to high fat/sugar foods Eat slowly and until only “lightly full”	Incorporate activity into leisure time Follow or surpass recommendations to be considered physically active Curb prolonged sitting; limit screen time Make physical activities fun – PLAY! Incorporate activity as a habit
Community	Political commitment to provide a safe and nutritious food supply	Provide environs for safe and enjoyable physical activity
Industry	Provide nutrition information at point-of-purchase, including restaurants Reduce fat/sugar/refined products; provide/promote low-cost alternatives Restaurant/packed food portion control	Promote and provide low-cost safe equipment for use by all, regardless of weight Incorporate physical activity at work, and limit prolonged sitting

(Bauman et al., 2011; Glanz et al., 2005; Humpel et al., 2002; Koutatsu et al., 2008; Levitan & Davis, 2010; Sallis & Glanz, 2009; Swinburn et al., 2011)

We are educators, so what can we do? We can prioritize healthy foods, maintain self-control in eating habits, and incorporate physical activity into our work and home lives. If we motivate others to play, stay active and social, and choose healthy foods, they can in turn become motivators of others.

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Physical Activity Promotion for the Enhancement of Health, Fitness and Wellness of Elderly People

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Abstract

Because of the modernization of societies and developments in medicine and technology, people in the contemporary world enjoy extended longevity. However, physical activity promotion for the enhancement of health, fitness, and wellness of older people is a special challenge of this millennium.

This lecture will introduce knowledge from the viewpoint of the promotion of physical activity and wellness among high-aged. In terms of physical activity, frequently walking becomes the topic of discussion, because for older adults, walking is the easiest physical activity to attempt, as there is minimal danger and enforcement, and it is in fact the most popular activity for this age group. Cautions to protect safety for those with certain metabolic oriented diseases such as myocardial infarction, high blood pressure and obesity will be introduced in this presentation.

Quality of life, including the mental health of high-aged people is an important aspect of wellness as well. Research studies have suggested that having support groups with open lines of communication and a supporting atmosphere may help individuals maintain their mental/spiritual health and result in people living longer.

However, even if an older person maintains an excellent, healthy lifestyle with regular exercise, the time may finally come when (s)he faces a locomotive syndrome, i.e., difficulty in carrying out daily living activities. Certain suggestions in assisting nursing care for the near-bed-ridden people will also discussed.

1. Physical activity is a challenge for high-aged people

Because of the modernization of societies and developments in medicine and technology, people in the contemporary world enjoy extended longevity. The overall life (men and women) expectancy at birth of Japanese in 2009 was 82.6 years, which is the longest of all the countries in the world. Hong Kong marks the second longest with 82.2 years and Iceland the third with 81.8 years (United Nations, 2009). As a result, in advanced countries, the ratio of high-aged older adults (or hereafter high-aged people, beyond 65 years of age) are becoming larger, producing “high aging societies” (the rate of high-aged people over the total population being 7% and above) and further “higher-aged societies” (the ratio being 14% and above). In the case of Japan the above ratio in the year 2010 was estimated to be 23.0% (JNIPSSR, 2006).

On one hand, living longer has been a long time dream of mankind for which medical and nutritional developments may have contributed greatly. But on the other, just living without looking forward life and the physical energy to move around may not necessarily bring happiness, satisfaction and willingness to live further. The HPERSD profession may be able to make certain contributions to encourage people along this line.

According to a study in Japan, TV watching was reported to be the most favorite leisure behavior among middle and high-aged Japanese (**Figure 1**, Saito, 2010). Nevertheless the people of the same age group reported liking walking with 70-80% frequency of the total population (**Figure 2**, Hatano & Setoguchi, 2000). That TV watching and walking were pointed out as their

favorite behavior/ activity may suggest a bipolarization tendency among the (middle and) high-aged people, i.e., a dichotomy of active walkers and sedentary people in the total population of the high-aged.

Human beings are destined to decline in strength and fitness after their late teens unless they attempt to maintain such function by engaging in special training/ physical exercise. Then in the high aging period which may arise by late 50s or so, physical activity capacity decreases may occur naturally. If one remains sedentary in these years in addition to aging then physical fitness levels may decline constantly. If this degeneration process keeps going, sooner or later life capacity, like locomotive movements, will become limited, before coming to the point where certain personal caring/ helping hands by others may become necessary. On the contrary if a person keeps engaged in certain periodical physical activity he may maintain his fitness level, if not improve upon it. This relationship may be named as an allegory of vicious and positive cycles. Indeed periodical engagement in any physical activity may be the decisive factor whether one would loose physical capability and thus become old faster, or remain relatively young in their physical and mental conditions.

Those who prefer to live a sedentary life may not be able to enjoy a healthy and satisfied life as much as those who actively are engaged with physical activities and or walking periodically. It is possible to suggest that active lifestyle like walking periodically may contribute in preventing certain lifestyle oriented hypo-kinetic diseases and in promoting mentally stimulated daily life. Such hypotheses will be discussed in the later portion of this article.

Physical activity promotion for the enhancement of health, fitness, and wellness of high-aged people, for example, may provide certain positive values in the lengthened life. However such contributions may not be realized unless the people really participate in the related activities, and the actual participation by the people may not be accomplished easily, thus the actual involvement by the people in various life enhancing activities may be a special challenge for the HPERSD related professionals.

This article intends to introduce knowledge from the viewpoint of the promotion of physical and other activities to promote healthy and meaningful life for the lengthened life among high-aged people. In terms of physical activity, frequently walking will become the topic of discussion, because it is now ranked as the most frequently participated sport/ physical activity in Japan (**Figure 3**, PMOJ, 2006). For high-aged people, walking is the easiest physical activity to attempt, as there is minimal danger and enforcement, and it is in fact the most popular activity particularly for this age group (Hatano & Setoguchi, 2000). Cautions to protect safety for those with certain metabolic oriented diseases such as myocardial infarction, high blood pressure and obesity will be specifically introduced in this article.

Quality of life, including the mental health of high-aged people is an important aspect of wellness as well. Research findings have suggested that having support groups with open lines of communication and a supporting atmosphere may help individuals to maintain their mental/ spiritual health and would result in people living longer (Takeda & Hatano, 2008).

However, even if an older person maintains excellent, including a healthy lifestyle with regular exercise, the time may finally come when (s)he faces a locomotive syndrome, i.e., difficulty in carrying out daily living activities. Certain suggestions in assisting nursing care for the near-bed-ridden high-aged people will also be discussed.

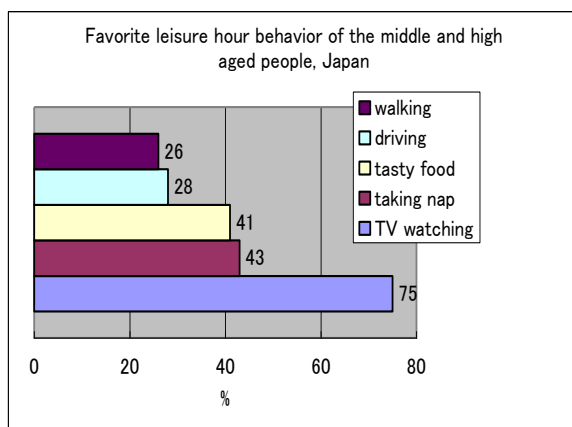


Figure 1. Favorite leisure behavior of the middle and high-aged

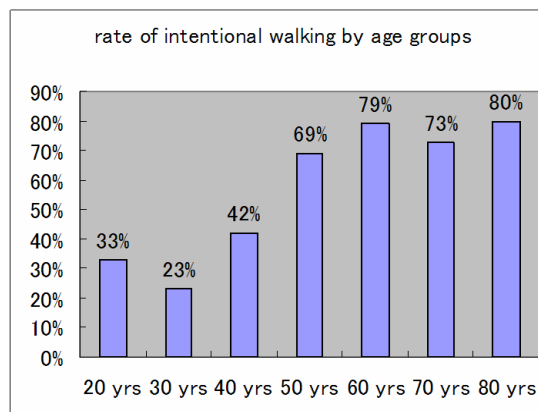


Figure 2. Rate of intentional walking by age groups (N=715)

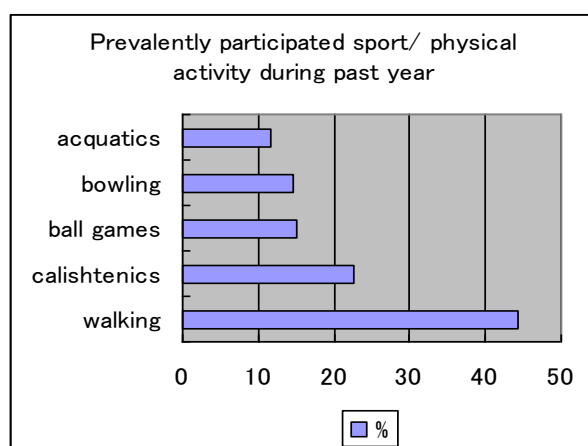


Figure 3. Prevalently participated sport/ physical activity during 2006

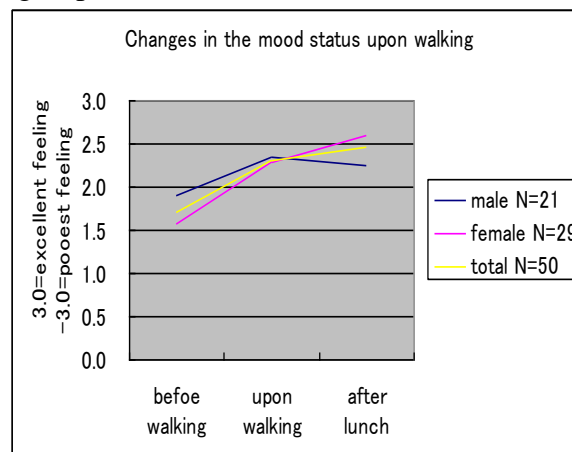


Figure 4. Mental status improves by walking

2. Possible positive effect of physical activity/ walking

Mental status such as a good/ poor feeling, (McNair, Lott, & Droppelman, 1992) of a person upon engaging with certain activity/ behavior may be measured by use of a POMS (profile of mood status) check list. **Figure 4** (Hatano, 2004) exhibits such statistically significant (1%) changes in the mood status of a group of middle and high-aged walkers before and after a 2-hour walking/ climbing uphill. In the same token the most prevalently felt effect of physical activity (multiple choice) among 295 middle and high-aged Japanese diabetes patients was “relief from stress” as seen in **Figure 5** (Hatano & Setoguchi, 1996). One may then utilize any physical activity for the purpose of overcoming stress that may come from urban living.

When the physical capacity of the ADL (activity of daily living) of three different groups of high-aged people, namely (1) periodically walking high-aged people (2) normal high-aged and (3) sedentary high-aged people, were compared with each other, a consistent tendency of differences among these three groups in ADL related capacity scores as well as in social activity characteristics that the walker group being rated as the most capable, then the regular high-aged group and the sedentary group resulting in the most incapable scores (**Figures 6 and 7**, Hatano, 2010). In addition another study suggested that the lifestyle of the good walkers (daily 10300

steps and above) was statistically significantly, and found to be good and that of the less walker (daily 6000 steps and less) was poor (**Table 1**, Ohtsuka, Kobayashi & Hatano, 1988)

As has been introduced in this section, exercise/ walking, especially that of the high- aged people, seem to function quite effectively in providing the participants' physical aspects to keep young and active, and in mental/ social aspects to be fulfilled for sound mind and sound relationship with the others.

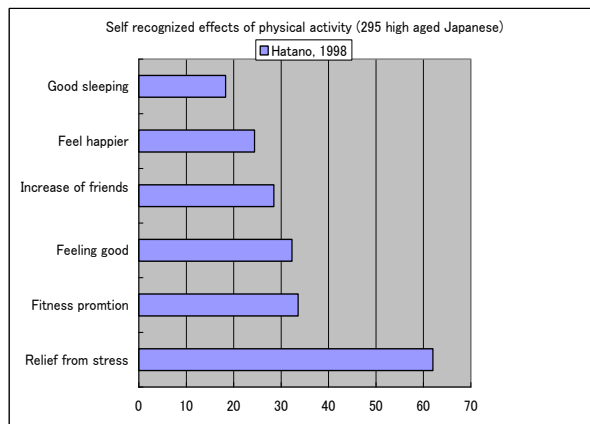


Figure 5. Effect of physical activity among the middle and high-aged Japanese

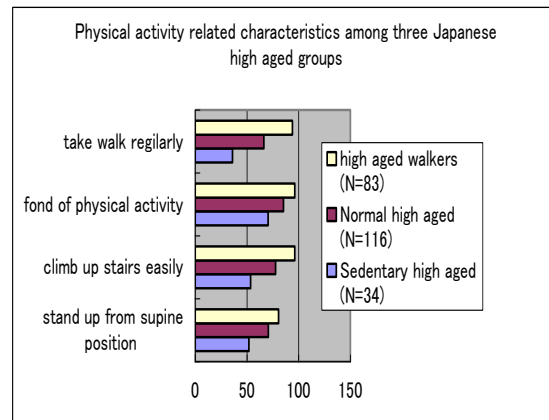


Figure 6. Physical activity related characteristics among 3 groups

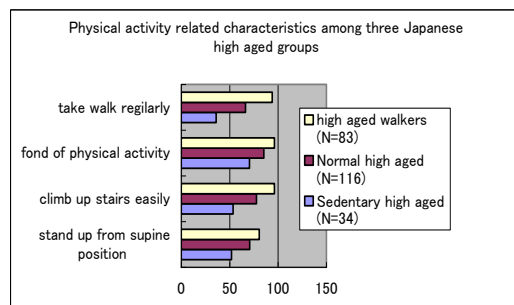


Figure 7. Social activity-related characteristics among 3 groups

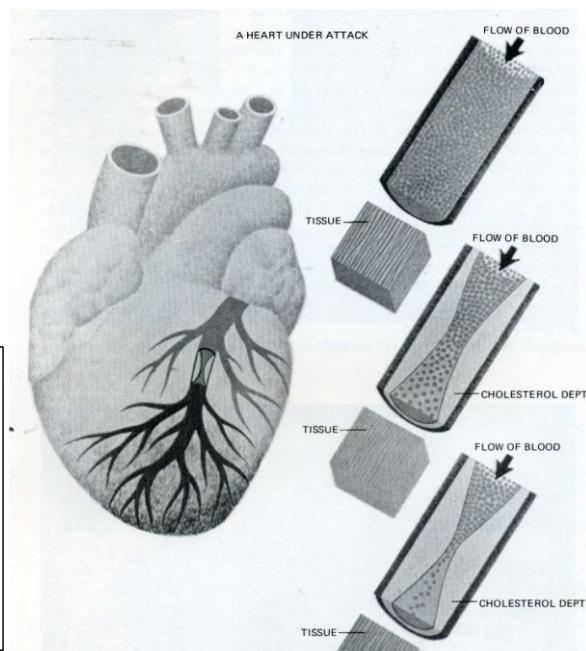


Figure 8. Explanation of coronary heart disease

Table 1. Lifestyle of the good and less walkers

Consciousness in daily life	Good walkers (100300 steps+)	Less walkers (6900 steps-)	Statistical significance
habit of walking/exercise	yes	no	**
feel of hypo-kinesis	no	yes	**
feel of stress	no	yes	**
Exercise/nutrition good balance	yes	no	**
Fitness level	good	poor	*
Feel of satisfied life	yes	no	*
Feel fatigued	no	yes	**
Catching cold	no	yes	**

3. Considerations for the patients of cardiovascular diseases, etc.

When dealing with physical activity programs for high-aged people, cautions should be given for the safety of these patients of various diseases, particularly with cardiovascular abnormalities. First of all, for the safety of these high-aged people, periodical medical examination, including cardiac checking is a prerequisite to find any possible danger upon doing exercise of certain intensity (Doba & Hatano, 1983). **Figure 8** (Wilmore, 1974, Hatano & Iga, 1983) shows a brief mechanism of possible cardiac infarction as an example. Let us try to compare the given three conditions as seen in Figure 8, i. e., (1) coronary artery of sound status where flow of blood runs 100% of the time, (2) coronary artery being 50% occluded condition by cholesterol depth and (3) near fully (90%) occluded condition. In the case of (1) where heart functions normally, regularly executed aerobic physical activity of reasonable intensity, which would result with several hundred per cent blood flow in comparison to sedentary status is expected. In this manner regular exercise enhances the cardiovascular fitness as well as serum lipid metabolism will be promoted.

However, in the case of (2) while only 50% blood flow at the coronary artery, myocardial oxygen supply may become short of demand, depending upon the degree of pathology and exercise intensity. Further in the case of (3) where the vessel is almost totally occluded, not much blood may go through despite the demand for a large oxygen supply, then most likely myocardial infarction may arise. For the patients of (2) and (3) status, an accurate exercise prescription should be provided by the cardiologist after an exercise stress test. If the executed exercise is within the acceptable intensity, then the executed exercise will function as a cardiac fitness enhancing measure, overcoming the pathology. Once an exercise prescription is given to a patient, by monitoring exercise heart rate (s)he may self-monitor the exercise without danger. Such being the case, by self-monitoring exercise heart rate according to the prescription, any patients of heart abnormalities, diabetes Miletus, hypertension (or high blood pressure) and obesity may enjoy individually prescribed exercise prescription (Hatano, 1998 and 1999).

For safety and efficiency reasons, exercise participants should recognize the exercise intensity in terms of the Mets system (Table 2, Hatano, 1992) and heart rate system for various age brackets (Table 3, Hatano, 1998). Besides, it should be noticed that for high-aged people and for

the patients of cardiovascular diseases the recommended exercise intensity for aerobic exercise to promote/ maintain one's cardiovascular fitness is "lower moderate" (heart rate intensity around 40% HRmax).

In the exercise program as a part of cardiac rehabilitation in Japan, many patients have recovered from serious cardiac cases to the level of participating in jogging programs and eventually competing in various long distance running races, such as the full marathon (Hatano & Iga, 1983).

Table 2. Exercise intensity by Mets system (middle age male)

Sample activity	Intensity (by Mets)	Category
Resting Sitting Standing/ slow moving	1 Met 2 Mets below 2.9 Mets	None exercise (not effective for fitness maintenance)
Walking Jogging	3~5 Mets 5~12 Mets	Moderate exercise
Full power running	12.5~23 Mets	Strenuous exercise

Table 3. Exercise intensity by Heart Rate for high-aged

Intensity	%HRmax					
	100	80	60	40	20	0%
50 yrs	170	168	126	104	82	60
60 yrs	160	140	120	100	80	60
70 yrs	150	132	114	96	98	60
80 yrs	140	124	98	92	76	60
Exercise	Strenuous		Moderate		Slow movement	Resting
Activity	Power running		Jog ging	fast walk ing		

4. Encouraging ideas for high-aged people

That participation in physical activities and walking in particular would contribute to the physical and mental wellbeing of high-aged people, and that with precautions about individual medical condition the program may be executed with safety have been presented in the preceding sections. In this section, certain discussion will be made as additional ideas to encourage these high-aged people to be engaged with physical activities and or any other activities to promote their long living life in preventing/ recovering from physical deterioration by aging as much as preserving their longevity with certain fulfilled mental status with good quality of living.

The experimental result as demonstrated in **Figure 9** (Kawazoe & Hatano, 2004) suggests that among 32 dementia patients in a day care center certain improvements in their physical capacity (N-ADL) was observed upon experiencing fitness/ group recreation activities for three months. A satisfactory daily life heavily depends on the physical capacity in activity of daily living, such as walking, climbing stairs, leaping, remain standing with single leg. These ADL activities are adopted in using the toilet and bath, changing clothes and cooking independently. Thus walking and locomotive movements should be practiced in daily life to prevent and/ or to recover from deteriorated physical conditions, including dementia.

A longitudinal survey result of the rate of survival after 5 years tracking of high-aged people (between 65 and 84 years old) as classified by a quality of living (QOL) score (SF36, Lawton, 1991), as demonstrated in **Figure 10** (Kubota & Hatano, 2006), suggests that high-aged people with low QOL scores (lowest of quartile distribution) had the poorest survival rate (significant level at 0.001%). In a related study (Kubota & Hatano, 2005) with 2903 high-aged

people, the decline rate of QOL score upon 7 years of aging of latter half high-aged (75~84 years) was significantly greater than that of first half high-aged (65~74 years), suggesting that the older one becomes, the lower the QOL score will be recorded (0.001%). By all means high-aged people should attempt to maintain the QOL level, especially among the latter half high-aged (75~84 years).

While examining the effect of social support network on the mental aspect of the QOL among the frail high-aged patients (due to post-stroke condition), certain significant relationship was recognized, in favor of social support circumstances (emotional relations and connections with others) to secure mental aspect of QOL (Takeda & Hatano, 2008).

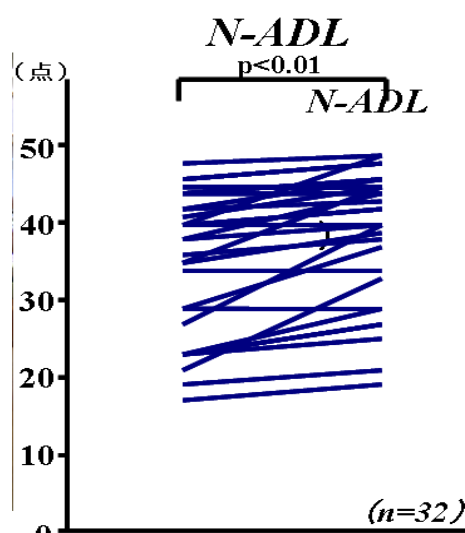


Figure 9. Changes in the ADL scores upon 3 months of participation in physical activities among dementia patients (Hatano/ Kawazoe, 2004)

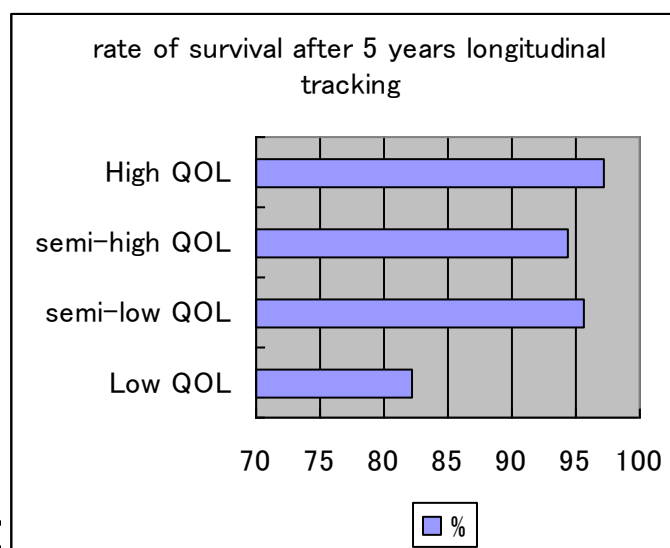


Figure 10. Rate of survival in 5 years among high-aged people (age 65~84, N=14001) classified by QOL score (Kubota/ Hatano, 2006)

5. Conclusion

By referring to previously conducted studies, the role of physical activity and walking for high-aged people in promoting their health, fitness and wellness has been studied in this presentation. It was suggested that periodical participation in certain physical activities or walking will be effective to enhance sound body functions, to maintain and or to promote physical fitness, to preserve mental and social wellness.

Then in the course of discussion, use of specific exercise prescriptions to cope with individual conditions of aging and physical deterioration was introduced. In terms of mental health and high QOL of high-aged people, not only physical activities and walking but also certain behavioral suggestions to enhance high QOL of high-aged people were introduced.

That any group-oriented activity may promote mental health and the social aspects of human network was also introduced. It seems that the wellness of high-aged people has multiple dimensions, though participation in physical activity is definitely one of the most effective elements. Physical educators and the HPERSD professionals are advised to deal with high-aged

people with flexible ideas to make these high-aged people live their lengthened life with happiness and satisfaction.

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Determination of Incidences and Causes of Atrial Fibrillation in Master Swimmers and

Health Related Issues

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Abstract

The purpose of this review is to investigate the literature related to atrial fibrillation (AF) in competitive master swimmers (females and males) and possible relationships to training history, individual and family cardiac history, and associated medications and the use of methyl xanthenes as ergogenic aids. Masters swimmers have been reporting AF at increasing rates. This study wanted to determine if this group had a higher incidence of AF when compared to non-exercising age matched master swimmers as well as age matched individuals involved in other sport or exercise activity. Some sources of AF could be related to training history, family cardiac health history, and the use of methyl xanthenes and Beta-2 agonists as ergogenic aids. Since many swimmers have asthma, we wanted to determine whether combining Beta-2 agonist asthma medications with methyl xanthenes would be useful in predicting atrial fibrillation in master swimmers. Another question examined was whether the use of methyl xanthenes could impact AF when used in combination with Beta-2 agonists. Creatine monohydrate (CM) has been shown to have a positive effect on recovery from coronary artery artificially induced occlusion and reduced fibrillation during and after the occlusion period. The researchers also examined whether vitamins like B6, B12, Coenzyme Q10 and Hawthorn extract resulted in lower incidences of AF or cardiac problems reported by master swimmers.

Key words: Parasympathetic Tone

Introduction

Masters swimmers have been reporting atrial fibrillation (AF) at increasing rates. Researchers have examined several different possible influences and causes for these elevated rates of AF like training histories, individual and family cardiac histories, prescribed medications, and the use of methyl xanthenes and Beta-2 agonists as ergogenic aids. This review of literature examines many different questions related to possible causes of AF in master swimmers. Many swimmers have asthma and take Beta-2 agonist medication to treat their asthma. They may use methyl xanthenes as an ergogenic aid. Researchers have shown that the use of Beta-2 agonists has positive chronotropic and ionotropic effects on the heart. One question addressed by this review was whether Beta-2 agonist asthma medication when used with methyl xanthenes could be contributing to the development of AF in master swimmers. Creatine monohydrate (CM) has been shown to have a positive effect on recovery from coronary

artery artificially induced occlusion and reduced fibrillation during and after the occlusion period. The authors also want to examine whether the use of vitamins B6 and B12, Coenzyme Q10, Taurine, Ubiquinone and Hawthorn extract results in a significant increase or decrease of cardiac problems reported by master swimmers.

Acute Cardiovascular Adaptations to Exercise

At the onset of exercise, several different acute cardiovascular exercise adaptations occur. Williamson, Fadel & Mitchell (2010) reported that the Central Command mechanism in the brain processes information related to the process of swimming and the brain responds to the stress of the activity by increasing the heart rate in swimmers. Muscle contractions produced by swimming causes resistance vessels to dilate, and increases muscle conductance, blood flow, and tissue pressure resulting from intravascular pulse pressure (Sanfilippo, et al, 1990). With further exercise, the blood vessels will continue to dilate to meet the oxygen requirements of the exercising muscles until maximal cardiac output and oxygen consumption are reached (Buchheit & Gindre, 2006). As exercise levels increase, cardiac output and conductance begin to match one another and a steady cardiac level of 50-80 percent of maximal oxygen consumption is created and maintained by the swimmer. An increase in workload over 80% to 90% of maximal oxygen consumption requires the use of non-aerobic energy sources to meet workload demands.

Chronic Cardiovascular Adaptations to Exercise

Master swimmers can maintain training loads of 50 to 80 percent of maximal oxygen consumption for 1 to 4 hours per training session. The chronic cardiovascular training involved in master swimming training results in several different physical adaptations like improvements in cardiac function, and increases in ventricular volume, wall thickness, and end diastolic volumes, and decreases in end systolic volumes that result in increased stroke volume. Resistance vessels become more responsive to vasodilator activity and the parasympathetic nervous system slows the heart rate allowing greater time for ventricular filling. The autonomic nervous system begins to maintain a balance between cardiac output and conductance of the resistance vessels that provides for significant increases in muscle blood flow while maintaining normal blood pressure. A well-documented long-term adaptation to exercise that could be related to AF is an increase in the parasympathetic braking of the heart by reducing the output of the Sino Atrial Node (SAN) that is the heart's pacemaker. Presumably, this allows greater filling time for the left ventricle, which then controls the end diastolic volume and results in an associated increase in stroke volume (Buchheit & Gindre, 2006). This constant increase in parasympathetic tone could cause the regular cardiac tissue to change its characteristics and to become another pacemaker for the heart causing an irregular heartbeat.

Other Forms of Exercise and Atrial Fibrillation

Atrial Fibrillation has not been studied in master swimmers exclusively and long distance runners may not be a viable model to study because necrotic effects on heart muscle have been documented after training and after participation in long duration physical activity such as marathon and ultra-marathon races over a period of years (Bristow et al, Uneo and Moritani

2006, Johnson, 1986, Karjalainen et al, 1998, Maron & Pelliccia, 2006, Rosenhtraukh et al 1988 & Apple et al, 2002).

The impact that aerobic training has on AF amongst long distance runners has been well documented. However, a comparison of the impact of training on AF between master swimmers and long distance runners may not be a valid comparison. Several researchers (Bristow et. al., 1989, Uneo and Moritani 2006, Johnson, 1986, Karjalainen et al, 1998, Maron & Pelliccia, 2006, Rosenhtraukh et al 1988 & Apple et al, 2002) have reported that long distance running training and participation in marathon and ultra-marathon races over a period of years has a necrotic impact on heart muscles in long distance runners.

Parasympathetic adaptation to exercise has been a well-documented function of cardiovascular fitness. Swimmers practice exercise durations that are similar to those observed in long distance runners; however, long distance runners many times cover total distances that are between 3.5 to 4 times greater than master swimmers while training. Another significant difference between runners and swimmers is during supine recovery from exercise. There is a significantly greater parasympathetic influence on the heart from training among swimmers. When master swimmers train their vagus nerve innervates the SAN which is the primary pacemaker of the heart. It is possible that after years of training this constant parasympathetic inhibition of discharge from the SAN causes the adjacent cardiac tissue to remodel and become conductive tissue that results in AF. This could also be true for runners or cyclists but it appears that the parasympathetic effect is greater during and after supine exercises. Therefore, there should be a study that specifically focuses on the impact that master swimmer training has on AF.

While AF may be a controllable event, it has also been associated with atrial enlargement. This enlargement could lead to lower atrial pressures if the venous return remains the same. This could also result in a significant decrease in ventricular diastolic volume and a lower stroke volume that is the major determining factor for increasing cardiac output (Sanfilippo et al, 1990). Many master athletes compete with defibrillators or pace makers. Some have undergone cardioversion, which is an electrical stimulation to normalize the rhythm of the heart. Finally, there is a medical procedure known as ablation, which destroys the new pacemaker tissue that has developed. Therefore, AF in master swimmers is a condition that deserves a greater amount of scrutiny from researchers.

Possible Causes of Atrial Fibrillation Related to Swimming Exercise

Many master swimmers have been training and active in competitive swimming since they were in elementary or high school. This long-term training by many swimmers puts unusual strains on the heart and ventricular remodeling resulting in significant increases in ventricular size and strength has been documented by Mont, Elosua & Brugata (2009). Swimmer training has been shown to result in significant anatomical changes like increases in ventricular chamber size and end-diastolic volume and decreases in end systolic volume. Many years of swimming training can result in these cardiac modifications that generally have a positive impact on health (Johnson 1986), but some researchers consider that the exercise and accompanying ventricular remodeling can have an adverse effect on electrocardiogram readings (Karjalainen et al 1998,

Takahashi 2000). Some researchers have shown that these altered morphologies of the heart lead to either physiological or pathological abnormalities in the ECG (Maron & Pelliccia, 2006). With dramatic ventricular remodeling and function it could be possible that the atrium might attempt to adapt to training by developing more conductive tissue. This adaptation has been associated with Lone Atrial Fibrillation (LAF) (Karjalainen et. al., 1998 and Mont, Sambola & Brugada, 2009). AF is associated with pathological conditions that have been observed in long-term active sports participants. A study by Maron and Pelliccia in 2006 found AF present in 63 percent of long-term endurance sports participants. These self-reported long-term sports participants were extracted from a larger population to study but the nature of their activities was not reported. In addition, female participants were used as part of the control group for these studies but not in the sports participation group (Maron & Pelliccia, 2006). Significant differences between male and female swimmers should be examined.

Lately, there has been a particularly high representation of asthmatics competing in swimming. The high rates of asthma amongst swimmers are thought to be a result of swimmers breathing in warm air in close proximity to pool water with a higher humidity than the ambient environment. The expiration capacity of asthmatic swimmers could also be enhanced by the hydrostatic pressure of the water on their chest. Many asthmatic swimmers use Beta-2 agonists that are inhaled during practice and competition to control the effects of their asthma. Many young asthmatic competitive swimmers, when they become adults, will continue to use asthma inhalers and medications as they transition into participating in master swimming competitions. Researchers have found Beta-2 receptors in the hearts of asthmatic master swimmers (Bristow et. al., 1989), suggesting that asthmatic swimmers that have used asthma medications for many years may have a greater chronotropic and ionotropic cardiac function and/or an abnormal sinus rhythm possibly contributing to LAF or to AF related to pathological conditions in the heart.

Atrial Fibrillation and Ergogenic Aids

Swimmers at all levels use ergogenic enhancing substances that can have a real or perceived effect on their performance. Methyl xanthenes, found in coffee, tea and chocolate, can have positive cardiac chronotropic and ionotropic effects on the heart. This means they speed up the heart rate and make the force of cardiac contraction greater. It is possible that years and years of taking this cardiac stimulant could result in abnormal ECGs. In addition, taking methyl xanthenes over a long period of time could produce undue cardiac stimulation possibly resulting in arrhythmias (Goldberg, Park & Berlinger, 1986). We propose that if methyl xanthenes are taken in combination with a Beta-2 agonist there would be greater chronotropic and ionotropic effects on the heart. Recent studies have shown that the heart does have Beta-2 receptors and can be stimulated by a Beta-2 agonist which has previously been thought to work only on the vasculature of the lungs (Bristow et. al., 1989).

Some supplements have supposed positive effects on the heart and circulation. Creatine monohydrate (CM) is an ergogenic aid that provides a creatine molecule that binds to the free inorganic phosphate to phosphorylate an ADP molecule during short term exercise where energy is supplied via the ATP-PC system. Creatine monohydrate has been shown to have some positive effects on occlusion induced AF (Rosenhtraukh et. al., 1988) and this suggests that swimmers using CM could be less susceptible to AF. If CM has been used over a long period of

time it could have a positive effect on AF and could possibly be masking the effects of events that cause AF.

Health maintenance is a very important goal for many competitive master athletes and they will many times take a variety of substances that they feel will improve their cardiorespiratory health. Some of these substances include vitamin B6 and B12, Co-enzyme Q10 or Ubiquinone a mitochondrial electron carrier (Morisco, Trimarco & Condorelli, 1993). Another substance, Taurine, is taken by many master swimmers and is thought to strengthen the heart ventricles and reduce the risk of congenital heart failure. Hawthorne Berry is an herb that is taken by many and is thought to prevent coronary artery disease and high blood pressure. It would be interesting to determine if master swimmers who are free of AF take these supplements and determine if they have had any significant positive impact on their heart health.

Another factor related to AF is the accumulation of fat on the heart and in areas adjacent to conducting tissues. It was found that obese patients had better outcomes and mortality than lean patients when they were treated for AF. Badheka et. al. (2010) hypothesized that fat deposits around the heart serve as a protective mechanism and promote cardiac health. Since master swimmers are generally lean and highly fit, it seems plausible that lack of fat on the heart of master swimmers might contribute to higher incidences of AF. The authors suggest that estimation and analysis of percent body fat could be an important variable to study when determining the impact that AF. Could extremely lean master swimmers be experiencing AF at higher rates than master swimmers with higher rates of percent body fat?

Training History

Another possible variable that could lead to significantly higher rates of AF amongst master swimmers could be their training regimens. Detailed records should be collected that outline the training histories of master swimmers. How many years have they trained, did they train prior to puberty, did they train for endurance, middle distance or sprinting events. Longitudinal data regarding information on training volumes and incidents of AF in master swimmers could provide insight into the influence that modes and duration of training have on the parasympathetic impact that endurance swimming training has on the heart. The authors propose that the following factors should be examined along with training history: 1) individual and family history of cardiovascular disease and abnormal ECG, 2) training history of the swimmer including weight training and other supplemental training, 3) achievement levels in swimming for short, intermediate and long distances, 4) demographic data and physical health profiles, 5) use of ergogenic aids including methyl xanthenes, creatine monohydrate and other aids, 6) and any history of Beta-2 agonist use to determine if this population has greater incidence of AF or other cardiac problems than the corresponding normal population of swimmers. A research project should determine whether duration and intensity of training, achievement levels, demographics and the use of ergogenic aids; either by themselves or in combination with Beta-2 agonists, have any relationship with or can help predict incidence of AF in master swimmers. It should also be determined whether Vitamin B complexes, Ubiquinone and Hawthorn Root are associated with lower incidences of AF and other types of heart disease or cardiac abnormalities.

Discussion and Conclusions

The review of literature has shown that many athletes with a history of long-term training have made a strong positive cardiac adaptation to exercise as indicated by the enhanced baroreceptor reflex (Ueno & Moritani, 2006). However, there may be a negative side effect to this adaptation to exercise. As the heart rate normally slows over the years, and with the added adaptation of training, the heart rate may slow to a point where there is cardiac tissue remodeling that results in AF not associated with any heart disease. Since this problem does not occur in all endurance athletes, we propose other factors associated with LAF such as family history, use of methyl xanthenes, and beta-2 agonists be investigated. Conversely we propose that the use of a variety of substances used by master swimmers reputed to positively impact cardiac health also be investigated.

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Effects Of Circuit Strength Training Program On Percent Body Fat And Lean Body Weight Of College Men And Women

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Abstract

This study identified a circuit strength training program as a means of achieving the treatment of hypokinetic conditions and its effects on body composition (percent body fat, lean body weight) of college men and women. Randomized pre-test, post-test, control group research design was adopted for the study. The participants were 87 male and female College of Education students in Ikere-Ekiti. Simple random sampling technique was used to assign the participants to experimental and control groups. The experimental group was treated with a circuit strength training program. Pre-test and post-test data were collected on body weight, skinfold and body girths of participants using bathroom weighing scale, stopwatch, skinfold calipers and anthropometric tape. A 12 – week intervention program, consisting of strength training exercises lasting 30 minutes, performed three times a week, was employed. Two hypotheses were tested at 0.05 level of significance. Mean, standard deviation, and analysis of covariance (ANCOVA) were used to analyze the data. Scheffee post-hoc analysis was used to determine the direction of significant differences. There were significant difference between the experimental and control groups in the following anthropometric parameters: percent body fat ($F_{(1,86)} = 161.84$, $P < 0.05$) and lean body weight ($F_{(1,86)} = 5.95$, $P < 0.05$) of the experimental and control groups. The circuit strength training program significantly improved percent body fat and lean body weight of college men and women. Physical education programs consisting of strength training exercises can be effectively utilized to improve the physical health of college men and women.

Key words: Physical inactivity, resistance exercise

There is increasing risk of chronic diseases (e.g. coronary heart disease (CHD), stroke, osteoporosis, diabetes, obesity/hypertension) that have become the leading causes of morbidity and mortality (Pollock & Kevin, 1994). Many adult men and women in Nigeria today are faced with chronic diseases. Many are assisted before they can walk, some walk with crutches, some are placed on special diets due to these chronic ailments. The best way to ameliorate these conditions have not been well established in the literature. This study therefore identified a circuit strength training program as expedient to the treatment of hypokinetic conditions and its effects on body composition of college men and women.

Quinn (2003), states that excess body fat may lead to obesity and increases the risk of getting many diseases. The American Heart Association (AHA, 1995; 2005) has identified inactivity as a primary risk factor for the development of CHD along with other diseases. The effects of resistive type exercise (strength training) on health status have been largely overlooked. Traditionally, strength training has been seen as a means for improving muscular strength, endurance and power, but not as a means for improving health. There is increasing evidence that strength training plays a significant role in many factors (The American College of Sports Medicine (ACSM) 1990; 1995; 2005), American Heart Association (AHA), (1995; 2005), and the Surgeon General Report on Physical Activity and Health (1996) all recognize the importance of strength training as an important component of health.

Total fat in the human body is classified into two types: essential fat and storage fat. Essential fat is needed for normal physiological functions. Without it, human health deteriorates. This type of fat is found within tissues such as muscles, nerve cells, bone marrow, intestine, heart, liver and lungs (Katch & Katch, 1980). This essential fat constitutes about 3 percent of the total weight in men and 12 percent in women. The percentage is higher in women because it includes sex-specific fat, as can be found in the breast tissue, the uterus, and other sex-related fat deposits (Hoeger & Hoeger, 1999).

Strength training is an effective method of developing musculoskeletal strength and is often prescribed for fitness, health, and the prevention and rehabilitation of orthopedic injuries (American Association of Cardiovascular and Pulmonary Rehabilitation, 1995). The physiologic adaptations are most often associated with strength training include increases in muscle mass, bone mass, and connective tissue thickness and associated increases in muscle strength and endurance (Costill & Wilmore 1999; Earle & Baechle, 2004; Heywood, 2002). These benefits can safely be obtained when exercise program variables (frequency, volume of training, and mode of training) are manipulated to meet the needs of the individual. The general benefits of strength training for both men and women include an increase in bone mass and lean mass, improved body composition in terms of decreased fat mass, cardiovascular fitness, strength, and an enhanced sense of wellbeing through circuit strength training program (Kraemer, 1997, Pollock, 1999; Nindl, 2000; Kraemer, 2004). Hoeger and Hoeger (1999), postulated that women are not able to achieve the same amount of hypertrophy (size) as men. However, there are individual differences in hormonal secretions causing some women to become larger than other women (The same is true of men).

Some authors, Wilmore & Behnke, (1970), Pavlov (1985), Kraemer, Nicolas and Fleck (1999) reported a decrease in lean body weight of participants. In their own submission (Oranugo, 1989; Nwanko, 1992 & William, 1999) others found no change in or an increase in Lean Body Weight following training. This was corroborated by Garrow and Summerbell (1995) that resistance exercise had little effect on weight loss, but increased fat free mass by about 2kg in men, and 1kg in women. Luis (2005) reports that Lean Body Mass increases consistently with a course of circuit training. A 1-3.2kg gain in lean body mass can be expected with a consequent decrease in relative fat mass of 1-3%, total weight remaining unchanged. The resistant work involved in the circuits encourages muscle mass development, and thus any fat loss is replaced equally by muscle gain. This makes it easier to maintain lower body fat or reduce body fat even further because the increase in Lean Body Mass pushes up basal metabolic rate and overall expenditure. Considering the increasing rate of health problems in adult Nigerians such as obesity, heart disease, diabetes, hypertension, low back pain etc., the researcher decided to carry out a study on the effects of circuit strength training on percent body fat, and lean body weight of college men and women.

Hypotheses

The following hypotheses were tested in the study:

- (1) There will be no significant difference between the percent body fat (% body fat) of the experimental and control groups after a 12-week circuit strength training program.
- (2) There will be no significant difference between the lean body weight (LBW) of the experimental and control groups after a 12-week circuit strength training program.

Methodology

The Sample

The sample consisted of 87 men and women of the school of science, College of Education Ikere-Ekiti. The participants were randomly assigned to two groups. One experimental group (men and women) and one control group (men and women). Forty-four participants were in the experimental group (21 men, 23 women). The control group consisted of 43 participants (21 men, 22 women). The men and women between the ages of 17-30 years served as the participants. The nature of the test and purpose of the study were explained to the students, informed consent, in which a short description of the investigation was written was given to them. The informed consent forms were dully filled and signed by the participants. The age, sex, height, weight and Skinfold measurement of each participant were taken and recorded before the commencement of the exercise program. The experimental group was exposed to a 12-week circuit strength training program while the control group did not undergo such a program.

Post – Experimental Measures

After the twelve weeks circuit strength training program, the weight and skinfold measure of each participant in the experimental and control groups were taken, as well as during the pretest measures.

Exercise Procedure used for this study

The exercise session started with warm-up activities that lasted for six minutes. Strength exercises followed for 20 minutes and ended with a cool down stretch four minutes.

Design and Analysis

The pretest – posttest experimental research design was used for the study. Data for the study were analyzed using both descriptive (mean, range and standard deviation) and inferential statistics Analysis of Covariance (ANCOVA), post hoc analysis Scheffeé was used where significant differences existed.

Results

Table 1 shows the descriptive statistics for the percent body fat (% body fat) of participants.

Table 1 shows the descriptive statistics for the Percent body fat (% body fat) of participants' pre and posttest values. The experimental group (men) pretest mean value for % body fat was 6.9 , the standard deviation was 1.1 with a range of 5.2 to 9.8. The posttest mean value for % body fat was 6.5, the standard deviation was 1.0 with a range of 5.1 to 9.1. The experimental group (women) pretest mean value for % body fat was 17.3, the standard deviation was 3.4 with a range of 12.1 to 23.3. The posttest mean value was 16.3; the standard deviation was 3.3 with a range of 11.4 to 21.9. The control group (men) recorded a mean of 6.5 with a standard deviation of 1.1 and a range of 5.2 - 9.2. The mean for the posttest was 7.2 with a standard deviation of 1.2 and a range of 5.3 - 10.3. The control group (women) recorded a mean of 16.7 with a standard deviation of 3.1 and a range of 12.3 to 22.5. The posttest mean was 17.9 with a standard deviation of 3.4 and a range 13.5–24.0. This is further illustrated in fig. 1.

Table 2 shows the descriptive statistics for the Lean Body Weight of participants' pre and posttest values. The experimental group (men) pretest values showed a mean of 58.95, and a standard deviation of 7.1. The range was between 43.4- 73.8kg. While the posttest values showed a mean of 57.8kg, a standard deviation of 6.8 and a range of 42.4 - 68.4 kg. The experimental group (women) pretest values showed a mean of 46.58, and a standard deviation of 5.0. The range was between 36.0-56.2kg. While the posttest value showed a mean of 45.7kg, a standard deviation of 5.2 and a range of 35.3 to 54.4 kg. The control group pretest values showed a mean of 59.2 with a standard deviation of 5.4 and a range of 49.9 - 69.0 kg. While the posttest values showed a mean of 58.8kg, a standard deviation of 5.5 and a range of 49.5 - 69.1kg. The

control group (women) pretest values showed a mean of 45.7 with a standard deviation of 3.9 and a range of 40.3 - 53.8 kg. While the posttest mean values showed a mean of 45.8 kg with a standard deviation of 3.8 and a range of 40.0 - 53.6 kg. This is further illustrated in fig. 2.

Table 1

Descriptive Statistics for the Percent Body Fat (% body fat) of Participants

Group	Sex	N	Measures	Mean	S.E. Mean	Std. deviation	Range
Experimental	Men	21	1	6.9978	.2426	1.11165	5.24-9.75
			2	6.5112	.2233	1.02310	5.14-9.12
	Women	23	1	17.2639	.7144	3.42633	12.10-23.34
			2	16.2580	.6926	3.32156	11.44-21.90
Control	Men	21	1	6.5104	.2455	1.12525	5.18-9.21
			2	7.1504	.2643	1.21103	5.34-10.34
	Women	22	1	16.7106	.6629	3.10933	12.29-22.47
			2	17.9134	.7315	3.43110	13.52-23.95

Measures : Pretest (1) Posttest (2)

Table 2

Descriptive Statistics for the Lean Body Weight of Participants

Group	Sex	N	Measures	Mean	S.E.	Std.deviation	Range
Experimental	Men	21	1	58.9576	1.5498	7.10186	43.35-73.82
			2	57.8001	1.4726	6.74823	42.43-68.40
	Women	2	1	46.5867	1.0523	5.04661	36.04-56.23
			2	45.6899	1.0820	5.18916	35.31-54.39
Control	Men	21	1	59.2193	1.1832	5.42232	49.99-69.00
			2	58.7676	1.2028	5.51199	49.51-69.14
	Women	22	1	45.7377	.8239	3.86450	40.32-53.78
			2	45.7885	.8117	3.80698	40.50-53.57

Measures : Pretest (1) Posttest (2)

Table 3

Analysis of Covariance (ANCOVA) Result on the Percent Body Fat (% Body Fat) of the Experimental and Control Groups

Sources of Variation	Sum of Squares	DF	Mean Squares	F	F _c	Sig
Main Effects	2820.460	4	705.115	1850.549		.000
Covariates	2752.430	1	2752.430	7223.665		.000
Group	61.664	1	61.664	161.836	3.96	.000
Residual	31.244	82	.381			
Explained	2851.704	86				
Total	15643.247	87				

$F_{(critical)} = 3.96$

* = Significant at $P < 0.05$

Table 4

Scheffé Multiple Pair Wise Comparisons for Percent Body Fat

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Exp-Male	Exp.-Female	-8.9818*	.91402	.000	-11.5902	-6.3735
	Control-Male	.1257	.93505	.999	-2.5426	2.7941
	Control-Female	-10.3789*	.93505	.000	-13.0473	-7.7105
Exp.-Female	Exp.-Male	8.9818*	.91402	.000	6.3735	11.5902
	Control-Male	9.1076*	.92507	.000	6.4677	11.7475
	Control-Female	-1.3970	.92507	.520	-4.0369	1.2429
Control-Male	Exp.-Male	-.1257	.93505	.999	-2.7941	2.5426
	Exp. -Female	-9.1076*	.92507	.000	-11.7475	-6.4677
	Control-Female	-10.5046*	.94586	.000	-13.2038	-7.8054
Control-Female	Exp.-Male	10.3789*	.93505	.000	7.7105	13.0473
	Exp. -Female	1.3970	.92507	.520	-1.2429	4.0369
	Control-Male	10.5046*	.94586	.000	7.8054	13.2038

* The mean difference is significant at the .05 level.

Table 5

Analysis of Covariance (ANCOVA) Result on the Lean Body Weight (LBW) of the Experimental and Control Groups.

Sources of Variation	Sum of Squares	DF	Mean Squares	F	F _c	Sig
Main Effects		4	1411.850	587.613		.000
Covariates	2218.152	1	2218.152	923.197		.000
Group	14.286	1	14.286	5.946	3.96	.017
Residual	197.020	82	2.403			
Explained	5844.420	86				
Total	239238.349	87				

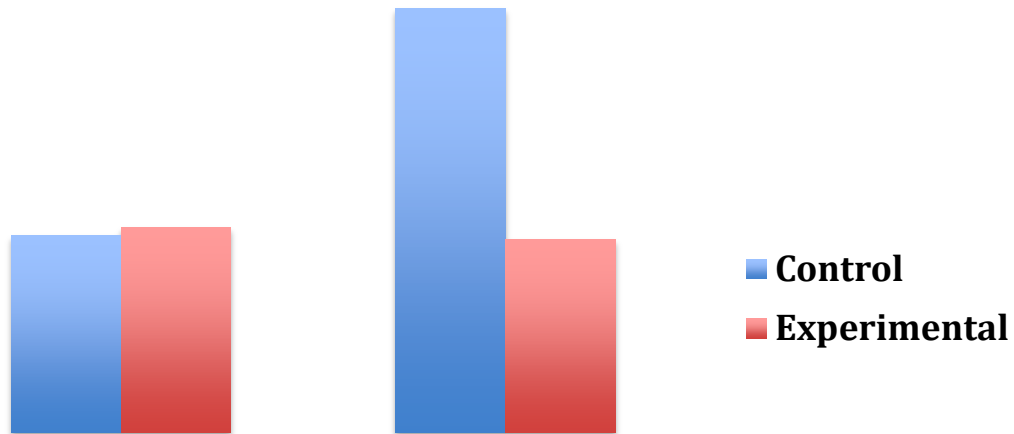
$F_{(critical)} = 3.96$

*Significant at $P < 0.05$

Table 6*Scheffé Multiple Pair Wise Comparisons for Lean Body Weight*

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Exp-Male	Exp.-Female	11.6540*	1.63905	.000	6.9766	16.3314
	Control-Male	-1.4237	1.67677	.868	-6.2088	3.3613
	Control-Female	11.6494*	1.67677	.000	6.8644	16.4344
Exp.-Female	Exp.-Male	-11.6540*	1.63905	.000	-16.3314	-6.9766
	Control-Male	-13.0777*	1.65887	.000	-17.8117	-8.3438
	Control-Female	-.0046	1.65887	1.000	-4.7386	4.7294
Control-Male	Exp.-Male	1.4237	1.67677	.868	-3.3613	6.2088
	Exp.-Female	13.0777*	1.65887	.000	8.3438	17.8117
	Control-Female	13.0731*	1.69616	.000	8.2328	17.9135
Control-Female	Exp.-Male	-11.6494*	1.67677	.000	-16.4344	-6.8644
	Exp.-Female	.0046	1.65887	1.000	-4.7294	4.7386
	Control-Male	-13.0731*	1.69616	.000	-17.9135	-8.2328

* The mean difference is significant at the .05 level.

**Fig 1: Effects of circuit strength training on percent body fat of college men and women**

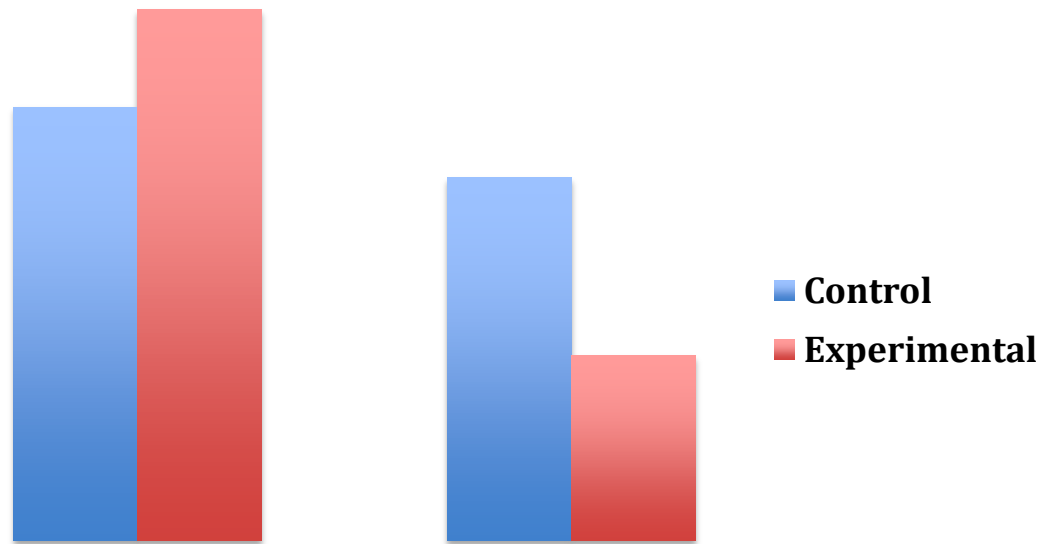


Fig. 2: Effects of circuit strength training on lean body weight of college men and women

Results

The results of the anthropometric assessment are presented in tables 1-6 and figures 1 and 2. The Analysis of Covariance computed to test for significant differences among the groups on effect of circuit strength training on percent body fat is presented in table 3. The null hypothesis (H_0) which stipulated that there would be no significant difference between the percent body fat (% body fat) of the experimental and control groups is rejected, as the result was found to be statistically significant. In probing further into the source of the significant difference recorded in table 3, the Scheffé post-hoc analysis was carried out, table 4. The result in table 4 shows that the mean differences between experimental men and experimental women, experimental men and control women, control men and control women were significant at $< .05$ level. The mean differences between experimental men and control men, experimental women and control women were not statistically significant. Therefore, the hypothesis is rejected.

Table 5 above contains the ANCOVA result of the hypothesis that there was no significant difference between lean body weight (LBW) of the groups after the circuit strength training program. The result shows that the differences among the groups are statistically significant. In order to trace the source of the significant difference recorded in table 5, the Scheffé post-hoc analysis was carried out. The result in table 6 shows that the mean differences between experimental men and experimental women, experimental men and control women, experimental women and control men, control men and control women were significant at $P < .05$ level. The mean differences between experimental men and control men, experimental women and control women were not statistically significant. Therefore, the hypothesis is rejected.

Discussion

Hypothesis 1 stated that there will be no significant difference between the percent body fat (% body fat) of the experimental and control groups. As indicated in table 1, the participants mean score was 12.14 with a standard deviation of 5.76. The calculated results $F_{161.84}$, and $P < 0.05$ in table 3, indicated a significant difference in percent body fat (% body fat) of the experimental and control groups. Therefore, the null hypothesis (H_0) was rejected. Table 4 shows the source of the significant difference recorded in table 3. Table 5 shows that the mean differences between experimental men and experimental women, experimental men and control women, experimental women and control men, control men and control women were significant at $P < 0.05$ level. The mean differences between experimental men and control men, experimental women and control women were not statistically significant. Therefore, the hypothesis was rejected.

Figure 1 indicates the pattern of change in the percent body fat, and shows that the control group showed significant increase in percent body fat but the values in experimental group decreased. This finding agreed with that of (Adewunmi & Amusa, 1992), Campbell (1994), Guv (1996), William et al, (1991), Luis (2005) who observed a significant decrease in the percent body fat of participants after training. The decrease in the % body fat after the 12-week circuit strength training program was due to utilization of fat as a source of energy during the physical activities. This reasoning corroborates the observations of Brooks and Gaesser (1980), Rowland (1990), Bahr and Sejersted (1991). They stated that physical activity tends to increase muscle mass while fat is burned for energy. The decrease in the percent body fat of the experimental group was due to the effect of the circuit strength training program, while the increase in the control group was due to inactivity.

The second hypothesis stated that there will be no significant difference between the lean body weight (LBW) of the experimental and control groups. As shown in table 2, the participants mean score was 51.80, and a standard deviation of 8.24. The calculated results $F_{5.95}$, and $P < 0.05$ indicated a significant difference in lean body weight of the experimental and control groups. Therefore the null hypothesis stated above was rejected. In order to trace the source of the significant difference recorded in table 5, the Scheffé post-hoc analysis presented in table 6 was carried out. The result in table 6 shows that the mean differences between experimental men and experimental women, experimental men and control women, experimental women and control men, control men and control women were significant at $P < 0.05$ level. The mean differences between experimental men and control men, experimental women and control women were not statistically significant. Therefore, the hypothesis was rejected.

Figure 2, indicates the pattern of change in the lean body weight, and shows that the experimental and control groups showed a decrease in lean body weight as shown in Figure 2. Table 6 shows the level of significant of the two groups. It shows that the mean differences between experimental men and control women experimental women and control men, control men and control women were significant at $P < 0.05$ level. The mean differences between experimental men and control men, experimental women and control women were not statistically significant. The hypothesis was therefore rejected.

This finding agreed with several previous studies (Pavlov et al, 1985; and Kraemer et al, 1999) that observed a decrease in lean body weight of participants. However, this result is at variance with other studies that report either no change or an increase in lean body weight following training (Pollock et al, 1975, Oranugo 1989, Nwanko 1992, Campbell et al, 1994, William et al, 1999, & Luis 2005). The result obtained in this study in respect of the participants

in the control group lean body weight could be due to diet taken, which was not controlled or manipulated in this study. The sharp decrease in the experimental group was due to the effect of the circuit strength training program.

Conclusion and Recommendations

A circuit strength training program significantly reduced percent body fat and lean body weight of college men and women in the experimental group. The reduction in percent body fat and lean body weight will be of help to those at risk of increased percent of body fat. The training program will be of help in improving the physical fitness of college men and women. It is recommended that college men and women should participate in moderate intensity strength training two to three days per week, with one set of eight to fifteen repetitions at a moderate exertion level and using eight to ten different exercises so that each major muscle group is recruited. The circuit strength training program should be adopted for body fat reduction.

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Effects of Weather Conditions on the Performance of Marathon Runners and Race Walkers at the 13th IAAF World Championships, Daegu 2011

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Abstract

The recent Olympics and the world championships have been carried out during the summer months in hot and humid conditions. There is in particular a negative influence of heat conditions on marathon running-performance, but the quantitative impact of weather has not been established. The purpose of this study was to quantify the influence of weather condition on men's marathon and men's race walk performance by elite athletes. Men's marathon and men's race walk results and weather data were obtained for the 13th IAAF World Championships in Athletics (Daegu, 2011). Analyses of the men's marathon and men's race walk finishers were compared with their personal best record and then contrasted with the weather conditions of the races.

The results showed that the Mean WBGT was $23.6 \pm 1.01^{\circ}\text{C}$ for marathon, $25.5 \pm 1.10^{\circ}\text{C}$ for 20km race walk and $24.7 \pm 0.85^{\circ}\text{C}$ for 50km race walk. The percent off personal best records was 5.8 ± 3.8 in marathon, 3.7 ± 2.6 in 20 km race walk, and $2.3 \pm 2.8\%$ in 50 km race walk, respectively. The percent off personal best record for men's marathon was higher than those for men' 20 km and 50 km race walk.

CONCLUSION: The percent off personal best records for men's marathon was higher than those for men's race walks. There was around 6% slowing of marathon performance in the hot environment, but the top 10 finishers had a higher personal best record and lower percentage off their personal best times.

Introduction

Since the Los Angeles Olympic Games in 1984, major competitions such as the Olympics and World Championships tend to be held in hot environments during the summer. It is well known that some elite runners collapsed due to heat-related injuries during women's marathon races at the Los Angeles Games and the Universiade 1995 in Fukuoka. Further, during the 11th World Championships held in 2007 in Osaka, the high temperature and humidity conditions caused heat exhaustion and dehydration, resulting in high dropout (did not finish) rates in both sexes (male: 33%, female: 14%) and the slowest winning times in World Championship history. Outdoor sporting activities including athletic competitions held in hot environments during the summer, particularly the marathon as an endurance and road event, are largely influenced by

weather conditions such as the temperature, humidity, and radiant heat. In the event of an excessive rise in the core body temperature, the physical load increases, and performance levels (results) drop (Costill, 1970; Costill, 1972). The weather conditions are an important factor for athletes to display their best performances by maintaining optimal conditions and the collection of such information is indispensable for their competition strategies.

The American College of Sports Medicine (1975 and 1984) proposed a preventive measure against heat-related illnesses in distance runners based on the WBGT (Wet-Bulb Globe Temperature) as a thermal index of hot environments. In line with this guideline, the IAAF (International Association of Athletics Federations) issued the “Medical Manual for Athletic and Road Racing Competition - A Practical Guide” (1998).

Although significant attention has been focused on the evaluation of environmental conditions based on the WBGT as a thermal index, the data have barely been reported in detail in marathons and race walkers at the Olympics or World Championships.

As previously mentioned, the collection of information on weather conditions affecting athletes' performance and conditioning is significant for their competition strategies.

However, such information is insufficiently provided during races and reported after the competition at present, not excepting the 13th IAAF World Athletics Championships; thus, the conditions of the hot environment the marathons and race walks were held in and whether the effects varied among marathon runners and race walkers depending on their running and walking performance have not yet been investigated.

Therefore, this study aimed to obtain basic strategic data regarding the performance and conditioning in marathon runners and race walkers by analyzing the weather conditions and runners' and walkers' achievements by rank at the 13th World Athletics Championships in Daegu.

Method

Subjects

The venue of the study was the 13th IAAF World Championships in Athletics, which were held in Daegu, Korea, from 27 August to 4 September 2011. The subjects were athletes who competed in the men's marathon and race walks (20km and 50km race walks) events. The data were collected from the formally published list of participants and formal results.

Summary of weather conditions

The temperature was measured over a period of time from one hour before starting to the end of the race in the men's marathons and race walks. The following items were measured based on the measurement method proposed in the American College of Sports Medicine's athletic guideline: WBGT (Wet-Bulb Globe Temperature); DBT (Dry-Bulb Temperature); RH (Relative Humidity); BGT (Black-Globe Temperature); and Trs (Road Surface Temperature: hereafter, “Road Temperature”). The equipment used for measurement included a heat stress indicator to measure hot environments during sporting activities: WBGT-203B of Kyoto Electronics Manufacturing Co., Ltd. The values indicated after 15 minutes or more by the heat stress indicator was installed at 120 cm above the ground or held in the hand were adopted. The road temperature was measured at intervals of 10 minutes, using the PM-Series JIS C 6802 (Distance D to Sport S size) of Yokogawa Electric Corporation. The other items including the WBGT were measured at intervals of 1 minute.

Calculation of percent difference from personal best record

To examine whether the effects of the hot environment varied among marathon runners and race walkers depending on their performance, the measured data were analyzed in comparison between 3 or 5 groups of athletes classified according to their ranks: 1 to 10; 11 to 20; 21 to 30; 31 to 40; 41 to 50th place.

The % difference between the race time at the 13th IAAF World Championships in Athletics and personal best (% off personal best) was calculated as: $[(\text{finish time} - \text{personal best}) / \text{personal best}] \times 100$.

Statistical processing

For statistics, the SPSS statistical package program (Version 16.0 for Windows) was used. For the comparative analysis of events in terms of the temperature, percent off personal best records, and their indices by rank, a one-way ANOVA was performed. In the case that a significant difference was shown between the groups, Fisher's least significant difference was applied. The significance level was set at $p < 0.05$.

Results

Figure 1 (a, b, c) shows a time-dependent variation in the WBGT, DBT, BGT, Trs, and RH before and after the men's marathon and race walks. Mean temperatures and humidity, together with their standard deviations, for men's marathon and race walks are shown in Table 1 and 2.

Only the men's 50 km race walk started at 8:00 a.m., and the men's marathon and 20 km race walk started at 9:00 a.m. The finish time for each race was as follows: 3:41:24 to 4:10:26 in the men's 50 km race walk; 2:07:38 to 2:38:33 in the men's marathon; 1:19:56 to 1:32:09 in the men's 20 km race walk.

Figure 1(a) shows a continuous change in weather conditions during men's marathon.

The highest values of the heat indices were detected during the last stage of the race: DBT: 29.9°C; BGT: 36.7°C; WBGT: 26.6°C; and Trs: 32.4°C. As shown in Table 1 and 2, the mean values during men's marathon race were as follows: DBT: $26.6 \pm 1.53^\circ\text{C}$; BGT: $29.9 \pm 2.28^\circ\text{C}$; WBGT: $23.6 \pm 1.01^\circ\text{C}$; Trs: $30.8 \pm 1.76^\circ\text{C}$; and RH: $55.4 \pm 2.83\%$. Namely, focusing on the WBGT, the temperature conditions at the World Athletics Daegu appeared to be more favorable for summer marathons than those at the 11th World Athletics Championships in Osaka (26 to 30°C; "high" to "extremely high" heat level) (Ishii, 2009).

The highest values of the heat indices during men's 20km race walk were detected during the last stage of the race: DBT: 30.4°C; BGT: 40.2°C; WBGT: 28.1°C; and Trs: 38.8°C. The mean values during the race were as follows: DBT: $27.4 \pm 1.31^\circ\text{C}$; BGT: $32.1 \pm 3.21^\circ\text{C}$; WBGT: $25.5 \pm 1.01^\circ\text{C}$; Trs: $32.3 \pm 3.16^\circ\text{C}$; and RH: $65.7 \pm 4.65\%$.

The highest values of the heat indices during men's 50km race walk were detected during the last stage of the race: DBT: 29.4°C; BGT: 34.7°C; WBGT: 26.°C; and Trs: 33.8°C.

The mean values during the race were as follows: DBT: $27.8 \pm 1.17^\circ\text{C}$; BGT: $31.0 \pm 1.79^\circ\text{C}$; WBGT: $24.7 \pm 0.85^\circ\text{C}$; Trs: $31.3 \pm 1.69^\circ\text{C}$; and RH: $56.3 \pm 3.38\%$ (Table 1, 2).

Although it was formally reported to be a fine day, our measurements demonstrated that the weather rapidly changed on that day; there were moments when it was cloudy, and suddenly strong sunlight streamed through the clouds. This may have resulted in a fluctuation in weather conditions during each race, although the values from field measurement tended to be higher than those from formal reports. In 20km race walk, the mean WBGT was significantly higher

than those in marathon and 50km race walk (20km race walk ; $25.5 \pm 1.10^{\circ}\text{C}$ > 50km race walk ; $24.7 \pm 0.85^{\circ}\text{C}$ > marathon ; $23.6 \pm 1.01^{\circ}\text{C}$, $p < 0.01$).

The IAAF has presented a risk chart for the prevention of heat stroke including the conditions for a road race in hot weather and an index, the Wet Bulb Globe Temperature (WBGT). According to the risk chart, the level of environmental conditions for the men's marathon and race walks was "high".

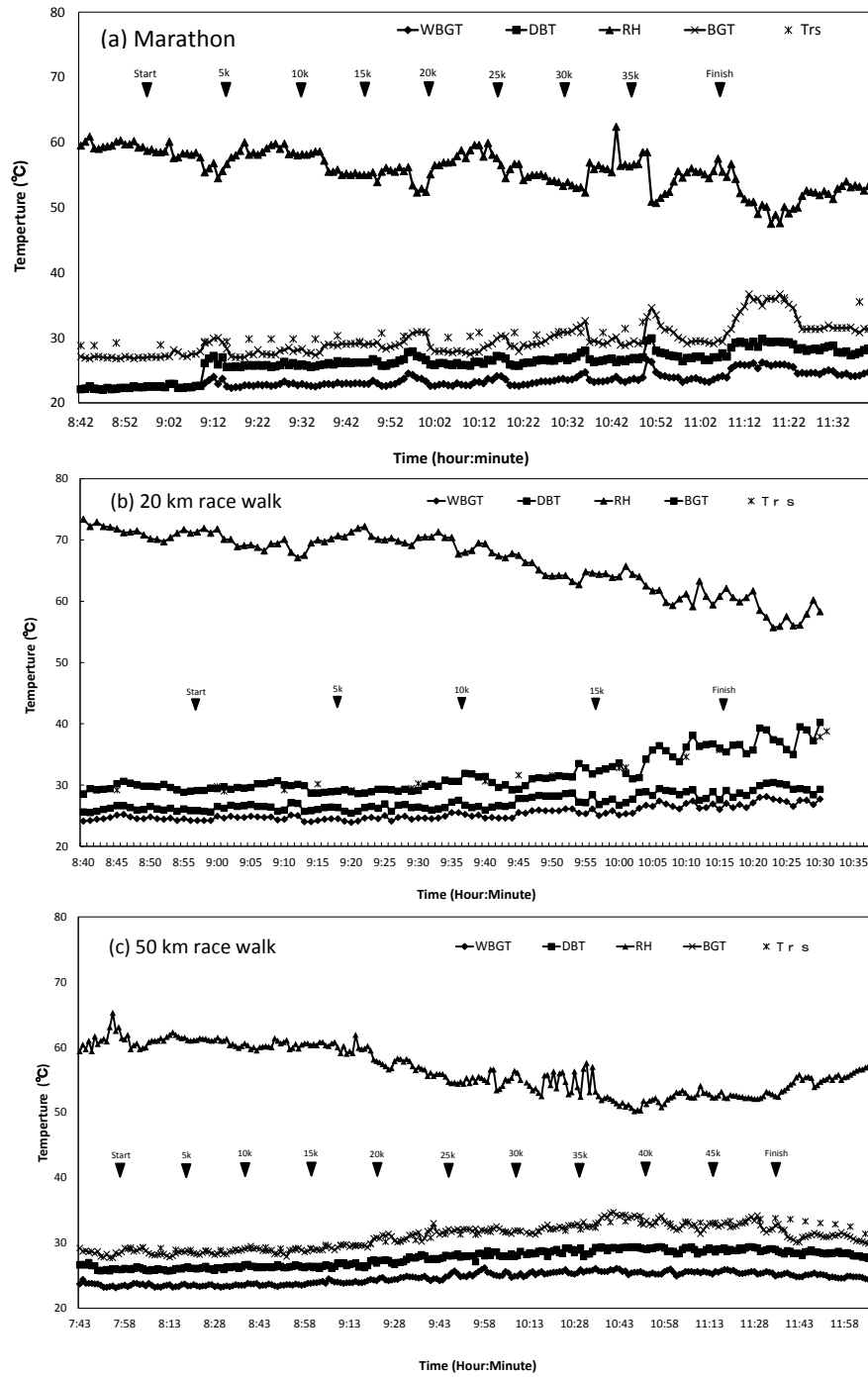


Figure 1. Change in environmental conditions during men's marathon (a), 20km race walk (b) and 50km race walk (c). WBGT: Wet bulb globe temperature, DBT: dry-bulb temperature, GT: globe temperature, RH: relative humidity, Trs: road surface temperature.

Table 1. Weather conditions during men's marathons and walks.

		DBT (°C)	BGT (°C)	T _{rs} (°C)	RH (%)	DBT _※ (°C)	RH _※ (%)
Marathon	Men	26.6 ± 1.53	29.9 ± 2.28	30.8 ± 1.76	55.4 ± 2.83	23.0 ± 1.41	61.0 ± 0
20km Race Walk	Men	27.4 ± 1.31	32.1 ± 3.21	32.3 ± 3.16	65.7 ± 4.65	22.0 ± 0	85.0 ± 0
50km Race Walk	Men	27.8 ± 1.17	31.0 ± 1.79	31.3 ± 1.69	56.3 ± 3.38	25.0 ± 2.83	67.0 ± 8.49

Values are mean ± SD , DBT ; dry-bulb temperature, BGT; black globe temperature, Trs ; road surface temperature, RH; relative humidity, DBT ※; dry-bulb temperature by the IAAF official announcement data, RH※ ; relative humidity by the IAAF official announcement data.

Table 2. WBGT and risk of thermal stress during men's marathons and walks.

		WBGT (°C)	WBGT range (°C)	Risk of thermal stress
Marathon	Men	23.6 ± 1.01	22.3~ 26.6	high risk
20km Race Walk	Men	25.5 ± 1.10	23.9~ 28.1	high risk
50km Race Walk	Men	24.7 ± 0.85	23.2~ 26.2	high risk

Values are mean ± SD , WBGT; wet-bulb globe , Risk of the thermal stress; Using guidelines adopted by the American College of Sports Medicine (Anonymous, 1984).

Table 3. Number of entrants, percent of did not finish personal best records, finish times and percent off personal best for men's marathons and walks.

		Entrants (n)	Did Not Finish (%)	Personal Best record (h:mm:ss)	Finish Time (h:mm:ss)	Percent Off Personal Best Record (%)
Marathon	Men	67	23.9	2:11:39 ± 0:03:37	2:19:21 ± 0:07:01	5.8 ± 3.82
20km Race Walk	Men	46	8.7	1:21:26 ± 0:03:16	1:24:27 ± 0:02:59	3.7 ± 2.56
50km Race Walk	Men	43	14.0	3:47:04 ± 0:06:44	3:52:18 ± 0:07:54	2.3 ± 2.81

Percent off personal best record: [(finish time - personal best)/personal best] × 100. Values are means ± SD

Table 4a, 5a and 6a shows the personal best records, finish times and percent off personal best records for the top eight of the men's marathon and race walks. Table 4b, 5b and 6b shows the personal best records, finish times and percent off personal best records by rank of the 3 or 5 groups in men's marathon and race walks, respectively.

The mean values of the percent off personal best record were 5.8 ± 3.8 in the men's marathon (n=51), 3.7 ± 2.6 , and $2.3 \pm 2.8\%$, in the men' 20 km (n=38) and 50 km race walk (n=25).

The percent off personal best record for men's marathon was significantly higher than men' 20 km and 50 km race walk ($p < 0.01$).

No significant differences in the percent off personal best records for men's marathon were observed between the groups ranked 1 to 10, 11 to 20th place, but comparison between these and other groups (ranked 21 to 30, 31 to 40 and 41 to 50th place) revealed significantly higher values in the latter.

Same as the above, in 50km race walk, the percent off personal best records for the 1 to 10, and 11 to 20th place groups was lower compared to other groups.

No significant differences in the percent off personal best records for men's 20km race walk were observed between 4 groups by rank, but those for the 1 to 10 and 11 to 20th place groups tended to be lower compared to other groups.

Table 4a. Personal best records, finish times and percent off personal best for the top eight of men's marathon.

Rank	Name	Nation	Personal Best Record (h:mm:ss)	Finish Time (h:mm:ss)	Percent Off Personal Best Record (%)
1	Abel Kirui	KEN	2:05:04	2:07:38	2.1
2	Vincent Kipruto	KEN	2:05:13	2:10:06	3.9
3	Feyisa Lilesa	ETH	2:05:23	2:10:32	4.1
4	Abderrahime Bouramdane	MAR	2:07:33	2:10:55	2.6
5	David Barmasai Tumo	KEN	2:07:18	2:11:39	3.4
6	Eliud Kiptanui	KEN	2:05:39	2:11:50	4.9
7	Hiroyuki Horibata	JPN	2:09:25	2:11:52	1.9
8	Ruggero Pertile	ITA	2:09:53	2:11:57	1.6
mean			2:06:56	2:10:49	3.1
SD			0:01:55	0:01:27	1.20

Percent off personal best record: [(finish time – personal best)/personal best] × 100.

Table 4b. Personal best records, finish times and percent off personal by rank of the 5 groups in men's marathon.

Rank	Personal Best Records (h:mm:ss)	Finish Times (h:mm:ss)	Percent Off Personal Best Record (%)
1–10th	2:07:14 ± 0:01:53**	2:11:16 ± 0:01:36**	3.2 ± 1.15**
11–20th	2:11:09 ± 0:03:26*	2:15:32 ± 0:01:07**	3.4 ± 2.37*,**
21–30th	2:11:09 ± 0:01:59*	2:17:38 ± 0:00:30**	5.0 ± 1.71**
31–40th	2:13:57 ± 0:02:53	2:21:58 ± 0:01:42**	6.0 ± 2.51‡
41–50th	2:14:47 ± 0:02:10	2:30:23 ± 0:05:10	11.6 ± 3.40

Values are means ± SD.

Personal Best Records : 11–20th, 21–30th < 31–40th < 41–50th *; p < 0.05,

1–10th < 11–20th, 21–30th < 41–50th **; p < 0.01

Finish times : 1–10th < 11–20th, 21–30th < 31–40th < 41–50th **; p < 0.01

Percent off Personal Best Record : 1–10th < 31–40th < 41–50th **; p < 0.01

Table 5a. Personal best records, finish times and percent off personal best for the top eight of men's 20km race walk.

Rank	Name	Nation	Personal Best Record (h:mm:ss)	Finish Time (h:mm:ss)	Percent Off Personal Best Record (%)
1	Valeriy Borchin□	RUS	1:17:38□	1:19:56	2.9
2	Vladimir Kanaykin□	RUS	1:17:16□	1:20:27	4.1
3	Luis Fernando Lopez□	COL	1:20:03□	1:20:38	0.7
4	Zhen Wang□	CHN	1:18:30□	1:20:54	3.1
5	Stanislav Emelyanov□	RUS	1:19:33□	1:21:11	2.1
6	Hyunsub Kim□	KOR	1:19:31□	1:21:17	2.2
7	Ruslan Dmytrenko□	UKR	1:21:21□	1:21:31	0.2
8	Yusuke Suzuki□	JPN	1:20:06□	1:21:39 □	1.9
mean			1:19:22	1:20:57	2.2
SD			0:01:29	0:00:35	1.27

Percent off personal best record: [(finish time – personal best)/personal best] × 100.

Table 5b. Personal best records, finish times and percent off personal by rank of the 4 groups in men's 20km race walk.

Rank	Personal Best Records (h:mm:ss)	Finish Times (h:mm:ss)	Percent Off Personal Best Record (%)
1-10th	1:19:20±0:01:22**	1:21:09±0:00:41**	2.3±1.35
11-20th	1:20:09±0:02:06**	1:23:18±0:0:42**	3.0±2.04
21-30th	1:21:33±0:01:28**	1:25:10±0:00:43**	4.5±2.36
31-40th	1:25:31±0:04:14	1:29:05±0:01:30	4.3±3.96

Values are means ± SD.

Personal Best Records :1-10th < 11-20th < 21-30th < 31-40th **; p < 0.01

Finish times : 1-10th < 11-20th < 21-30th < 31-40th **; p < 0.01

Table 6a. Personal best records, finish times and percent off personal best for the top eight of men's 50km race walk.

Rank	Name	Nation	Personal Best Record (h:mm:ss)	Finish Time (h:mm:ss)	Percent Off Personal Best Record (%)
1	Sergey Bakulin	RUS	3:38:46	3:41:24	1.2
2	Denis Nizhegorodov	RUS	3:34:14	3:42:45	4.0
3	Jared Tallent	AUS	3:38:56	3:43:36	2.1
4	Tianfeng Si	CHN	3:38:48	3:44:40	2.7
5	Luke Adams	AUS	3:43:39	3:45:31	0.8
6	Koichiro Morioka	JPN	3:44:45	3:46:21	0.7
7	Chil-sung Park	KOR	3:47:13	3:47:13	0
8	Faguang Xu	CHN	3:42:20	3:47:19	2.2
mean			3:41:05	3:44:51	1.7
SD			0:04:10	0:02:09	3.52

Percent off personal best record: [(finish time – personal best)/personal best] × 100.

Table 6b. Personal best records, finish times and percent off personal by rank of the 3 groups in men's 50km race walk.

Rank	Personal Best Records (h:mm:ss)	Finish Times (h:mm:ss)	Percent Off Personal Best Record (%)
1-10th	3:42:28±0:04:42***	3:45:33±0:02:24**	1.4±1.31*
11-20th	3:48:25±0:03:32**	3:52:48±0:02:24**	1.9±1.94*
21-30th	3:53:32±0:09:11	4:41:47±0:06:02	4.9±4.91

Values are means ± SD.

Personal Best Records : 1-10th < 11-20th *; p < 0.05, 1-10th < 21-30th **; p < 0.01

Finish times : 1-10th < 11-20th < 21-30th **; p < 0.01,

Percent off Personal Best Record: 1-10th , 11-20th < 21-30th *; p < 0.05

Discussion

The present study investigated temperature and humidity conditions at the 13th IAAF World Athletics Championships in Daegu, examining percent off personal best records, for men's marathon and 20km and 50km race walks.

The main results obtained were: (1) Mean temperatures and humidity for men's marathon race were as follows: DBT: 26.6±1.53°C; BGT: 29.9±2.28°C; Trs: 30.8±1.76°C; and RH: 55.4±2.83%. The mean values for 20km race walk were as follows: DBT: 27.4±1.31°C; BGT: 32.1±3.21°C; Trs: 32.3±3.16°C; and RH: 65.7±4.65%. The mean values for 50km race walk

were as follows: DBT: $27.8 \pm 1.17^{\circ}\text{C}$; BGT: $31.0 \pm 1.79^{\circ}\text{C}$; Trs: $31.3 \pm 1.69^{\circ}\text{C}$; and RH: $56.3 \pm 3.38\%$. In 20km race walk, the mean WBGT was higher than those in marathon and 50km race walk (20km race walk ; $25.5 \pm 1.10 > 50\text{km race walk ; } 24.7 \pm 0.85 > \text{marathon ; } 23.6 \pm 1.01^{\circ}\text{C}$). However, according to the risk chart for the prevention of heat stroke of the IAAF, the level of environmental conditions for the men's marathon and race walks were "high" ; (2) The drop-out (did not finish) rate was 23.9 in the men's marathon, 8.7 and 14% in the men's 20 km and 50 km race walk, respectively (Table 3).

In the World Championships Daegu in 2011, the drop-out rate in the men's marathon was the highest, which was lower than 32.9% in Osaka in 2007. It is well known that long-distance and marathon events are strongly affected by the temperature and humidity.

Focusing on the WBGT, the temperature conditions at the World Athletics Daegu ("high" heat level) appeared to be more favorable for summer marathons than those at the 11th World Athletics Championships in Osaka (26 to 30°C ; "high" to "extremely high" heat level) (Ishii, 2009)

The percent off personal best records was 5.8 ± 3.8 in the men's marathon, 3.7 ± 2.6 in the men's 20 km race walk, and $2.3 \pm 2.8\%$ in the men's 50 km race walk, respectively. The percent off personal best record for men's marathon was higher than those for men's 20 km and 50 km race walk.

In both the men's marathon and race walks, the percent off personal best records for the top 10, and 11th to 20th place groups was lower compared to other groups. The data suggest that slower finishers are affected more by a rising WBGT than faster finishers. According to a study on marathon running performance based on the WBGT conducted by Matthew R. Ely and colleagues (2007), the rate of decline in the results in a hot environment equivalent to that at the World Athletics Daegu (WBGT: $23.6 \pm 1.01^{\circ}\text{C}$) tends to be 3 to 4%, and is smaller in higher-performance runners. The results of this study support this finding: the rates of decline in the results were 5 to 6%, and shown to be smaller in higher-performance runners. On the other hand, Kajiwarra and colleagues (2001) conducted a study involving 45 female marathon runners at the Sydney Olympic Games held in 2000 (WBGT: $21.5 \pm 2.0^{\circ}\text{C}$), and reported that the rate of decline was 3 to 4%, showing smaller values in higher-performance runners. Comparing with the rate reported by Ely and colleagues, this was 2 % lower; although such a difference may be beyond the error threshold, various factors such as the weather conditions, course, scale and significance of the competition, presence/absence of a pace-maker, mixed-gender marathon, and performance levels of runners may be associated with marathon performance.

Conclusion

This study aimed to obtain basic strategic data regarding performance and conditioning in marathon runners by analyzing the weather conditions and runners' and walkers' percent off personal best records by rank at the 13th World Athletics Championships in Daegu.

From the results, the following findings were obtained: The percent off personal best record for marathon was higher than those for race walks. There was around 6% slowing of marathon performance in the hot environment, but the top 10 finishers had a higher personal best record and lower percentage off the personal best record.

Conditioning and countermeasures to heat stress are essential for winning summer competitions such as the Olympics and World Athletics Championships, and the results of this study may be informative for athletes and coaches to plan their strategies. The relationship

between temperature conditions and performance is an interesting issue and should be continuously investigated.

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Effect of Exercise Induced Fatigue on Standing Balance Performance

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Abstract

Fatigue is caused by a combination of different physiological mechanisms occurring at both central and peripheral levels leading to decreased motor control. This study was carried out to determine the effect of exercise-induced fatigue on balance performance in undergraduate students. Eighty-two (53 males and 29 females) students between 19 and 29 years old were randomly selected to participate in this study. Balance performance was measured using the One Legged Stance Test (OLST) before and after fatigue (exercise induced). All data obtained were analyzed using descriptive statistics of mean, range and standard deviation. Inferential statistics of paired 't' test was used to compare balance performances in male, female and all participants before and after exercise. Alpha level was set at 0.05. Results showed significant reduction in balance performance of male students following exercise ($p < 0.05$), there was also significant reduction in balance performance in all participants ($p < 0.05$), however reduction in balance performance in female students following exercise was not significant ($p > 0.05$). Reduction in static balance performances of the participants following fatigue could have resulted from proprioceptive deficit in muscle receptors and loss of muscular reflexes responsible for dynamic joint stability. Fatigue significantly affected the standing balance performance of male participants but the standing balance performance of the female participants was also affected but not significantly. Balance performance exercises should be carried out before other exercises during training in sportsmen. Extreme fatigue should be avoided during sporting activities so as to reduce the risks of falls and injuries.

Introduction

Fatigue is defined as an inability to maintain a power output or force during repeated muscle contractions (Gibson, 1985). It is the inability to maintain muscle tension when a contraction is sustained or reproduce a particular tension during contractions over time (Fox, 1996). Postural control is a person's ability to maintain an appropriate relationship between the body segments and between the body and the environment, and to keep the body's center of mass over the base of support when performing a task (Shumway-Cook, 1995). Balance is the ability to keep the body in equilibrium in either static or dynamic positions with minimal muscle activity (Thomson et al. 1991). Williams (1983), described balance as a state in which the opposing internal and external forces are in a state of equilibrium. Balance control is multi-dimensional and requires complex sensory, neuromuscular, and central processing systems (Light et al. 1995). The ability to maintain balance depends on visual, vestibular, auditory, somato-sensory and motor systems (Iverson et al. 1990).

Some authors have reported a decrease in ability to maintain balance in bilateral and single limb stance after fatiguing exercise, and it has been suggested that individuals are therefore at an increased risk of injury when fatigued (Eva et al. 2004; Yaggi & Armstrong, 2004). Pendergrass et al. (2003) reported that fatigue significantly decreased balancing ability

and potentially predisposes athletes to increased risk of injury. However, others have found no effect of fatiguing exercise on postural control in single- limb stance with fatigue induced by isolated isokinetic exercises of the lower extremities or by general fatigue such as running or walking (Rowe, 1999; Adlerton, 1996; Rozzi, 1999). There is therefore a need for further studies regarding the possible effects of fatigue induced by short duration sub-maximal exercise on postural control in healthy subjects.

Materials And Methods

Participants

A total of 82 apparently healthy undergraduate (53 male and 29 female) students of the College of Medicine, University of Ibadan participated in this study. Their age range was between 18 and 30 years. The procedures took place in the Exercise Physiology Laboratory of the Department of Physiotherapy, College of Medicine, University of Ibadan.

Instrumentation

- 1 A digital Cronus Memory 100 stopwatch was used to measure balance performance time of the participants in seconds.
- 2 A bathroom weighing scale of the Viking brand (Made in England) calibrated in kilogram from 0-120kg was used to measure the participant's body weight to the nearest kilogram.
- 3 A vertical height meter of the Seca brand calibrated in centimeters from 0- 200cm with a horizontal bar, which can be moved to make contact with the vertex of the participant's head, was used to measure participants height to the nearest centimeter.
- 4 A Welder TG- 700 bicycle ergometer was used to induce a short duration, sub maximal fatiguing exercise.
- 5 A manual metronome manufactured by Wittner, Takel Piccollo, (Made in Germany) was used to guide cadence during the cycling exercise.
- 6 A fabricated rectangular wooden platform (50cm x50cm) within which the participants stood for the One-Legged Stance Test (OLST).

Procedure

Ethical approval from the University of Ibadan / University College Hospital institutional review board was sought and obtained before the commencement of the study. The procedure of this study was adequately explained to the participants and their informed consent was sought and obtained before they were allowed to take part in the study. The following variables were measured or determined:

1. **Age-** The ages of the participants in years as of the last birthday were recorded.
2. **Gender-** The gender of the participants was recorded as M for male and F for female.
3. **Body weight** - The weight of the participants was measured using the bathroom weighing scale of the Viking brand. The participants were asked to put on light apparel and instructed to stand barefooted on the weighing scale, looking straight ahead with the upper limbs by the sides. The weight was measured and recorded to the nearest kilogram (kg).
4. **Height-** The participants were instructed to dress in light apparel but with no cap or scarf and asked to stand erect on the base of the height meter barefooted looking straight ahead with the heels together and with the knee extended. Measurements were taken by bringing

the lever arm of the height meter to touch the vertex of the participant's head without undue pressure. Height was recorded to the nearest centimeter (cm).

5. Determination of Dominant Lower Limb and OLST - The participants were asked which leg they will use preferentially for kicking a ball. The response of the participants was recorded as the dominant limb. Participants were tested using the One Legged Stance Test before (pre-test) and immediately after completion of fatigue induced cycling (post-test). Fatigue was induced using short-duration, sub-maximal exercise performed on a bicycle ergometer. Perceived exertion was used as a measure of fatigue as well as a decrease in the rate of pedaling which was kept constant at a rate of 60 revs \ minute. The exercise took place beside a wooden platform so that the post exercise OLST test after exercise commenced within 5 seconds. The One -Leg Stance Test was done by asking each participant to take off his or her shoes and stand on the determined dominant lower limb within a rectangular wooden frame on a level floor with the arms on the hips while the other leg is raised to the level of the knee of the dominant leg with the eyes open and the patient looking ahead. Using a stopwatch, the duration of time for which the participant was able to maintain balance on the stance limb was recorded in seconds. The test was stopped when any of the following events occurred while standing on one leg-

1. When the raised leg could not be maintained at the knee level of the stance limb.
2. When the raised limb touched the floor
3. When there was a loss of balance with the body displaced outside the wooden frame.
4. When there was a bracing of the raised leg against the stance leg for support
5. When the participants removed his or her hands from the sides.

Data analysis

Descriptive statistics of mean range and standard deviation were used to present the data. Paired 't' test was used to compare the effect of fatigue on balance performance pre and post exercise in all the participants. Level of significance was set at 0.05

Results

Participants in this study consisted of 82 (53 males and 29 females) undergraduate student within age range 18-32 years. Summary of physical characteristics are shown in table 1.

Table 1

Physical Characteristics of Male, Female and all the Participants

Variables	All participants mean \pm sd 82	Male participants mean \pm sd 53	Female participants mean \pm sd 29	p value
Age (Years)	23.91 \pm 2.17	24.00 \pm 2.14	23.75 \pm 2.26	0.633
Height (cm)	170.96 \pm 8.51	174.49 \pm 7.44	164.51 \pm 6.36	0.000
Weight (Kg.)	64.78 \pm 14.61	66.92 \pm 15.88	60.86 \pm 11.16	0.072

Alpha level = 0.05

Table 2

Comparison of Balance Performance of all, Male and Female Participants before and after Fatiguing Exercise

Variables	All participants mean \pm sd 82	Male participants mean \pm sd 53	Female participants mean \pm sd 29
Before exercise	54.19 \pm 29.95	60.15 \pm 30.26	43.31 \pm 26.52
After exercise	45.13 \pm 26.40	47.52 \pm 27.93	40.76 \pm 23.17
p value	0.000	0.000	0.414

Alpha level = 0.05

Discussion

Cycling is a form of exercise that results in fatigue. The observed reduction in static balance performance of the participants could have resulted from muscular fatigue resulting from proprioceptive deficit in muscle receptors and loss of muscular reflexes responsible for dynamic joint stability. According to Simoneau et al. (2006) moderate fatigue led to an immediate decrement of the performance on the balance control task. Nordone et al. (1997) reported similar findings where body sway was increased after strenuous physical exercise. This was also confirmed by Eva et al. (1999), who reported that short term sub-maximal cycling had an effect on balance in single limb stance tests. The observed sway was likely brought about by decreased knee proprioception, increased knee laxity and a delay in muscle response following fatiguing exercise. Rowe et al. (1999) and Rozzi et al. (1999) support this explanation. Fatigue according to Patrick et al. (1997) was associated with decreased knee and hip motion and increased lumbar flexion after repetitive lifting exercise of the lower limbs and force the significant decrease in postural stability and force generation capability because the repetitive lifting tasks indicated a higher risk of injury in the presence of unexpected perturbation. This is supported by Johnson et al. (1998), whose findings showed evidence that fatigued individuals were at an increased risk of injury because of loss of balance and that avoidance of fatigue and pre conditioning may prevent injuries. This study observed a significant difference in balance performance of male participants while in female participants there was no significant difference in balance performance before and after fatiguing exercise. This observed gender difference is not conclusive, though Lindsey and O' Neal (1976) also observed no significant difference in balance in the static or dynamic balance between deaf boys and girls.

Conclusion

There is a reduction in standing balance performance after fatiguing exercise in male, female and all students - hence physiotherapists and exercise specialists should avoid fatigue during rehabilitation of patients and training of sportsmen. Extreme fatigue should be avoided in sportsmen and women during active sporting activities to reduce the risks of injuries resulting from falls when there is an increased inability to maintain balance.

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Physical and Physiologic Characteristics of Nnamdi Azikiwe University Athletes: Preparticipation Assessment

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Abstract

The purpose of this study was to assess the physical and physiological characteristics of Nnamdi Azikiwe University (NAU) athletes who competed in the Nigeria University Games Association (NUGA). The sample consist of 46 (27 males, 19 females) athletes participating in various sports and games. Physical parameters of height, weight as well as physiological variables of blood pressure were taken and calculated to determine the Body Mass Index (BMI), Mean Arterial Pressure (MAP), and Myocardial Oxygen Uptake (MO_2) parameters. Stadiometer, stethoscope and sphygmomanometer were employed for data collection. The descriptive statistics of Mean and SD, and inferential statistics of independent sample T-test and ANOVA were utilized for data analysis, which was set at 0.05 alpha level. The independent sample T-test result showed that there was no significant difference in the BMI, MAP, and MO_2 variables between male and female athletes; $t\text{-cal} = 0.855, 0.224, \text{ and } -0.900$ respectively. Moreover, the ANOVA result showed that there was no significant difference in the BMI characteristics of NAU athletes ($2.069, p < 0.05$). However, there were significant differences in the MAP and MO_2 values of NAU athletes ($2.759, p > 0.05$), and ($2.288, p > 0.05$) respectively. In conclusion, the paper recommended that the sports and medical units of NAU should collaborate more in order to ensure that the physical fitness and health of NAU athletes are well catered for so as to create an enabling environment for the athletes to excel in competitions.

Keywords: BMI, MAP, MO_2 .

Introduction

Parikh & Stratton (2010) noted that physical activity (PA) is widely considered as a primary component of a healthy lifestyle. With the growing epidemic of obesity and cardiovascular diseases worldwide, and the protective benefits conferred by PA, it is being increasingly promoted to combat this problem through regular participation in sports and physical exercise (PE). PE induces loss of body fat (BF) probably due to the activation of the sympathetic nervous system, and is likely to reduce the percentage of caloric intake coming from fat (Papadopoulou & Papadopoulou, 2010).

For the purpose of cardiovascular risk stratification, sports are classified according to their degree of dynamic and static exercise (Baman, Gupta & Day, 2010). This classification scheme was adopted during the 36th Bethesda Conference (Mitchell, Haskell, Snell & Van Camp, 2005). Independent of the sports classification, emotional stress and environmental factors, such as temperature and attitude, should be taken into account when assessing risk in an individual athlete (Maron & Zipes, 2005). Both aerobic fitness and PA are known to influence several risk factors for cardiovascular disease (Kyröläinen, Santtila, Nindl & Vansankari, 2010). Body Mass Index (BMI) is widely used to define obesity in the adolescent population (Etchinson et al, 2011). It is the current standard in determining obesity in the adolescent population. The

American Academy of Pediatrics Policy Statement (2003) caution that when using BMI, clinical judgment must be used in applying these criteria to a patient because obesity regards to excess adiposity rather than excess weight, and BMI is a surrogate for adiposity.

The association of cardio-respiratory (CRE) fitness with different intensities of PA is less defined than the association of adiposity in observational studies (Rowland, Eston & Ingledow, 1999). Also, the association between total cholesterol and physical fitness (PF) has also been reported in 18 year old Australians. In that study, PF was negatively correlated with systolic blood pressure [SBP] (Milligan et al, 1997 cited in Kyröläinen, et al. 2010). Excellent aerobic fitness can include greater left ventricular wall thickness, internal diameter and muscle mass and lower heart rate (Kyröläinen, et al. 2010).

Baman, Gupta & Day (2010) observed that systemic hypertension is defined as a blood pressure exceeding 140/90mmHg recorded on at least two occasions. It is the most common cardiovascular condition affecting competitive athletes and is usually discovered on a routine pre-participation physical examination. Although coronary artery disease (CAD) is an extremely rare occurrence in the young competitive athlete, it is of significant concern in the master athlete. Therefore, the aim of this study was to assess the pre-participation characteristics of the physical and physiological profiles of Nnamdi Azikiwe University (NAU) athletes.

Hypotheses

1. There is no significant difference in the BMI of NAU athletes
2. There is no significant difference in the mean arterial pressure (MAP) of NAU athletes
3. There is no significant difference in the myocardial oxygen uptake (MO_2) of NAU athletes.

Methods and Materials

The population of this study was made up of male and female athletes of NAU, Awka. A sample of 46 athletes between 18 and 27 years comprising Ball games, Track and Field, Swimming and Badminton athletes were used for the study. The ex-post-facto research was adopted for this study.

The ages of the athletes were defined as years and their weights and heights were scaled with the aid of a stadiometer; RGZ-160 model. The systolic and diastolic blood pressures were measured by means of a Stethoscope and sphygmomanometer. The radial artery on the wrist was used to record heartbeats. The pulse was recorded by putting the index and middle finger on the artery. The count was taken for 15 seconds and then multiplied by four.

The body mass index (BMI), otherwise known as the Quetelets index was calculated thus:

$$BMI = \frac{\text{Weight (Kg)}}{\text{Height}^2 \text{ (m)}}$$

It is fairly closely related to the amount of body fat (≈ 0.80).

The value of the mean arterial pressure (MAP) was calculated as

$$MAP = \frac{SBP + (2 \times DBP)}{3}$$

where SBP is systolic blood pressure and DBP is diastolic blood pressure.

The MAP represents the average pressure found in the vascular bed (Burke, Michael & Avakian, 1990). According to Fox & Mathews (1981) it is regarded as one of the most vital determinant of the rate of blood flow through the systemic circuits.

Myocardial oxygen consumption/uptake (MO_2) was computed as $MO_2 = HR \times SBP$ where HR is Heart Rate and SBP is Systolic Blood Pressure. Balogun, Abereoje, Olaogun, Obajuluwa & Okonofua (1990) noted that the MO_2 is an indirect measure of coronary blood flow. It has been found to be a useful index of the cardiac stress and a valid predictor of the rate pressure product (RPP) meaning Myocardial Oxygen Consumption [MVO_2] (Song, Lee, Kim & Koo, 2010).

The data was finally subjected to descriptive statistic of means (X) and standard deviation (SD), and the inferential statistics of independent sample t-Test and analysis of variance (ANOVA).

Results

The findings of this study are presented in the tables below:

Table 1

The Mean and SD Values of BMI, MAP & MO_2 for all Athletes

Events	No	BMI	MAP	MO_2
Basketball	13	23.85±3.70	89.30±7.60	8951± 1276
Relay athletes	3	21.38±2.43	84.87±4.50	7852± 2081
Throws	1	33.95	96.60	7680
Sprinters	4	23.39±3.08	70.83±4.95	7384± 1646
Taekwondo	3	22.98±2.70	91.20±8.79	1048± 1601
Racket Game	2	24.82±2.50	93.80±17.25	1035± 1372
Log Distance	3	21.40±3.11	81.20±11.5	7503± 578.3
Badminton	2	21.99±1.70	74.0±2.83	7774
Swimming	2	24.48±1.37	82.15±1.63	8008± 7467
Volleyball	4	24.11±1.11	81.90±7.73	8467± 837.1
Handball	9	23.22±2.91	86.11±8.42	7738±1154

Table 1 shows the physical/anthropometric variables of body mass index (BMI) for all the athletes. Also the physiological variables of the mean arterial pressure (MAP), and the myocardial oxygen uptake were also presented. A clear look at the table shows that basketball has the largest number of athletes with 13 players. Throwers (field event) in athletics presented just one athlete.

Table 2

The Mean and SD Values of Male and Female Athletes

Gender	No	BMI	MAP	MO_2
Male	27	23.57± 3.64	85.38± 11.0	8248± 1556
Female	19	22.73± 2.68	84.73± 7.29	8640± 1294
Total	46	23.22± 3.27	85.11± 9.52	8410± 1452

Table 2 shows that the mean SD for the values of BMI, MAP and MO_2 for the male athletes was 23.57± 3.64, 85.38± 11.0, and 8248± 1556 respectively. The values for female

athletes were 22.73 ± 2.68 , 84.73 ± 7.29 , and 8640 ± 1294 . The mean and SD for the total number of athletes (46) were also reported in the table above.

Table 3

Independent Sample t-test of Differences in the BMI Values of NAU athletes

Gender	N	X	SD	t	df	crit.t
Male	27	23.57	3.64	.885	44	2.010
Female	19	22.73	2.68			

In table 3, the $t_{cal} (0.855) < t_{crit} (2.010)$ was set at the 0.05 Alpha level.

Table 4

Independent Sample t-test of Difference in the MAP Value of NAU athletes

Gender	N	X	SD	T	df	crit.t
Male	27	85.38	11.0	.224	44	2.010
Female	19	84.73	7.30			

In table 4 the $t_{cal} (0.224) < t_{crit} (2.010)$ was set at the 0.05 alpha level.

Table 5

Independent Sample t-test of Different in the MO_2 Values of NAU athletes

Gender	N	X	SD	T	df	crit.t
Male	27	8248	1556	-.900	44	2.010
Female	19	6640	1294			

In table 5, the $t_{cal} (-0.900) < t_{crit} (2.010)$ was set at the 0.05 alpha level.

Table 6

Analysis of Variances (ANOVA) Values of BMI of NAU athletes

	Sum of squares	df	Mean sq	F	Crit f
BMI Between Grps	178.69	10	17.87	2.069	2.120
Within Grps	302.32	35	8.64		
Total	481.00	45			

In table 6, the ANOVA result showed that there was no significant difference in the BMI characteristics of NAU athletes (2.069, $p < 0.05$). Therefore the null hypothesis that there is no significant difference in the BMI status of NAU athletes is accepted.

Table 7*Analysis of Variance (ANOVA) Values of MAP of NAU Athletes*

	Sum of squares	df	Mean sq	F	Crit f
MAP Between Grps	1799.457	10	179.946	2.759	2.120
Within Grps	2282.728	35	65.221		
Total	4082.185	45			

In table 7, the ANOVA result showed that there was a significant difference in the MAP profile of NAU athletes (2.759, $p > 0.05$). Therefore, the null hypothesis that there is no significant difference in the MAP status of NAU athletes is rejected.

Table 8*Analysis of Variance (ANOVA) Values of MO_2 of NAU athletes*

	Sum of squares	df	Mean sq	F	Crit f
MO_2 Between Grps	3.748E7	10	33748027.128	2.288	2.120
Within Grps	5.734E7	35	1638217.224		
Total	9.482E7	45			

In the table 8, the ANOVA results showed that there was a significant difference in the MO_2 characteristics of NAU athletes (2.288, $p > 0.05$). Therefore, the null hypothesis that there is no significant difference in the MO_2 variable of NAU athletes is rejected.

Discussion

The results presented in table 2 showed that the male athletes have higher BMI values than the female athletes. Naturally, it is expected for females generally to possess more fatty tissues (adiposity) than males. However, it has been known that the BMI alone is not a sufficient technique to assess the body weight of athletes (Parikh & Stratton, 2011). The authors observed that a measure such as BMI is less accurate, since it does not distinguish between fat and fat-free mass.

Whitlock, Williams, Gold, Smith & Shipman (2005) observed that because BMI utilizes only body weight and height and does not take into account overall body composition, including body fat, muscular individuals may be classified as obese. Consequently, even though it is widely accepted, BMI may actually be a poor indicator for obesity in the adolescent athletic population (Etchison et al, 2011).

However, it is interesting to note that BMI have been increasing over the years (Kyröläinen, et al., 2010). Reductions in aerobic fitness have also been found to be significantly and independently associated with measures in BMI. Moreover, Papadopoulou and Papadopoulou (2010) utilized the BMI along with measurement of percent body fat (% BF) in

their study of nutritional status of female top team sport athletes according to body fat. The athletes' BMI was 22.00 ± 1.75 and % BF was 16.94 ± 3.96 .

A majority of the athletes used for this study had normal blood pressures (BP) measures. A few of them had BP measures that were slightly higher than normal. None of the athletes reported that they had any adverse medical condition. The overall mean results of the MAP and MO_2 for the male and female athletes were 85.11 ± 9.52 and 8410 ± 1452 . As far as the researchers are concerned there appear to be a paucity of research done on these parameters, if any had been done at all on athletes.

Athletes who exhibit an abnormally high BP should be examined carefully by a physician and preferably a cardiologist. Gupta, et al. (2009) noted that the athlete's heart is characterized by mild concentric left ventricular hypertrophy and mild dilation of the left ventricle cavity. Studies have been done to describe the physiological limits of the morphological changes that occur in the normal heart of a competitive athlete (Pelliccia, Maron, Spataro, Proschan & Spirito 1991; Sharma, Maron, Whyte, Firoozi, Elliott, & McKenna 2002), beyond which an alternate pathologic diagnosis should be considered.

In the younger athletes, there are three conditions that could mimic the presentation of atherosclerotic coronary artery disease (CAD): coronary artery vasospasm, myocardial bridging, and anomalous origin of coronary arteries. Each of these conditions can be difficult to diagnose and the last is the third-most-common cause of sudden death in athletes (Maron, 2003). Athletes with coronary anomalies of wrong sinus origin should be excluded from all competitive sports until at least three months after surgical repairs (Graham, Driscoll, Gersony, Rocchini & Towbin, 2005).

Thompson, Balady, Chaitman, Clark, Levine & Myerburg (2005) submitted that the paradox with CAD and exercise is that whereas exercise is associated with a reduction in cardiac mortality for CAD patients, CAD is the most common cause of exercise related cardiac events in adults older than 30 years. Furthermore, whereas every young competitive athlete must undergo pre-participation screening and examination, the same is not true for the older athletes.

Rowland (2008) in his study of echocardiogram and circulatory responses to progressive endurance exercise noted that the circulatory system appear to act like an arterial venous fistula during exercise, and with peripheral resistance serving as the principal factor facilitating and controlling blood flow. Observations in subjects with altered circulatory dynamics during exercise (patients with cardiac diseases, highly trained endurance athletes) can be understood within the context of this physiological model.

The difference between an athlete's heart and hypertrophic cardiomyopathy (HCM) has critical implications (Gupta, et al., 2009). Missing the diagnosis of HCM in athletes and allowing them to continue to compete may put them at risk of sudden cardiac death (SCD). Conversely, an incorrect diagnosis of HCM may lead to unnecessary disqualification from competitive sports, with significant physical, emotional, and possibly financial repercussions for the athletes.

Conclusion

The purpose of this study was to assess the pre-participation profile of physical and physiological characteristics of NAU athletes. It is rare for athletes to undergo thorough medical check ups in schools and colleges before undergoing any form of training, or participating in competitions, whether intramurals or extramural here in NAU. As long as the students shows up for training, the coaches readily admit the athletes into the sports teams as long as they are

talented, without giving a thought to their physical or physiological conditions. There have been reported cases of SCDs during competitions in some of our universities and organizations involved in physical activities and sports competitions. From the foregoing conclusion the following recommendations are made:

- The Sports and Medical units of NAU should collaborate in order to ensure that the physical fitness and health of the athletes are well catered for.
- University athletes should be encouraged to train at least three times weekly for a duration of about one hour during each training sessions in order to build up their physical fitness profiles.
- Medical screenings that should include BP measurement, electrocardiogram (ECG), in addition to percent of body fat and BMI measures should be incorporated into our university health care system, particularly for student athletes.

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Effect of False Start Rule Change on Start Reaction Time of World Championships in Athletics

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Abstract

The IAAF (International Association of Athletics Federations) has applied a new rule since January 1st, 2010. "Except in Combined Events, any athlete responsible for a false start shall be disqualified" (IAAF Rules No.162). In this study, we compared athletes' start reaction time between the 2011 Daegu World Championships in Athletics and the past six World Championships in Athletics, investigating the effect of the new false start rule on start reaction time. The analysis used start reaction times recorded in the men's and women's 100m dash finals of the World Championships in Athletics. The total number of samples in this start reaction time study is 111. The statistical analysis compared the start reaction times among seven sets of 100m dash finals for both men and women. As for results of the men's and women's 100m dash finals, there are statistically significant differences athletes' start reaction times between the 2011 Daegu World Championships in Athletics and the past six World Championships in Athletics. The rule revision is considered exerting considerable psychological burden on the sprinters, particularly in the 100m dash finals.

Keywords: start reaction time, 100 m dash, athletics

Introduction

In all races up to and including 400 m (including the first leg of the 4 x 100 m and 4 x 400 m relay) of International Competitions such as the World Championships in Athletics, Olympic Games, and World Cups in Athletics, the use of false start apparatuses is now required (International Association of Athletics Federations [IAAF], 2007). The false start apparatuses were invented to make the sprint race start more impartial. The false start apparatuses measure the reaction time from the firing of the official starter's gun to the first movement of the athlete, and automatically judges whether the athlete has made a false start (i.e., when reaction time is less than 100/1000ths). Today, two types of false-start detection systems, fixed-threshold-level detection system (FTLDS) and dynamic-threshold-level detection system (DTLDS) have been approved by the IAAF and are being used in parallel at major international games. FTLDS has been used since the 1972 Munich Olympic Games and DTLDS since the 1995 World Championships in Athletics in Goteborg. Previous studies on the start reaction time in sprint events have reported that the reaction time of the same events in the same sprinters differed considerably when measured by different detection systems (Nozaki et al., 2001; Yokokura et al., 2002; Nozaki et al., 2003).

In January 2003, the IAAF adopted a new rule: "only one false start per race shall be allowed without the disqualification of the athlete(s) making the false start. Any athlete(s) making further false starts in the race shall be disqualified." The effects of this rule change on the start reaction times of athletes were very interesting and deserved analysis and evaluation. We performed pilot studies and analyzed the distributions of the start reaction time and the start reaction times of the finalists before and after the rule change (Kajiwara et al., 2004; Yokokura et al., 2004). All events of 100 m-400 m indicated that the influence of the rule revision decreased the distribution of the start reaction time (Kajiwara et al., 2005; Yokokura et al., 2008). The start reaction time of the sprint races exerts a significant influence on the performance, particularly for the 100 m dash. Yokokura reported the effect of the new false start rule on start reaction time of the 100 m dash finals of the past six World Championships in Athletics (Yokokura et al., 2009; Yokokura et al., 2010).

At the general conference for the 2009 Berlin World Championships, the IAAF adopted a new false start rule: "Except in Combined Events, any athlete responsible for a false start shall be immediately disqualified", and this new rule has been applied January 1, 2010. In this study, we compared 100 m dash start reaction time between the 2011 Daegu World Championships in Athletics and the past six World Championships in Athletics, investigating the effect of the new false start rule on start reaction time.

Methods

The start action of the sprint event is important and exerts a significant influence on the performance of the 100 m dash particularly. As for the start reaction time of the 100 m dash, it becomes shorter in the order of the trial heats, the semi-finals, and the finals. As for the start reaction time of the 100 m dash finals, it indicates the characteristic of a good single response.

The data used in this study were the officially announced data of the start reaction time of the finalists of the 100 m dash in the past seven World Championships in Athletics (1999 Seville, 2001 Edmonton, 2003 Paris, 2005 Helsinki, 2007 Osaka, 2009 Berlin, and 2011 Daegu). The total data of start reaction times of the 100 m dash finals involved 96 athletes (1999 Seville, $n = 16$; 2001 Edmonton, $n = 16$; 2003 Paris, $n = 16$; 2005 Helsinki $n = 16$; 2007 Osaka $n = 16$; 2009 Berlin $n = 16$) from the past six World Championships in Athletics before the implementation of the new rule and 15 athletes (2011 Daegu, $n = 15$) from the World Championships in Athletics after the implementation of the new disqualification rule regarding false starts. The valid data were decided from within the limits of double standard deviation. Statistical analysis was the comparison of the reaction time on men's and women's 100m dash finals between the past six World Championships in Athletics and the 2011 Daegu World Championships in Athletics. All statistical analyses were conducted using the statistical software SPSS 16.0 for Windows. The differences in the mean values were analyzed by one-way analysis of variance (ANOVA), followed by using the Fisher's Modified least significant difference for multiple comparisons if ANOVA was significant. The acceptance level for significance was $p < 0.05$ and all results were expressed as mean \pm SD.

All the figures of the start reaction time with a probability curve to show delay and variance of the start reaction time. Probability curve is Gauss's error curve obtained from the mean value and standard deviation of the start reaction time.

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-M)^2}{2\sigma^2}} \quad M: \text{mean value} \quad \sigma: \text{standard deviation}$$

This calculation used Microsoft Excel 2010.

Results

Table 1 shows the results of the start reaction times of the 100 m dash finals of the past six World Championships in Athletics when the previous rule was used and the 2011 Daegu World Championships in Athletics when the new rule was used. The mean value of the reaction time of the finalists in the 2011 Daegu World Championships in Athletics was delayed by 15 milliseconds compared with that in the previous six World Championships in Athletics, and the difference was significant. Breaking down according to sex, the females delayed more than 16 milliseconds and the differences were significant between the 2011 Daegu and all the previous World championships in Athletics except for 2003 Paris and 2007 Osaka. As for males, they delayed more than 14 milliseconds and the differences were all significant compared with each of the six previous World Championships in Athletics.

Table 1.

The mean values, standard deviations, and the significant levels of the comparison

	1999 Seville	2001 Edmonton	2003 Paris	2005 Helsinki	2007 Osaka	2009 Berlin	2011 Daegu
Total	Number of Data	16	16	16	16	16	15
	Mean (Second)	0.1378	0.1491	0.1559	0.1404	0.1577	0.1726
	Standard Deviation	0.0149	0.0145	0.0287	0.0287	0.0180	0.0241
	Significant Probabilit	0.0000	0.0011	0.0190	0.0000	0.0354	0.0001
Female	Number of Data	8	8	8	8	8	8
	Mean (Second)	0.1341	0.1489	0.1711	0.1390	0.1626	0.1781
	Standard Deviation	0.0157	0.0187	0.0316	0.0170	0.0179	0.0317
	Significant Probabilit	0.0003	0.0116	0.5330 (n.s.)	0.0010	0.1707 (n.s.)	0.0192
Male	Number of Data	8	8	8	8	8	7
	Mean (Second)	0.1414	0.1494	0.1408	0.1419	0.1528	0.1663
	Standard Deviation	0.0140	0.0100	0.0156	0.0138	0.0178	0.0153
	Significant Probabilit	0.0013	0.0249	0.0010	0.0016	0.0699	0.0004

Values are mean \pm SD.

Figure 1 shows Gauss's error curve obtained from the mean values and standard deviations of the start reaction time of the females and males for each the World Championships in Athletics. From Gauss's error curve the start reaction time of the 2011 Daegu World Championships in Athletics indicates delay and dispersing tendency and it is similar to the significant probability.

Figure 2 shows Gauss's error curve obtained from the mean values and standard deviations of the start reaction time of the females for each World Championships in Athletics. From Gauss's error curve the start reaction time of the 2003 Paris, 2007 Osaka, and 2011 Daegu World Championships in Athletics indicates a delay tendency and it is similar to significant probability. However, from Gauss's error curve, the distribution of the start reaction time indicates a tendency in 2003 Paris and 2011 Taegu World Championships in Athletics that is different from 2007 Osaka World Championships in Athletics. The reaction time in the 2003 Paris and 2011 Daegu World Championships in Athletics indicates a tendency of dispersion in the distribution of the start reaction time.

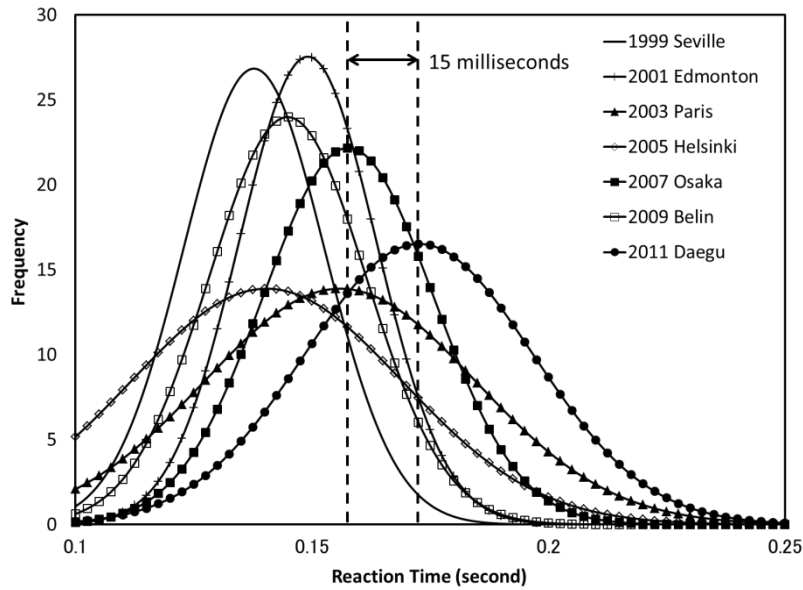


Figure 1. Gauss's error curve obtained from the mean value and standard deviation of the start reaction time of the females and males total for each World Championships in Athletics.

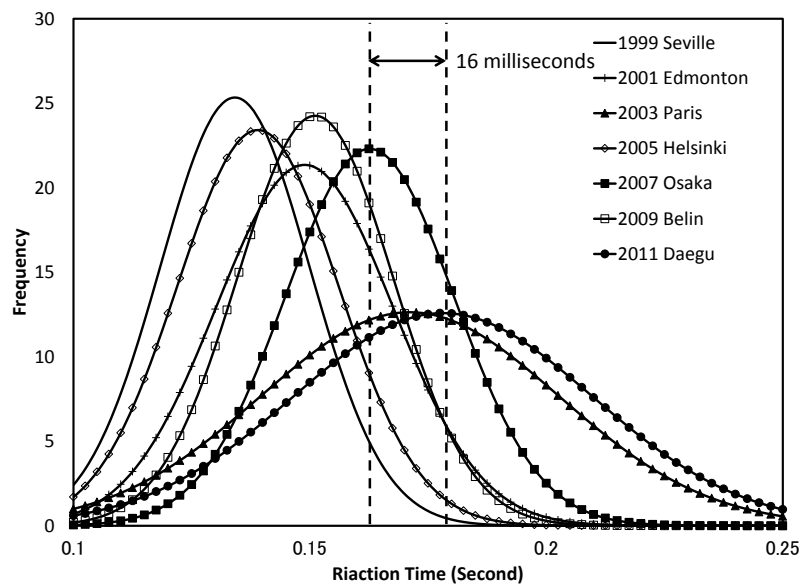


Figure 2. Gauss's error curve obtained from the mean value and standard deviation of the start reaction time of the females for each World Championships in Athletics.

Figure 3 shows Gauss's error curve obtained from the mean value and the standard deviation of the start reaction time of the males for each World Championships in Athletics. From Gauss's error curve, the start reaction time of 2011 Daegu World Championships in Athletics indicates a tendency to delay compared with the previous six World Championships in

Athletics and it is similar to significant probability. However, from Gauss's error curve, distribution of the start reaction time does not indicate the tendency of dispersion, which is different from that of females.

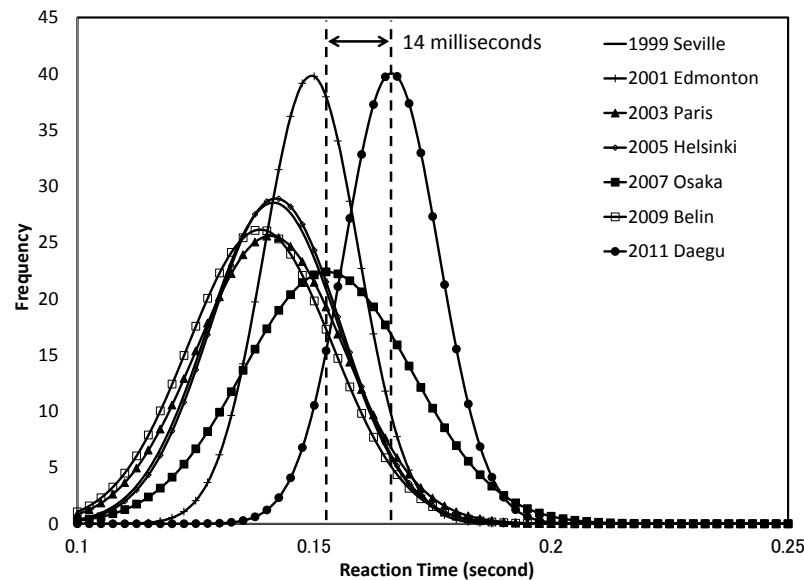


Figure 3. Gauss's error curve obtained from the mean value and the standard deviation of the start reaction time of the males for each World Championships in Athletics.

Discussion

The false start rule was revised in 2003 the first time since 1928, and revised again in 2010. Short-distance races compete by 1/100 second and a quick start is a vital element affecting the performance significantly. So the start action is considered important in races. In this study, we compared the start reaction time in 100 m dash finals between the previous six World Championships in Athletics before the 2010 rule revision and the most recent World Championships in Athletics after the 2010 rule revision to evaluate the effects of the new false start rule revision (2010) on the athletes' start reaction time.

The start reaction time of 100m dash finals was significantly different between the previous six World Championships in Athletics before the 2010 rule revision and the most recent World Championships in Athletics after the 2010 rule revision, and indicating there was the effect of the rule revision on the athletes' start reaction time. As for the rule revisions of 2003 and 2010, Gauss's error curve indicates a similar characteristic on the part of female's start reaction time, and the rule revision is considered to exert considerably psychological burden on the female's sprinters in the 100m dash events. This was consistent with the results reported by Kajiwar et al. (2004). As for the rule revision of 2010, the start reaction time of the men's 100m dash finals was significantly different from that before the 2010 rule revision, but the Gauss's error curve does not indicate the dispersion characteristic. In the 2011 Daegu World Championships in Athletics men's 100m dash final, the athletes became disqualified for a false start at the first time no matter who did it. The sprinters became very careful for their start and tried best to avoid a false one. As a result, their start reaction time was significantly longer in the 2011 Daegu World Championships than that in the previous six World Championships when the first false start was allowed.

In conclusion, the new rule regarding becoming disqualified after the first false start has had a significant impact on athletes' start reaction time. To avoid the first false start and disqualification, the sprinters' reaction time at 100 m dash finals became longer compared to that when the first false start was allowed. We would like to conduct further research to examine the new zero-tolerance rule and its influences on sprinters' reaction time.

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Correlation of Body Mass Index and Flexibility among Selected Badminton Players in Northern Nigeria

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Badminton comprises a number of skill-related movements, such as: footwork in the playing center using a split jump/pre-tension jump, footwork, lunge, scissors jump, two-feet landing, and two legged jumps, and movement back towards the playing center using many different movement patterns. The body mass index and flexibility of badminton players are basic tools for assessing performance of badminton players. Competitive badminton requires good stroke production and good physical fitness, as well as psychological characteristics that will enable successful performance at the competitive level (Faccini & Dalmonte, 1996).

The physical fitness of a player however, can be a prime determinant of success during a tournament (Smekal, et al., 2001). Similarly, a racket sport player would need to develop higher levels of basic physical qualities such as strength, flexibility, endurance, speed and agility to be able to compete effectively against stronger opponents (Groppel & Roetert, 1992). Chin, Wong, So, Siu, Steininger and Lo (1995), recommended that if a player wants to achieve reasonable success at international badminton competitions, improvements in physical fitness need to be emphasized in addition to skill training. It is therefore useful to assess both physiological and motor performance components thought to be important in a particular sport at various levels (Elliot, Ackland, Blanksby, Hood, & Bloomfield, 1989).

Body composition is an important aspect of fitness (Reilly & Stratton, 1995). A standard anthropometric analysis during a physical fitness assessment would involve determining the height, mass, somatotype and body fat percentage of an individual or athlete (Maud & Foster, 1995). Height does not seem to be a determinant of success in badminton (Reilly & Palmer, 1995), as most adult players are taller than the top of the badminton net which is 1.52 to 1.55 metres from the floor. Body mass is a factor that plays a role in influencing performance in throwing sports, and because it can impose resistance to movement, it is also an important factor in contact sports. In sports where body weight has to be lifted repeatedly against gravity, such as in badminton, extra mass in the form of fat would be disadvantageous (Reilly & Stratton, 1995).

It has been well established that excess body fat is detrimental to health and that the body fat percentage required for excellence in performance differs between males and females, and varies from sport to sport (Powers & Howley, 1997). Junior males differ from females in many morphological and physiological characteristics, and it is therefore important to consider the sexes separately in data analysis (Marshall, 1978 as reported in Van Lieshout, 2002).

Top competitive players tend to have a low body fat percentage, as the negative impact of excess body fat would increase the energy expended in moving around the court (Elliot *et al.*, 1989; Chin *et al.*, 1995). Lower levels of body fat will enhance the game of badminton as it permits a more effective gradient for the rapid transfer of heat produced during high intensity exercise, and would be advantageous concerning moving quickly across the court and in leaping to smash the shuttle-cock. In a research carried out by Elliot *et al.*, (1989), body composition was found to be an important indicator of tennis performance for 11 - 15 year old male and female players. In studies performed on American footballers by Wilmore and Haskell (1972) as

reported in Van Lieshout (2002), it was concluded that lean body mass rather than total body weight was the critical factor relative to performance ability.

According to Jaski and Bale (1987), a moderate increase in lean body mass will result in greater speed, strength and power without a loss of flexibility and explosive power.

Flexibility is an important, yet often neglected component of physical fitness (Heyward, 1998). It is important not only in learning athletic skills satisfactorily, but also for general health and fitness, athletic performance, injury prevention, and rehabilitation (Waugh & Grant, 2006; MacDougall, Wenger & Green, 1991). It is a component of fitness that sport scientists and physiotherapists measure to gain an impression of a person's physical capacity (Harvey & Mansfield, 2000). Flexibility reflects the ability of the muscle-tendon units to elongate within the physical limitations imposed by the joint (MacDougall *et al.*, 1991), and refers to the looseness or suppleness of a joint. According to Maud and Foster (1995) and Heyward (1998), there are two types of flexibility namely static and dynamic flexibility. Static flexibility is the measure of the total range of motion at a joint whereas dynamic flexibility refers to the measure of the resistance to movement. Flexibility however, is not only specific to the sport, but also to the joint and joint action (Waugh & Grant, 2006). Joint flexibility is controlled by a number of morphological factors, such as the geometry of the joint capsule, adipose tissue, the muscles surrounding the joint, the tendons and ligaments around the joint, and the skin (Maud & Foster, 1995). The joint capsule contributes to approximately 47% of the ROM (range of motion), the muscles approximately 41%, and the tendons approximately 10%, and the skin approximately 2% (McGlynn, 1996).

It is an advantage to have above average flexibility levels of the trunk and shoulder regions for racket sports (Chin *et al.*, 1995). This corresponds with Omosegaard (1996) who stated that a greater flexibility of the trunk and stroke arm is undoubtedly an important factor, as well as hip and hamstring flexibility. Therefore, with badminton, above average flexibility of the shoulder, trunk and hip is expected of players, as flexibility is important in reaching the shuttlecock, especially in stressful situations. An adequate level of flexibility also allows a player to perform the various strokes efficiently as much retrieval are made with the spine and shoulder joint in hyperextension, and with the hip and hamstrings fully flexed when lunge jumps are made at the net. This flexibility allows for more fluent stroking when forced to stretch and facilitates explosiveness on the court (Reilly & Palmer, 1995). A greater flexibility in badminton players would result in improved maximal strength, a greater ability to utilize the stretch-shorten cycles effectively, augmented efficiency and correct movement patterns throughout the required range of motion. It is for these reasons that flexibility is an important component of badminton (Chandler, Kibler, Stracener, Ziegler & Pace, 1992).

Methodology

The purpose of the current study was to assess the body mass index (physiological) and flexibility (motor performance) characteristics of selected badminton players in Northern Nigeria. And also, examine the correlation and differences between the players' body mass index and flexibility characteristics based on gender and status. A purposive sampling method was used to select the participants. One-shot study design was used for data collection. Twenty (20) male and nine (9) female participants from the Northern states totaling twenty nine (29) players were selected for the study. There were four (4) male and two (2) female national team players

among them, the remaining 23 were non-national team players. All the participants featured in the Commonwealth Games Trials 2010.

The following instruments were used for data collection: Bathroom weighing scale (by Hooya Import and export Co., Ltd, China): This was used to measure participants' weight (in kg). Height meter (Stadiometer by Quick Medical, North Bend, WA98045, USA): This was used to measure participants' height (in meters). Sit-and-reach box: a standard constructed sit-and-reach box, with a fixed ruler and slider.

Procedures

Standing height: Measurement was the maximum distance from the floor to the highest point on the head, undertaken when the subject was looking directly ahead. Shoes were taken off, feet together, and arms placed by the sides with face in Frankfort plane. Heels, buttocks and upper back were in contact with the wall. Height was measured to the nearest 0.1cm. This procedure was recommended by Badminton Australia (2008).

Body weight (mass): The participants stood with minimal movement with hands by their sides. Shoes and excess clothing were removed. Generally, the body mass in minimal clothing is sufficiently accurate (Badminton Australia, 2008). Body weight was measured to the nearest 0.1g. The data and that of standing height were used for the calculation of BMI, using: weight in kg divided by height in meters square (W/H^2).

Flexibility test: Flexibility was evaluated using a standardized sit-and-reach box. The preparation for and execution of all measurements were standardized. The test involves sitting on the floor with legs out straight ahead. Feet (shoes off) are placed with the soles flat against the box. Shoulder-width apart, both knees were held flat against the floor by the tester. With hands on top of each other and palms facing down, the subject reached forward along the measuring line as far as possible. After three (3) practice reaches, the fourth reach was held for at least two seconds while the distance was recorded. Records were taken only in the absence of jerky movement by the participant and fingertips remained level and the legs flat. Scoring: the score was recorded to the nearest centimeter as the distance before (negative) or beyond (positive) the toes.

Statistical Analysis

Data obtained were analysed using SPSS Version 17. Descriptive statistics including means and standard deviations ($\bar{x} \pm SD$) were used to describe the BMI and flexibility. *Multiple correlation coefficient* (r) was computed, *independent t-test* was also computed to examine the significant differences in the BMI and flexibility between the sexes (*Male and Female*) and their status (*National and Non-national*). An alpha level of 0.05 was used for all statistical tests.

Results And Discussion

Table 1: Correlation Values between BMI and flexibility

S/No.	VARIABLES	R	Prob
a1	Height vs. sit & reach	0.02	0.92
a2	Weight vs. Sit & reach	0.07	0.70
a3	BMI vs. Sit & reach	0.06	0.77

*Correlation is significant at the .05 alpha level or <.

Table 1A: Descriptive for all Participants Irrespective of Gender or Status

S/NO.	Variables	N	\bar{x}	SD
Physiological Characteristics				
1	Height (cm)	29	173.2	8.7
2	Weight (kg)	29	60.6	5.8
3	Body mass index (BMI) (kg.m ²)	29	20.4	2.9
Motor Performance Characteristic				
4	Flexibility (Sit and reach)	29	14.3	3.6

Table 2: *t*-Test Values between the selected Male and Female Badminton Players in Northern Nigeria

S/NO.	VARIABLES	SEX	N	\bar{x}	SD	T	Df	Prob
1	Height (cm)	Female	9	162.5	4.8	7.83	27	0.00*
		Male	20	177.9	4.9			
2	Weight (kg)	Female	9	61.2	4.5	0.36	27	0.72
		Male	20	60.4	6.5			
3	Body mass index (BMI) (kg.m ²)	Female	9	23.2	1.9	4.58	27	0.00*
		Male	20	19.1	2.3			
4	Flexibility (Sit and reach)	Female	9	15.1	4.3	0.7	27	0.43

*Correlation is significant at the .05 alpha level or <.

Table 3: *t*-Test Values between the National and Non-national Badminton

S/NO.	VARIABLES	STATUS	N	\bar{x}	SD	T	Df	PROB
1	Height (cm)	Non-National	23	173.1	7.6	0.03	27	0.97
		National	6	173.3	13.0			
2	Weight (kg)	Non-National	23	60.7	6.1	0.13	27	0.89
		National	6	60.3	5.1			
3	Body Mass Index (BMI) (kg.m ²)	Non-National	23	20.4	2.6	0.12	27	0.91
		National	6	20.5	4.3			
4	Flexibility (sit & reach)	Non-National	23	13.7	3.7	1.73	27	0.09
		National	6	16.5	2.5			

*Significant at the .05 alpha level or <.

Height

The participants in this study had a mean height of 173.2 ± 8.7 cm (n=29) (Table IA). A significant correlation between height and flexibility was not found, where $r = 0.02$, $p = 0.925$ (Table 1). The male and female players in this study had a mean height of 177.9 ± 4.9 cm (n=20) and 162.5 ± 4.8 cm (n=9), respectively (Table II). There was a significant difference between the heights of selected male and female badminton players in Northern Nigeria. This is because the calculated t value was greater than the t critical value at 5% level of significant with $p < 0.05$. The males were significantly taller than the females ($t = 7.83$, $p = 0.00$) (Table II).

The national and non-national players in this study had a mean height of 173.3 ± 13.0 cm (n=6) and 173.1 ± 7.6 cm (n=23), respectively (Table III). There was no significant difference in height between selected national and non-national badminton players in Northern Nigeria. This

is because the calculated t value is less than the t critical value at 5% level of significant with $p > 0.05$ ($t = 0.03$, $p = 0.97$) (Table IV).

The result obtained seems similar to that of national badminton, state and top club level tennis players and national elite Swedish tennis players who have recorded mean heights of $181.0 \pm 5.7\text{cm}$, $175.4 \pm 5.4\text{cm}$, $181.0 \pm 0.02\text{cm}$, $182 \pm 7\text{cm}$ and $184 \pm 6\text{cm}$ respectively (Reilly & Palmer, 1995; Faccini & DalMonte, 1996; Majumdar, Khanna, Malik, Sachdeva, Arif & Mandal, 1997). Studies by Rannou *et al.*, (2001) as Cited in Van Lieshout (2002) on national and international badminton players reported mean heights of $177.0 \pm 1.4\text{cm}$ and $190.0 \pm 1.2\text{cm}$, respectively. These values are higher than those found in junior tennis players, top squash players, junior national squash players, and professional badminton players who have recorded mean heights of $163.4 \pm 9.4\text{cm}$ to $174.5 \pm 0.7\text{cm}$ (Elliot *et al.*, 1989; Todd & Mahoney, 1995), 166cm to 180cm (Chin *et al.*, 1995), $173.0 \pm 6.4\text{cm}$ (Mahoney & Sharp, 1995) and $172.0 \pm 6.2\text{cm}$ to $177.2 \pm 4.0\text{cm}$ (Chin *et al.*, 1992 & 1995), respectively. The values corresponds with values found in junior female badminton and tennis players who had mean values ranging from 160cm to 165cm (Ghosh, Goswani & Ahuja, 2000) and from $162.8 \pm 7.5\text{cm}$ to $165.1 \pm 5.2\text{cm}$ (Elliot *et al.*, 1989), respectively. These values are lower than those obtained by Powers and Walker (1982), and Hughes (1995) who recorded mean height values of $168.70 \pm 2.35\text{cm}$ for female high school players, and $166.5 \pm 6.4\text{cm}$ for senior national badminton players.

Weight

The participants in this study had a mean weight of $60.6 \pm 5.8\text{kg}$ ($n=29$) (Table 1A). There was no significant correlation between weight and flexibility, where $p = > 0.05$. The male participants in this study had a mean weight of $60.4 \pm 6.5\text{ kg}$ ($n=20$). Meanwhile, the females had $61.2 \pm 4.5\text{ kg}$ ($n=9$) (Table 2). The result of this study revealed no significant difference in weight between the selected male and female badminton players in Northern Nigeria. The t -calculated is less than the t -critical values ($t = 0.36$, $p = 0.72$).

The national participants in this study had a mean weight of $60.3 \pm 5.1\text{kg}$ ($n=6$). While, the non-national had $60.7 \pm 6.1\text{kg}$ ($n=23$) (Table 3). No significant difference was found in the weight between selected national and non-national badminton players in Northern Nigeria. This is because the calculated t value is less than the t critical value at 5% level of significant with $p > 0.05$ ($t = 0.13$, $p = 0.89$) (Table 3).

These results are lower than values obtained for elite Danish badminton players whose values range from 73.3kg to 76.9kg (Omosegaard, 1996), and from $74 \pm 2\text{kg}$ to $79.4 \pm 0.8\text{kg}$ (Rannou *et al.*, 2001 in Van Lieshout, 2002), respectively. It is further lower than values obtained in studies on national male badminton players, leading junior tennis players, top squash, and professional badminton players who had values of $69.8 \pm 4.8\text{kg}$ and $64.8 \pm 6.9\text{kg}$ (Faccini & DalMonte, 1996; Majumdar *et al.*, 1997), and $67.7 \pm 6.9\text{kg}$ and $67.7 \pm 5.0\text{kg}$ (Chin *et al.*, 1992 & 1995). The value tends to correspond closely with that of elite female Danish badminton players, female high school tennis players and leading junior tennis players, whose body mass ranged from 57.0 to 66.7kg (Omosegaard, 1996), $57.99 \pm 2.59\text{kg}$ (Powers & Walker, 1982) and $56.2 \pm 8.1\text{kg}$ (Elliot *et al.*, 1989). These values however, are similar to those obtained for 14 to 15 year-old leading female tennis players of $52.5 \pm 7.2\text{kg}$ and $54.2 \pm 6.8\text{kg}$ by Elliot *et al.*, (1989). In Reilly, Secher, Snell and Williams (1990), it was concluded that lean body mass rather than total body weight was the critical factor relevant to performance ability.

Body Mass Index (BMI)

The participants in this study had a mean BMI of $20.4 \pm 2.9 \text{ kg.m}^2$ (n=29) (Table 1A). There was no significant correlation between BMI and flexibility. The male participants in this study had a BMI of $19.1 \pm 2.3 \text{ kg.m}^2$ (n=20) and $23.2 \pm 1.9 \text{ kg.m}^2$ (n=9) for female participants. There was a significant difference in BMI between selected male and female badminton players in Northern Nigeria. This is because the calculated t value was greater than the t critical value at 5% level of significant $p < 0.05$. The females were significantly possessed more BMI than the males ($t= 4.58$, $p= 0.00$) (Table 2).

The national participants in this study had a mean BMI of $20.5 \pm 4.3 \text{ kg.m}^2$ (n=6). While, the non-nationals had $20.4 \pm 2.6 \text{ kg.m}^2$ (n=23) (Table 3). No significant difference was found in the BMI between the selected national and non-national badminton players in Northern Nigeria. This is because the calculated t value was less than the t critical value at 5% level of significant with $p > 0.05$ ($t= 0.12$, $p= 0.91$) (Table III).

In research carried out on junior male and female tennis players by Elliot et al., (1989), body composition was found to be an important indicator of tennis performance for 11 - 15 year old male and female players. In studies performed on American footballers by Wilmore and Haskell (1972) as unveiled in Van Lieshout (2002), it was concluded that lean body mass rather than total body weight was the critical factor relative to performance ability. In this study males and females were treated differently as buttressed by Marshall (1978) as reported in Van Lieshout (2002) that; “junior males differ from females in many morphological and physiological characteristics, and it is therefore important to consider the sexes separately in data analysis.”

Flexibility (Sit and reach)

The mean sit-and-reach values of the males in this study was $13.9 \pm 3.3 \text{ cms}$ (n=20). The females had a mean sit-and-reach values of $15.1 \pm 4.3 \text{ cms}$ (n=9) (Table 2). There was no significant difference in the sit-and-reach values of selected male and female badminton players in Northern Nigeria. $t= 0.7$ $p= 0.43$, the females were significantly more flexible than the males.

The mean sit and reach values of the national players in this study was $16.5 \pm 2.5 \text{ cm}$ (n=6). The non-national players had a mean sit and reach values of $13.7 \pm 3.7 \text{ cm}$ (n=23) (Table III). The study revealed no significant difference in the flexibility between the selected national and non-national badminton players in Northern Nigeria. The calculated t value was less than the t critical value at 5% level of significant, $p > 0.05$ ($t= 1.73$, $p= 0.09$), though, the national were more flexible than the non-national (Table III).

Chin *et al.*, (1995); Omosegaard (1996) supported that; high levels of flexibility are also needed so that the players are able to position themselves where they are able to hit the shuttlecock more powerfully (Nowak, 1998). Omosegaard (1996) stated that most right-handed badminton players have a reduced flexibility of the right hip in comparison to the left hip, which is probably due to greater loads imposed on the right leg during a jump, combined with inadequate stretching exercises.

Summary

In the correlation between BMI and flexibility, the following sequel was noted:

- A significant correlation between height and flexibility was not found.
- No significant correlation between weight and flexibility.

In testing the differences between *males and females* in BMI and flexibility, the following outcome was discerned:

- There is a significant difference between the heights of selected male and female badminton players in Northern Nigeria.
- There is no significant difference in weight between the selected male and female badminton players in Northern Nigeria.
- There is a significant difference in body mass index (BMI) between selected male and female badminton players in Northern Nigeria.
- No significant difference in the sit-and-reach values of selected male and female badminton players in Northern Nigeria. Even though the females were more flexible than their male counterpart was.

In testing the difference between *National and Non-national* in BMI and flexibility, the following results was obtained:

- ✓ No significant difference in height between selected national and non-national badminton players in Northern Nigeria. Even though, the national players were taller.
- ✓ No significant difference was found in the weight between selected national and non-national badminton players in Northern Nigeria. Even though, the non-national players were heavier.
- ✓ No significant difference was found in the BMI between the selected national and non-national badminton players in Northern Nigeria.
- ✓ No significant difference in the flexibility between the selected national and non-national badminton players in Northern Nigeria. Even though, the national players obtained higher values than the non-national.

Recommendations

The following recommendations were proffered:

1. The BMI and flexibility components of the players in this study need to be enhanced to meet up with international standards.
2. Athlete trainers, coaches, exercise scientists and all personnel concerned with designing training programs for badminton players should put all the physiological and motor performance components into consideration for enhancement.
3. Athlete trainers, coaches, exercise scientists and all personnel concerned with designing training programs for badminton players should place emphasis upon skill training. Skill tests seems to be a major variable left untouched by the foregoing study. Skill training seems a determinant of success in badminton.
4. Equally, it should be realized that males are physiologically disparate from females.

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Effects of Aerobic and Progressive Resistance Exercise on Running Mechanism of Primary School Children in Nigeria

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The objective of this study was to determine the effectiveness of aerobic exercise (AE) and progressive resistance exercise (PRE) on the running mechanism of children in primary school. The randomized classic pretest-posttest, control group experimental research design was adopted for the study. Participants were 180 children purposively drawn from primary grades 3, 4 and 5 of each of the two public and private primary schools in Ibadan. Systematic random sampling technique was used to assign the participants into AE, PRE experimental groups and control group. Each of the experimental groups was exposed to a 12-week interval training program that took place three times a week. Pretest-posttest data were collected with the aid of the criterion referenced running mechanism Test of Gross Motor Development -2 (TGMD-2, $r=0.91$) developed by Ulrich (2000). Data were analyzed using mean, analysis of covariance and Scheffé post hoc test. Result shows that there were significant differences in the effect of the training regimens on running mechanism [$(F_{3,176}) = 233.600$, $p < 0.05$] and that PRE enhanced better performance. The study concluded that for effective achievement of good running mechanism, PRE must be integrated into the training modes of primary school children on running mechanism [$(F_{3,176}) = 233.600$, $p < 0.05$] and that PRE enhanced better performance. The study concluded that for effective achievement of good running mechanism, PRE must be integrated into the training modes of primary school children.

Introduction

Running is a means of terrestrial locomotion allowing humans and other animals to move rapidly on foot. It is simply defined in athletic terms as a gait in which at regular points during the running cycle both feet are off the ground (Gallahue and Ozmun, 1998). Biewener (2003) opined that running mechanics is in contrast to walking, where one foot is always in contact with the ground, the legs are kept mostly straight and the center of gravity vaults over the legs in an inverted pendulum fashion. A characteristic feature of a running body from the viewpoint of spring-mass mechanics is that changes in kinetic and potential energy within a stride occur simultaneously, with energy storage accomplished by spongy tendons and passive muscle elasticity (Gallahue, & Donnelly, 2003). The term running can refer to any of a variety of speeds ranging from jogging at the aerobic phase to sprinting which is typically anaerobic. Humans leap from one leg to the other while running. Each leap raises the center of gravity during take-off and lowers it on landing as the knee bends to absorb the shock. At mid arc, both feet are momentarily off the ground. This continual rise and fall of bodyweight expends energy opposing gravity and absorbing shock during take-off and landing.

Running is executed as a sequence of strides which alternate between the two legs. Each leg's stride can be roughly divided into three phases: support, drive, and recovery (Gallahue, & Donnelly, 2003). Support and drive occur when the foot is in contact with the ground. Recovery occurs when the foot is off the ground. Since only one foot is on the ground at a time in running, one leg is always in recovery, while the other goes through support and drive. Then, briefly, as

the runner leaps through the air, both legs are in recovery. Running is both a competition and a type of training for sports that have running or endurance components. Events are usually grouped into several classes, each requiring substantially different athletic strengths and involving different tactics, training methods, and types of competitors.

Cools, De-Martelaer, Samaey, and Andries, (2008) affirmed that most preschool children are naturally curious, love to play and explore, running mechanisms are learned very easily, especially when stimulation, opportunities to play and to be physically active or sport are offered. The mode of play of children is basically aerobic and as they are naturally more aerobic, it would be useful to know if aerobic exercise (AE) would enhance proficiency in their running mechanism better than progressive resistance exercise (PRE) which is a form of strength training in which each effort is performed against a specific opposing force generated by resistance.

Methodology

The randomised classic before and after experimental research design of two experimental comparison groups and one control group devised by Isaac and Michael (1981) was used for the study. The design has one experimental group and two control groups. One of the two control groups is actually an experimental comparison group because the trainings are not the same while the third group is a pure control group. A total of one hundred and eighty (180) volunteered pupils were drawn purposively from four (two public and two private) primary schools in Ibadan, Nigeria. The sample size range between thirteen (13) and ten (10) pupils from primary three (3); and twenty (20) and eighteen (18) from primary four. In primary five (5), fifteen (15) pupils were from three schools and twelve (12) from one school. Each of the schools had representation ranging from 40 to 48 pupils. Systematic random sampling technique was used to assign participants into the three groups, namely: the aerobic exercise (AE), the progressive resistance exercise (PRE) and the control group.

The AE and PRE trainings involved a twelve –week interval training in which participants in the experimental groups were exposed to repeated periods of work, interspersed with rest periods. The AE group involved in low intensities (35–54%HRmax) work loads while the PRE group took part in short moderate intensities (55–69%HRmax) workload with increment at scheduled interval (Marwick et al., 2009). The activities took place three times a week in line with the position of the American College of Sports Medicine (2007) on quality and quantity of exercise training. The control group did not partake in any organised training during the period.

Height and weight characteristics of the participants were measured and considered as adjunct to this study because of their effect on running mechanism. Body weight of the participants was obtained by standing on weighing scale dressed in a gymnastic cloth and was recorded in kilograms to the nearest 0.1kg. The height of the participants was measured as each stood on Stadiometer bare-footed, erect, feet together with heel, buttocks, proximo-posterior trunk and rear of the head in contact with the bar of the Stadiometer. While the participants looked straight forward, the height was recorded to the nearest 0.1m. Criterion referenced running test developed by Ulrich (2000) employed in the study has four behavioural components that are presented as performance criteria. Where the participant performs a behavioral components correctly, ‘1’ mark was awarded but if the participant does not perform a behavioural component correctly, ‘0’ mark was awarded. After completing this procedure for each of two trials, the researchers totaled the scores of the two trials to obtain a raw skill ability

score which were converted to a standard score. The materials, directions and performance criteria as posited by Ulrich are in the table 1.

To enhance the cooperation of the participants, the researcher collected a signed letter of introduction from the Head of the Department of Human Kinetics and Health Education, University of Ibadan, which was used for identification purpose. With this, awareness interaction on exercise and its benefits were given to the pupils after a discussion with their teachers that were well incorporated into the training. Finally, they all filled informed consent through their head teachers, class teachers and parents. Data on the gross motor skills and Physiological parameters of the participants was collected before (pre) and after (post) training programmes that lasted for twelve (12) weeks by the researcher with the help of his trained assistants. The descriptive statistics of mean and standard deviation and inferential statistics of analysis of covariance were used to test data collected for the study. The Scheffé post hoc test which Maxwell and Delaney (2004) supported to be preferred when many contrasts are of interest was adopted for specific differences in ANCOVA results, all at the 0.05 level of significance.

Table 1
Running mechanism procedure

Skill	Materials	Directions	Performance Criteria
Running	60 feet of clear space, and two cones.	Place two cones 50 feet apart. Make sure there is at least 8 to 10 feet of space beyond the second cone for a safe stopping distance. Tell the child to run as fast as he or she can from one cone to the other when you say "Go". Repeat a second trial.	Arms move in opposition to legs, elbows bent. Brief period where both feet are off the ground. Narrow foot placement landing on heel or toe (i.e., not flat footed). Non-support leg bent approximately 90 degrees (i.e., close to buttocks).

Sources: Ulrich, 2000.

Results

The results of descriptive analysis in respect of changes in the variables due to AE and PRE and mean differences are shown in table 2.

Table 2
Pretest-Posttest Means and Standard Deviations for the three Groups

	Aerobic Exercise Group			Progressive Resistance Exercise Group			Control Group		
Variables	Pre test	Post Test	MD	Pre test	Post test	MD	Pre Test	Post test	MD
	Mean & Std	Mean & Std		Mean & Std	Mean & Std		Mean & Std	Mean & Std	
Height (m)	1.31 ± 0.07	1.35 ±0.08	0.04	1.35 ±0.08	1.36 ±0.09	0.01	1.33 ±0.08	1.35 ±0.08	0.02
Weight (kg)	25.52 ±5.25	27.40 ±4.90	1.88	27.4 ±3.75	29.52 ± 5.82	2.04	26.9 ±4.00	26.78 ±5.29	0.19

Running Mechanism	2.43 ±0.96	5.75 ±0.95	3.32	1.90 ±1.21	5.97 ±0.94	4.07	1.15 ±0.97	3.35 ±0.97	2.20
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Table 2 reveals that there were slight increases in height from $1.31 \pm 0.07\text{m}$ to $1.35 \pm 0.08\text{m}$ (AE), $1.35 \pm 0.08\text{m}$ to $1.36 \pm 0.09\text{m}$ (PRE) and $1.33 \pm 0.08\text{m}$ to $1.35 \pm 0.08\text{m}$ (control); weight increased from $25.52 \pm 5.25\text{kg}$ to $27.40 \pm 4.90\text{kg}$ (AE), $27.4 \pm 3.75\text{kg}$ to 29.52kg (PRE) and $26.9 \pm 4.00\text{kg}$ to $26.78 \pm 5.29\text{kg}$ (control); and running mechanism increased from 2.34 ± 0.96 to 5.75 ± 0.95 (AE), 1.90 ± 1.21 to 5.97 ± 0.94 (PRE) and 1.15 ± 0.97 to 3.35 ± 0.97 in the control group.

Table 3
ANCOVA to Determine the Effect of Aerobic Exercise and Progressive Resistance Exercise on Running Skills

Source of Variation	Sum of Squares	df	Mean Squares	F	Sig. of F	Remark
Covariates	11.208	1	11.208	10.655	.001	Sig.
Main Effects of Treatment Groups	491.419	2	245.709	233.600	.000	
Explained	502.626	3	167.542	159.285	.000	
Residual	185.124	176	1.052			
Total	687.750	179	3.842			

The above table 3 showed the results of ANCOVA on the effect of AE and PRE trainings on locomotor skills of primary school children in Ibadan. The main effects of the test on the participants (experimental groups and control group) were statistically significant at 0.05 significant level [$(F_{3,176}) = 233.600$, $p < 0.05$]. There were significant effects of AE and PRE on locomotor skills. The mean score for the PRE group was 4.90, AE was 4.27, and control group was 1.08 while grand mean score was 3.42.

Table 4

Multiple Classification Analysis of Pretest and Posttest Showing the Direction of the Significant Interaction Effects Running Skills. Grand mean = 3.42

Variable category	N	Unadjusted Deviation	Eta	Adjusted for Independents + Covariates Deviation	Beta
PRE	60	1.48	0.85	1.47	0.85
AE	60	0.85		0.86	
Control	60	-2.33		-2.33	
Multiple R ²					0.731
Multiple R					0.855

This table 4 showed the MCA results of AE and PRE on locomotor skills of primary school children in Ibadan. From the table, experimental group of PRE has an adjusted mean score value of 4.90 (3.42+1.48), experimental group of AE has the adjusted mean score value of 4.27(3.42+0.85) and control group has the adjusted mean score value of 1.08 (3.42-2.33). The result indicated that PRE was the most effective training, next to it was the AE and control group respectively.

Table 5

Scheffe Post hoc Analysis for Running Skills

Variable	Treatment Groups	Treatment Groups	Mean Difference	Sig.
Locomotor Skills Abilities	PRE	AE	.6333*	.004
		Control	3.8167*	.000
	AE	PRE	-.6333*	.004
		Control	3.1833*	.000
	Control	PRE	-3.8167*	.000
		AE	-3.1833*	.000

* = The mean significant is at the 0.05 level. The significant difference in locomotor skills abilities as indicated by scheffe is between control and PRE ($P < 0.05$) on one side and control and AE on the other side ($P < 0.05$).

Discussion

The focus of this study was to determine the effectiveness of aerobic exercise (AE) and progressive resistance exercise (PRE) on the running mechanism of children in primary school. Findings from this study show that significant differences existed in the effect of the training regimens on running mechanism with better improvement occurring in the PRE group. The PRE group expectedly performed better than the AE and control group probably because the running ability test used for the study was mainly anaerobic in nature. Researches have confirmed the PRE significantly increases muscle bulk and therefore produces adequate force required for anaerobic performance.

The results agree with the observations of Misra, et al. (2008) that exercise training, whether aerobic or resistance, leads to an increase in skeletal muscle, fat-free mass, fat mass, brings about functional changes in the muscle. They further opined that the addition of resistance exercise to aerobic training can help achieve the targets in shorter time than achievable by isolated aerobic exercise alone.

There is evidence that improvements in the ability to generate muscle force can carry over into an improved ability to do everyday tasks. According to the principle of specificity of training, improvements are specific to the manner in which training is completed so that one would not necessarily expect improvements in the ability to generate muscle force in the training setting to translate to an improved ability to perform everyday activities (ACSM, 2007). Taylor, Dodd, and Damiano (2011) asserted the evidence that PRE programmes that lead to improvements in the ability to increase force production also lead to improvements in muscle power and endurance. Hsu (2001) reported that typical preschool children demonstrated qualitative performance gains in six fundamental motor skills from pretest to posttest as a result of two 5-week instructional units consisting of direct instruction. In contrast, the control group, who engaged in well equipped free play, made no significant gains in motor skill development. A study by Connor-Kuntz and Dummer (1996) found significant pretest-posttest gains in FMS in typical preschool children, head start (disadvantaged) preschool children, and preschool children with disabilities, as a result of an 8-week intervention.

Conclusion

On the basis of the findings of this study, primary school children responded to exercise training similarly, irrespective of being in the private or public sector. Both aerobic exercises and progressive resistance exercises affected running mechanism positively. However,

progressive resistance exercises had better effects than aerobic exercises. This study demonstrated that aerobic and progressive resistance exercises programs are essential to the development of the running mechanism, a position that related literature supports. It is recommended that there should be regular and frequent use of these programs at the primary school level.

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Creatine Phosphate and Ascorbic Acid Administration on Motor Performance of Male Athletes in Lagos State, Nigeria

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Abstract

The problem of developing legitimate aids in sports that can enhance muscular performance and that will not produce deleterious effects on users has been a challenge for many years. The increased use of ergogenic aids in sport, such as caffeine, anabolic steroids, bicarbonates and sodium citrate have been well studied and documented but very little work has been done on the effect of creatine phosphate as an ergogenic aid on African athletes.

This study adopted a pretest, posttest, control group experimental design. Simple random sampling was used to select 60 participants from Lagos State male amateur athletes. The participants were randomly assigned to the two experimental groups and one control group. The treatment lasted three weeks. Interval-circuit training of five stations (r-0.75) was used to establish the homogeneity of the groups. Four hypotheses were tested at 0.05 level of significance. The motor performances tested were speed, agility, strength and leg power. Data were analyzed using Analysis of Covariance.

There was a significant difference in the administration of creatine phosphate and ascorbic supplement scores of the participants in intervention treatment and control groups ($p < 0.05$). There was however no significant difference in the performance of the participants treated with creatine phosphate and those exposed to ascorbic acids supplements. ($F(6,48) = 1.25, p > 0.05$). Significant difference existed between the two treatment groups and the control groups on agility and strength performance skills $F(6,48) = 0.38, p > 0.05$. Administration of creatine phosphate intervention was effective in fostering motor performance more than an ascorbic acid supplement.

Key Word: supplements

Introduction

Physiologists and other sport scientists have been carrying out research in the developed nations on different kinds of ergogenic aids - all in an effort to improve human performance in sports and other muscular activities (Elchnet, 1986). The effects of ergogenic aids such as caffeine, anabolic steroids, bicarbonates, sodium citrate, have been well studied and documented, (Gledhill, 1982, McNaughton, 1987; McNaughton & Cedaro, 1992) but very little work has been done to elucidate the effect of creatine phosphate as an ergogenic aid among black Africans. Greenhaff (2000) reported on research carried out on creatine phosphate and its application that the ergogenic aid seems to increase muscular power in the short-term and increase weight gain after high intensity exercise.

Increase in the sarcoplasmic concentration of creatine phosphate is capable of enhancing muscular performance by providing more creatine phosphate, which will combine with

adenosine diphosphate to produce more energy in the form of ATP for improved muscular work. Although it is widely accepted by the sporting community that a high maximum oxygen uptake ($\text{VO}_2 \text{ max}$) and endurance fitness (training status) are important determinants of the ability to recover power output after sprinting, there is little information to support such beliefs in the physiology literature.

Studies conducted so far to determine the effects of creatine phosphate (c.p) supplementation on muscle concentration and performance indicated (20mg per day or 0.3g p kg body mass per day for 7 days) an increase intramuscular creatine phosphate content by 10 to 30C (Casey constants in-Theodosia & Nowell, 1996; Febbraio, Flanagan & Snow, 1995; and Green, Hultman & Macdonald, 1996). There is also evidence that creatine phosphate supplementation enhances the rate of ATP. Following intense exercise studies (Greenhaff, Constantine-Teososi, Casey & Hultman, 1994) indicated that short-term creatine phosphate supplementation increases total body mass, work performed during multiple sets of maximal effort muscle contractions and single or repetitive sprint capacity (Preiwest, Nelson & Morris, 1997). In addition, long-term creatine phosphate supplementation during training has been reported to promote greater gains in strength, fat-free mass and sprint performance (Kreder, Ferreira & Wilson, 1998).

The intensity of international sports competitions has increased in recent times. This has made the margin between winning and losing very small - measurable in fractions of a second or a fraction of a centimeter due to poor nutrition could make a potential winner a loser. Male athletes take vitamins supplements in order to ensure adequate nutrient intake. Some athletes believe that certain vitamins like vitamin C (ascorbic acid) have ergogenic properties that would enhance performance, (Haruna & Venkate Swarlu, 2002).

Bazzarre (1992) reported significant association between ingestion of 200mg-300mg/day vitamin C for female and male in body building. However vitamin C supplements have no record of its effect on muscular strength and endurance.

Hence, the need to study the effect of creatine phosphate and ascorbic acid administration on anaerobic performance of athletes to determine the changes in muscle metabolism and power output when anaerobic exercise is repeated after a short interval of recovery.

Methodology

The population for this study consisted of 60 amateur athletes of Lagos State, Nigeria – all of whom volunteered for the study. The participants and event were selected using purposive sampling techniques. Sixty participants from four anaerobic athletic events were randomly selected and assigned to experimental and control groups using a table of random numbers. The first 20 participants selected were in the control group while the second and third 20 participants serve as the experimental groups one and two respectively.

Figure 1. Administration of Creatine phosphate and Ascorbic Acid on Amateur Athletes

Pre tests	Treatment	Post tests
Anthropometrics test Cardio-respiratory test Speed -50yrd dash Power-standing broad jump Strength-handgrip dynamometer Agility-shuttle run	'Oral drugs dosage of 5mg per day of creatine phosphate and ascorbic acid of 200 mg was administered to the treatment groups I&II respectively while clean water as a placebo was given to control group.	Anthropometrics test Cardio respiratory test Speed-50m dash Power-standing broad jump Strength-handgrip dynamometer Agility-shuttle run

Procedures for Training Program

The following procedures were followed:

1. The training program was an interval-circuit training exercise on anaerobic intermittent work.
2. The training program consisted of five stations of bench stepping, press-ups, sit ups, squat jump, and chin-up for three times per week (e.g. Monday, Wednesday and Friday)
3. The work interval of 30 seconds was followed by the relief interval, during which time the participants were engaged on slow walking for thirty seconds.
4. Each participant was encouraged to perform 3 sets with a minimum of 12 and maximum of 26 repetitions in 30-second work intervals. Following each work interval, the participants rested for 30 seconds. During this period the pulse was counted for six seconds at two different times, which were:
 - a. Five seconds following the work interval counts pulse for six seconds.
 - b. Twenty seconds following the work interval count pulse for six seconds.
5. The participants pulse was allowed to drop to below 120 beats/min before starting the next set.
6. Every training session was made up of three segments. They were general body warm-up, conditioning bout or anaerobic segment and cool down.
7. All training and measurements took place in the sport ground of the Lagos state sports council.

Data Analysis

Both descriptive and inferential statistical methods were used for the treatment of the data. The means and standard deviation were computed for the variables. The analysis of co-variance (ANCOVA) procedure was used to test the hypotheses at 0.05 alpha levels in determining the significant differences between the performance of the treatment groups of oral supplements of creatine phosphate and ascorbic acid and the control group, water as placebo. The data of each experimental group was also analyzed from pre to post treatment measurement using the t-test to determine the effects of creatine phosphate on each group.

Results

Table 1
Demographic Data of the Participants on Age, Weight and Stature

Groups	Age Range (years)	Mean	S.D	Weight Range (kg)	Mean	S.D	Height Range (cm)	Mean	S.D
Experimental Group 1	25-28	26.55	1.05	88.60	59.1	2.47	145-179	162	18
Experimental Group 2	21-29	25.0	1.22	60.02	61.5	4.19	165-174	169.5	18.4
Control Group	21-27	25.6	1.79	64.78 66.64	63.0	3.32	165-184	1174.5	18.6

Total mean of the Groups ages = 25.58, weight = 61.5 and Height = 252.5cm

Table 2
Adjusted Y-mean on Performance Test of Participants

ROW S	N O	SPRINT	LONG JUMP	HIGH JUMP	JAVELIN THROW				
SPEED		- X-X	- Y- X	- X- X	- Y-X	- X-X	- Y-X	- X-X	- Y-X
TRT. 1	20	7.600	7.800	7.680	7.285	7.740	7.359	7.660	7.694
TRT. 2	20	7.600	7.680	7.680	7.685	7.680	7.605	7.260	7.588
CONTROL	20	7.060	7.875	7.560	7.337	7.480	7.472	7.100	7.938
AGILITY									
TRT. 1	20	13.58	19.52	13.64	22.71	12.88	20.12	13.44	2038

TRT. 2	2 0	14.76	17.84	14.96	22.01	15.52	16.72	14.98	19.56
CON TRO L	2 0	15.06	16.44	15.12	17.63	15.02	17.94	14.50	16.24
STRE NGT H									
TRT. 1	2 0	37.48	37.32	36.50	42.15	39.08	41.20	36.50	47.33
TRT. 2	2 0	37.32	38.49	36.50	47.75	42.02	37.83	36.98	37.69
CON TRO L	2 0	54.00	35.92	52.48	40.78	48.08	40.01	49.92	45.57
POW ER									
TRT. 1	2 0	0.44	0.41	0.45	0.39	0.48	0.37	0.47	0.42
TRT. 2	2 0	0.44	0.44	0.45	0.40	0.41	0.37	0.51	0.45
CON TRO L	2 0	0.44	0.44	0.44	0.39	0.36	0.37	0.45	0.43

The above pretest measurements were adjusted for the initial group differences. The adjusted pre test scores showed no significant differences between the three groups. To determine the effect of the treatments between and within the groups, analysis of covariance (ANCOVA) was used as presented below.

Table 3
Analysis of Covariance Comparing Speed, Agility, Strength and Power Performance Tests

Source of variation	Variable	DF'	Sum of squares	Mean squares	F	P	Remarks
Rows	Speed	2	0.035	0.017	0.75	>0.05	NS
Columns		3	0.285	0.095	4.14	<0.05	S
Interaction		6	0.174	0.029	1.26	>0.05	NS
Within		48	5.512	0.023			
Rows	Agility	2	26.31	13.15	18.10	<0.05	S
Columns		3	14.77	4.92	6.78	<0.05	S
Interaction S		6	9.22	1.54	12.11	<0.05	S
Within		48	174.43	0.73			
Rows	Strength	2	34.03	17.01	3.35	<0.05	S
Columns		3	60.24	20.08	3.95	<0.05	S
Interaction		6	37.99	6.33	4.25	<0.05	S
Within		48	1219.93	5.08			
Rows	Power	2	0.000	0.000	0.30	>0.05	NS
Columns		3	0.006	0.002	3.69	<0.05	S
Interaction		6	0.001	0.000	0.15	>0.05	NS
Within		48	0.131	0.001			

Table 3 shows that there is no significant difference in pretest and post test speed within each group ($F=0.75$; $P>0.05$), despite that there was significant regression effect among the three groups ($F=4.14$; $P<0.05$) the result shows that the treatment has no significant effect on speed performance of the participants ($F=1.26$; $P>0.05$). However for agility there was significant difference within performance ($F=18.10$; $P<0.05$) likewise among the groups ($F=6.78$; $P<0.05$) also there was significant regression effect of the treatment on agility performance ($F=12.11$; $P<0.05$). This agility result is similar with what was obtained for strength. Power had no statistically significant difference between pre and post test of participants ($F=0.30$; $P>0.05$, NS). The column shows that there was statistical significant difference among

sprint, long jump, high jump and javelins throw - ($F=3.69$; $P<0.05$). But there was no significant interaction between the treatments and power performance ($F=0.15$; $P>0.05$).

Table 4
Adjusted Y-means for Comparison and Summary of Test Performance

GR OU P		EVENTS			
		SPRINT	LONG JUMP	HIGH JUMP	JAVELINE THROW
TR T 1	Spe ed	7.80	7.29	7.36	7.69
TR T 2		7.68	7.69	7.61	7.59
Co ntr ol		7.88	7.34	7.47	
TR T 1	Agi lity	19.52	22.71	20.12	20.38
TR T 2		17.84	22.01	1672	19.56
Co ntr ol		16.44	17.94	16.24	
TR T 1	Str eng th	37.35	42.15	41.20	47.33
TR T 2		35.92	40.78	40.01	45.57
Co ntr ol		38.49	37.75	37.83	37.69
TR T 1	Po wer	0.410	0.389	0.366	0.420
TR T 2		0.400	0.404	0.371	0.452
Co ntr ol		0.396	0.391	0.367	0.425

Discussion

Table 4 shows that little or no difference existed in the adjusted Y-mean scores of treated subjects on speed. While on agility the result shows that adjusted Y-mean scores of treated subjects were higher than the X-mean scores. However, the adjusted Y scores of control subjects

did not significantly differ from their means. The above proved that the treatments were effective in fostering agility and strength of the participants. In addition as indicated on table 4 treated subjects performed better than the control subjects.

To determine the effect of the two treatments on the variables, the ANCOVA result further shows that, for the agility and strength tests the treatments as contained in the rows are statistically significant. Also, the table shows statistical significant difference in the columns. However, there was no significant difference in the alteration effect.

The result shows that little or no difference existed in the adjusted Y-mean scores of treated subjects on speed. Since adjusted Y-means scores of treated subjects were not significantly superior to those of control subjects. The study therefore concluded that there was no significant interaction between the treatments and speed performance of treated subjects and the control group being the least.

The treatment groups on strength performance test contained in the rows had no statistically significant difference ($F=3.75$, $DF= 2$ (48, $P>0.05$). The result shows that little or no difference existed in the adjusted Y- scores of treated subjects on the columns. However, the treated subjects were significantly superior to those of the control subjects, the null hypothesis was therefore accepted. The study concluded that there was significant difference in the strength performance test of subjects and control with treatment one (1) being more effective compared to treatment two (2).

For power, the adjusted Y-means scores of control subjects did not significantly differ from their X-mean scores. The above proved that the treatments were not effective in fostering power tests of the participants. Summarily treated groups did not benefit from the programs more than the control group in leg power.

Conclusion

Based on the research findings of this study, the following conclusions were made. Oral creatine phosphate and ascorbic acid administration had an effect on some of the variables tested. For instance, treated participants benefited on variables of agility and strength, while on speed and power tests, there were no benefits based on the treatments.

Consequently, creatine phosphate, based on the results, is an adequate energy source for some anaerobic events of general body and not of specific body parts. This may be right because fluctuation in the levels of high energy phosphates with exercise are in accord with hypothetical control mechanisms found in the glycolytic pathway resulting in an increased activity of the glycolytic rate timing enzyme, Phospho fructokinase.

Recommendations

Based on the results of the study, the following were recommended. There is still need to continue to take an in-depth interest in the issue of ergogenic aids by educating athletes on the harmful effects of such practices that could affect the health status of their performances. Athletes and coaches should be educated on the use of creatine phosphate supplement, especially on its side effects of weight gain that may cause decrease performance in some sports events. Use of creatine phosphate may just be an economic waste as this study did not show appreciable performance effect.

Previous studies revealed that creatine phosphate gave promising results, but more

research work is needed to conclusively determine if creatine is a nutritional or drug supplement. Studies should be conducted to determine the effects of ascorbic acid on exercise and protocols of aerobic endurance and progressive resistance on similar sport performance. Also, studies should be conducted in other parts of the country in order to generate more evidenced based data that are comparable locally.

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Noise Levels and its Effect on the Motor Flow of one of the Composition Requirements "CR" on the Balance Beam

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The purpose of this research was to know the motor flow level of the given skill through the different levels of noise in the sample. Also, to know the effect of the noise levels on the motor flow and the performance level of the skill in the sample. The analytical descriptive method was used as it is suitable for the nature of the research. The sample (n=4) female players were chosen because they were enrolled in "The Egyptian Gymnastics Federation" in the second division at Semouha Sporting Club. Furthermore, they were good in performing the given skill. Noise levels were measured with a special machine while the gymnasts' performance was video recorded. This recorded performance was analyzed by computer. The results showed a moderate correlation between the motor flow and the performance level with a sudden level of noise. The correlation was weak between the same variable at the other noise levels (without noise, loud noise). Their correlation was reverse and there was no statistical significance between the noise effect on the motor flow of the intensity of the noise the less the motor flow level of the sample. The most important recommendation was it is necessary to increase the public awareness that the players' performance on the balance beam is influenced greatly by the surrounding noise, which should be avoided when the line players begin to use this apparatus.

Introduction

Sports championship can be likened to the theatre where all athletes and champions can display their dexterity while performing also show their motor dexterity. Gymnastics has a great measure of popularity. A difference in rating the player's performance on different gymnastics apparatus was observed during championships. The audience's effect in either raising or lowering a player's performance is sometimes considered the main reason for the given player's poor showing. Noise emanating from play grounds, public shouting, sounds of drums and tambourines are considered audio excitements which are picked up by the player's audio system during the performance of the skill under observation. These noises distract the player's attention and offset her concentration to the point where these undesired sounds cause the athlete to feel tired and even fatigued. The degree of sounds can be distinguished on a continuum from harsh to not so sharp to shrill. The unit to measure the height of sound in the "DB Decibel".

The results of scientific studies in the sports domain have proved that noise with its different levels effects causes the player's ability to perform both the rapid and fine movements to a suitable degree of consistency and fluidity to be weakened

Movement fluency is considered a very important phenomenon to motor performance as it is one trait of the athletic movement and a basic criterion in evaluating the level of performance of the given skill. Movement fluency means the optimum coordination of all body parts when performing the movements in sequence.

Fluency, from a biomechanical point of view means that there is coordination between different body parts. In gymnastics, fluency represents on the dynamic patterns of the technical passes which is considered a scale measuring level of performance.

The balance beam is a piece of gymnastic equipment that females use and requires a higher degree for this fluency. Since the balance beam is characterized by its special geometric by its special geometric design including the height from the ground and its narrow support base. It is on this base that the players perform the movement phase requiring forming different rhythmic elements including static, Turing and acrobatic movements with during a period of time lasting between 1.10 and 1.30 minutes.

One of the composition requirements "CR" on the balance beam is a connection of at least two different dance elements. These elements may include a leap or jump or hop with open legs 180 degrees (only in the crossing position). As a result of watching world championships, Olympic and local tournaments, the researcher has noticed the achievement of this requirement by performing an open leap by alternating legs followed by a wolf leap. This leap is considered one of the main jumps that many players depend on in forming the movement phases on the apparatus.

According to what was mentioned above and taking into consideration to what degree noise has on an athlete's ability to perform a given skill and the importance of fluidity in a sequence of movements, the researcher has undertaken this research. The researcher's objective was to find out to what extent the different noise levels affected motor fluency and the ability to perform a given skill. The skill in question was the open leap jump and open leap jump with alternating leap followed with a wolf jump on the balance beam.

The objectives:

The aim of the research was to find out:

- 1- The effect of the different noise levels on the sequence of movements in performing one element of the composition requirements "CR" (open leap with alternating leg followed by a wolf jump) on the balance beam with regard to the sample.
- 2- The effect of the different noise levels vis-à-vis the performance level of the given skill regarding the sample
- 3- The relationship between the flow of the movement and the performance of the skill in question bearing in mind the various noise levels for the sample.

The research question:

- 1-Is there any effect of the different noise levels on the sequence of movements to "CR"(open leap skill with alternating legs followed by a wolf jump) on the balance beam with regard to the sample?
- 2- Do the different noise levels have any effect on the performance level vis-à-vis the skill for the given sample?
- 3- Can any significant statistical relationships be discerned between the progression of movements and the level of performance for the skill under observation in terms of the different noise levels for the given sample?

The methodology:

The researcher used the descriptive method based on the biomechanical analysis by using the computer as it was suitable for the nature of the research.

The population:

The players enrolled, (n=4), in the Egyptian Gymnastics Union from Semouha Club in Alexandria were specifically chosen for the sample because they were able to perform the skill under observation properly.

Table 1 Sample Specifications

variables	means	Standard deviation	skew ness
Age	1	0.72	0.08
Height	145	2.61	-0.61
Weight	36	17.4	-0.05
Performance level degree	7.5	1.47	0.00

The table reveals the sample consistency, as the skew ness was restricted between I 3 which indicated that the distribution of these variables was moderate.

Tools for collecting data:

a) Anthropometric tools:

- Rest meter to measure the height & Medical balance to measure the weight.

b) Tools used in taking pictures:

-video camera Panasonic 5 cadre/ second and video cassette tape model VHS.

c) Measuring the noise:

- preparing a CD recording of the public encouraging the players, music and applauding.
- control the increase of the sound intensity by the sound system device.
- using a sound level meter model 407735 EXTECM INATRUDNENT.
- Device to measure the sound intensity.

The measuring process was done by Dr.Adel Zakaria at the Institute of Research and Vocational Health, Alexandria University.

- Each player performed a trial and the noise level was measured at each of the three levels by taking photos with the video camera. Table 2 represents the noise levels of each player.

Table 2 Noise Levels

N	Levels Noise players	Without Noise (db)	High Noise (db)	Sudden Noise (db)
1	First player	54-58	85-89	66-86
2	Player Second	62	87-89	65-86
4	Player Third	59-61	86-89	66-89
5	Player Fourth	59-64	86-90	66-89

d) Evaluating the performance level of the skill in question:

Players were evaluated by four judges certified by the Egyptian Gymnastic Federation.

The Basic study:

The basic study was conducted on 16/1/2011 in the gym of the Faculty of Physical Education for Girls in Alexandria, as follows:

- 1- Take photos with video from the lateral level of the given skill and at the same time the noise level was measured.
- 2- Evaluate the performance level of the skill by the judges.
- 3- Movement analysis of the performance of each play trial of each of the three levels of noise by a motion track programmer to analyze the skill in question. The programmer was standardized by "SHORI" company of technology to assure the validity of the operation.

The biomechanical variable was extracted (sum of displacement)* from which the level of movement floats can be stimulated. The reason this biomechanical variable was chosen (sum displacement) was that the sequence of movements could not be defined without this trajectory which was made by this sum displacement of the body sectors (head and trunk-right arm-left arm-right leg – left leg- body center of gravity).

The statistical treatment:

To achieve the research objectives the following statistical treatments were used:

(- Means - Movement flow level - Standard deviation- Skew ness - Coefficient correlation)

Results and discussion:

Results and discussion were shown by collecting data and statistical treatment of the body groups (body center of gravity- right arm- left arm - right leg – left leg – head and trunk) as they were considered the effective joints in performing the skill.

Table 3 Sum of the Displacement Variable of Body Groups Gathered at the Moments through Movement Stages of the first Player at the Different Noise Levels

Skill	Skillful Performance Stage	The time of moments during movement stages	Cadre Number	Without noise	High noise	Sudden noise
Open leap	Preliminary stage	Moment of starting performance	2 <- 1	2.542	3.271	0.333-
		Moment of maximum knee bent before swinging	7 <- 6	1.541-	0.960-	3.543
		Front swinging of the free leg at 45 degree angle and straight	10 <- 9	2.764	2.014	4.327
	Basic stage	Take off with after alternating back swing of the free leg	11 <- 10	5.176	1.677-	3.880
		Reaching moment of 180 degree position in crossing position	12 <- 11	2.258-	1.183-	3.163
	Final stage	Landing moment on the front leg	18 <- 17	1.311-	3.690	0.826-
		Landing on the front leg then the back leg balanced	19 <- 18	5.882	4.994	1.276-
Connection	Connection moment	Final moment of landing stage and beginning of jumping with two feet	20 <- 19	1.051-	4.922	3.606
			21 <- 20	3.365	0.923	3.867
			22 <- 21	0.611	0.969-	3.785
			24 <- 23	1.171-	0.833-	5.023
Woolf jump	Preliminary stage	Moment of start jumping with two feet	30 <- 29	1.809-	4.902	1.346-
	Basic stage	One leg bent with knees together and buttock angle is at 45 degree angle	33 <- 32	1.916-	0.566	3.577
	Final stage	Landing with two feet and balanced	39 <- 38	1.032-	2.163	5.736
			46 <- 45			1.663
Level of movement flow				%92.31	%89.13	%74.36

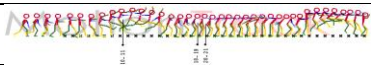
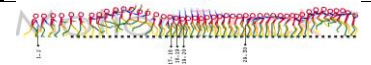
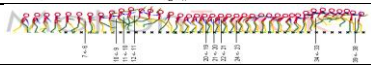
Limitation moments during the movement stages of the first player	Noise levels
	Without noise
	High noise
	Sudden noise

Figure 1 Limitation moments during the movement stages of the first player.

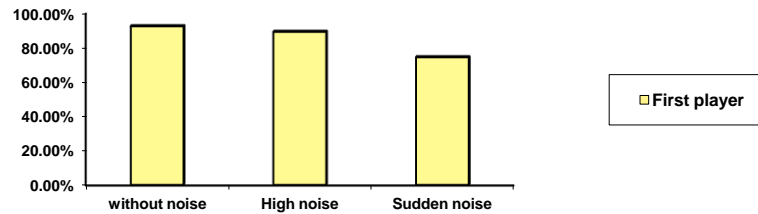


Figure 2 Flow level of the first player in three levels of the noise.

Table 4 Sum of the Displacement Variable of Body Groups Gathered at the Moments through Movement Stages of the Second Player in the Different Noise Levels

Skill	Skillful performance stages	The time of moments during movement stages	Cadre Number	Without noise	High noise	Sudden noise
Open leap	Preliminary stage	Front swinging of the free leg at 45 degree angle and straight	8 <- 7	0.300-	1.372-	4.751
			9 <- 8	3.111	1.883	1.641
		Take off with after alternating back swing of the free leg	10 <- 9	3.857	3.272	0.906-
	Basic stage	Reaching moment at 180 degree position at crossing position	12 <- 11	1.809-	1.696	3.314
	Final stage	Landing moment on the front leg	19 <- 18	1.838-	0.564-	3.010
		Landing on the front leg then the back leg with balance	20 <- 19	0.354	1.852-	4.410
Connection	Connection moment	Final moment of landing stage and beginning of jumping with two feet	21 <- 20	1.130	0.086	2.213
			21 <- 20			
			22 <- 21	0.508	0.782	1.644-
Woolf jump	Preliminary stage	Moment of start jumping with Two feet	23 <- 22	3.038-	-3.052	0.091-
	Basic stage	One leg bent with knees together and buttock angle is at 45 degree angle	25 <- 24	0.183-	1.331	3.373
			29 <- 28	0.269-	-3.578	2.048-
	Final stage	Landing with two feet and balanced	35 <- 34	0.158-	-3.274	0.276
			42 <- 41			1.576
	Level of movement flow			%82.86	%88.57	%92.85




Limitation moments during the movement stages of the second player	Noise levels
	Without noise
	High noise
	Sudden noise

Figure 3 Limitation moments during the movement stages of (the Second player).

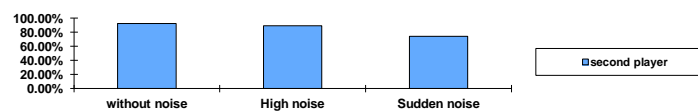


Figure 4 Flow Level of the Second player in three levels of the noise

Table 5 Sum of the Displacement Variable of Body Groups Gathered at the Moments through Movement Stages of the third Player in the Different Noise Levels

Skill	Skillful performance stages	The time of moments during movement stages	Cadre Number	Without noise	High noise	Sudden noise
Open leap	Preliminary stage	Front swinging of the free leg at 45 degree angle and straight	5 <- 4	3.370	2.888	0.755
			12 <- 11	1.045-	1.692-	3.695
	Basic stage	Take off with after alternating back swing of the free leg	13 <- 12	1.577-	5.940	3.094
		Reaching moment at 180 degree position at crossing position	18 <- 17	1.744	0.178-	5.692
		Landing moment on the front leg	19 <- 18	5.064	1.329-	5.563
		Landing on the front leg then the back leg with balance	20 <- 19	1.537-	3.949	1.585
Connection	Connection moment	Final moment of landing stage and beginning of jumping with two feet	21 <- 20	5.365	5.411	2.125-
			22 <- 21	4.229	5.782	2.296-
Woolf jump	Preliminary stage	Moment of start jumping with two feet	23 <- 22	1.352	5.723	1.637
	Basic stage	One leg bent with knees together and buttock angle is at 45 degrees	26 <- 25	0.798-	0.346	4.856
			27 <- 26	1.828-	0.986	3.174

	Final stage	Landing with two feet balanced	36 <- 35	1.192		5.018
			40 <- 39	0.738-		
	Level of movement flow			%90	%85.71	%81.58

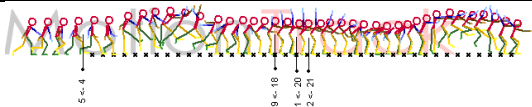
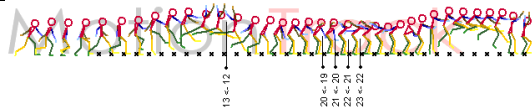
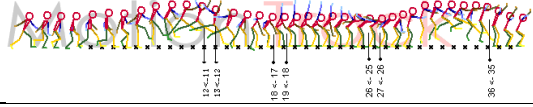
Limitation moments during the movement stages of the Third player	Noise levels
	Without noise
	High noise
	Sudden noise

Figure 5 Limitation moments during the movement stages of (the Third player)

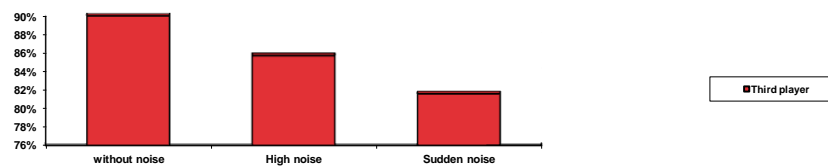


Figure 6 Flow level of the Third player in three levels of the noise.

Table 6 Sum of the Displacement Variable of Body Groups Gathered at the Moments through Movement Stages of the fourth Player in the Different Noise Levels

Skill	Skillful performance stages	The time of moments during movement stages	Cadre Number	Without noise	High noise	Sudden noise
Open leap	Final stage	Landing moment on the front leg	17 <- 16	4.644	2.768-	1.808-
		Landing on the front leg then the back leg with balance	18 <- 17	0.798	1.367-	2.739
			19 <- 18	1.761-	1.629	5.885
Connection	Connection moment	Final moment of landing stage and beginning of jumping with two feet	23 <- 22	1.362	1.179	3.512
Woolf jump	Preliminary stage	Moment of start jumping with two feet	31 <- 30	1.980-	1.840-	3.250
	Basic stage	Bent one leg with knees together and buttock angle at 45 degrees	32 <- 31	1.506-	3.013	3.625
			33 <- 32	3.503	0.253	0.141-
			34 <- 33		0.063-	5.666
			35 <- 34		3.722	1.823
	Final stage	Landing with two feet and balance	37 <- 36		0.816-	4.374
			38 <- 37		1.392-	3.262
			39 <- 38		5.208	1.767-
			48 <- 47			0.065-
	Level of movement flow			%93.93	%92.30	%85.41

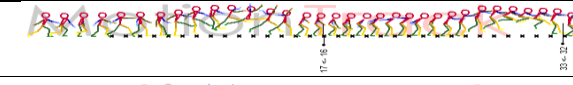
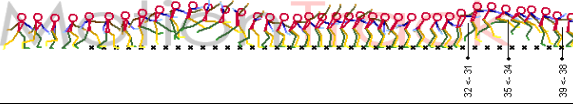
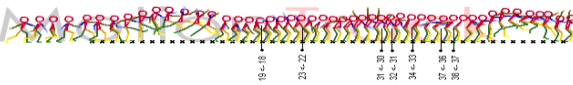
Limitation moments during the movement stages of the Fourth player	Noise levels
	Without noise
	High noise
	Sudden noise

Figure 7 Limitation moments during the movement stages of (the Fourth player)

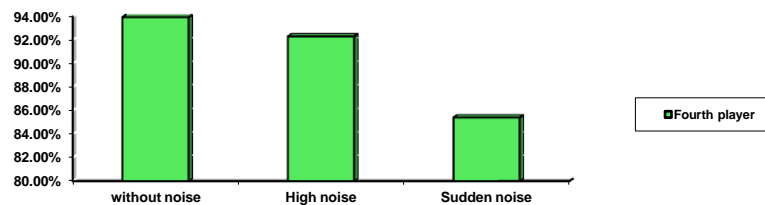


Figure 8 Flow level of the Fourth player in three levels of the noise

It was revealed from tables 3,4,5,6 and figures 1,2,3,4,5,6,7,8 and from the flattened coefficient of the body groups (body center of gravity- right arm – left arm –right leg – left leg – head and trunk) during the moments of the movement stages, that there were a number of moments which limited the flow of movement at varying degrees of intensity in terms of noise level as follows:

The first player (92.31% without noise), (89.13% high noise) and (74.36% sudden noise).

The second player (92.85% without noise), (88.57% high noise) and (82.86 %sudden noise)

The Third player (90%without noise), (85.71% high noise) and (81.58 %sudden noise)

The Fourth player (93.93% without noise), (92.30% high noise) and (85.41 %sudden noise)

As these amounts were calculated as following:

Movement flow level = (total of cadres – limitation cadres) / total cadres) x 100, i-e.

The ratio of the correct moments to the total of the movement moments.

Table7 Degree of Evaluating the Level of Performance with Regard to the Sequence of Movements for the Given Skill Flow of the Sample at the Different Noise Levels (n=4)

No	player	Without noise		High noise		Sudden noise	
		the skillful performance level	movement flow level%	the skillful performance level	movement flow level%	the skillful performance level	movement flow level%
1	first player	8.5	92.31%	7.2	89.13%	6.0	74.36%
2	second player	7.8	92.85%	7.5	88.57%	6.3	82.86%
3	Third player	7.5	90.00%	7.0	85.71%	6.2	81.58%
4	Fourth player	9.0	93.93%	7.5	92.30%	6.7	85.41%

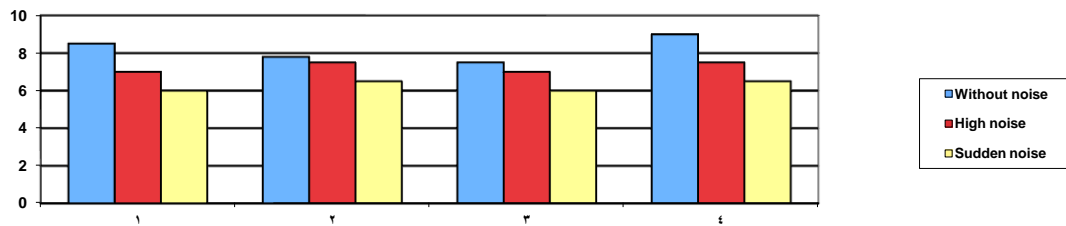


Figure 9 the Performance level of the given skill at the different noise levels for the sample.

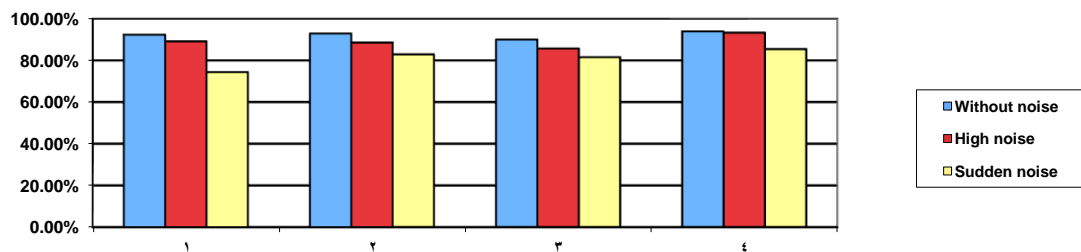


Figure 10 Movement flow level at the different noise levels of the sample.

Table 7 revealed the raw scores of the performance level and the movement flow level of the sample at the different levels of the noise intensity, figure 9,10 revealed the difference aspects between the subjects regarding study of variables in question.

Table 8 Correlation Coefficient between the Movement Flow and the Performance Level of the Skill in Question for the Sample at the Different Noise Levels (n=4)

No.	Noise Level	Movement Flow		Skillful performance level		Coefficient correlation	Significance
		-x	y	-x	y		
1	Without noise	92.27	3.84	8.2	1.80	1.00	Significant
2	High noise	80.93	5.05	7.25	0.59	0.893	Significant
3	Sudden noise	81.05	6.73	6.25	0.48	0.924	Significant

(p =0.05), (r =0.861)

It is clear from table 8 that there is a correlation between the movement flow and the skillful performance level in the without noise level (1.00), while 0.893 for high noise and 0.924 for sudden noise. It was concluded that the fluidity of movements and the performance level were influenced greatly by the noise at different degrees since the sudden noise affected the players more adversely than the high noise. Also, the performance on the balance beam was influenced by the noise surrounding the players inside the gym, which caused us to ask the audience to be quiet while the players mounted the players adjusted to the gymnastic piece of equipment, and the balance beam in particular. It was concluded that the movement flow and the performance level were influenced greatly by the noise at different degrees since the sudden noise affected the players much more so than the high noise. Also, the performance on the

balance beam was influenced by the noise experienced by the players inside the gym, which provoked to ask the audience to be quiet while the players mounted the gymnastic apparatus and the balance beam in particular.

Results and recommendations:

- Different noise levels affect the progression of movements.
- Different noise levels affect the performance level of the observed skill
- The sequence of movements and the performance level of the given skill were influenced by different noise levels.
- The researcher recommends beginning with the ground movement music before the players mount the balance beam so as the player can get used to this level of sound noise especially since the sudden noise affects the technical performance level and movement flow of the players. This observation depends on the individual differences among the players and they respond to this outside noise.
- Trainers should make use of outside sound noise while the players train on the balance beam so the player will not be affected by this stimulus during local and international championships.
- Trainers should depend on the motor analysis of the difficult skills to know the level of movement flow in performing these skills.

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Kinematics Differences of Push and Landing Stages of Yurchenko With a Two and a Half Twisting Layout on a Vault Horse with Its Counterpart on the Floor Exercise Apparatus

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Maha Ameen & Soha Abed-el-Aal, Alexandria University

Abstract

The purpose of this study was to know the kinematic differences and values of the push and landing stages of the Yurchenko with a two and a half twisting layout on a vault horse. These very same skills are looked at, but on the floor exercise apparatus. The researchers used the descriptive method based on biomechanical analysis by using the computer as it is suitable for this research. The sample was deliberately chosen because the Chinese female gymnast is an elite performer at both the international and Olympic levels having won gold at several competitions. She finished in the top eight at the 2008 Olympics on both the vault and floor exercise apparatus with the same degree of efficiency for both routines. The important results include the fact that the total time to perform the skill on the vaulting apparatus was (2.2 seconds) and the series of movements on the floor took 0.94 seconds more to complete than its counterpart. During the pushing stage on the vault the angle of the shoulder was close to being at a 90-degree angle, while for the floor it was the leg which was close to being at a 90 degree angle. This is the optimum angle that enables the gymnast to achieve the full range of the second flight.

Introduction

Great developments have happened in gymnastics concerning the performance of sophisticated skills on the different apparatus and the vaulting table. It first made its appearance at the world championships in Ghent. (BEL) (2001). There appears to be a noticeable difference as far as skills performed on the vault horse as opposed to skills on the vault table. The results obtained from performances on the vaulting table further confirmed its effect. For example, there were some very complex skills performed that resulted in perfect scores due in large part to the development of this apparatus' safety since there was a reduction in the number of injuries when player performed the Yurchenko Vault which consists of a round-off onto the vaulting board and flic-flac onto the vaulting table. Then, the player performs the Salto backward, which may range in difficulty from a simple tuck to a triple twist layout before landing with his feet on the ground. Before the advent of the vault table, gymnasts ran a great risk of missing their landing when attempting to place their hands on the vault horse because of its faulty design. (13)

The researchers made several observations while watching the Olympic Games in Beijing in 2008 on each of the apparatus. According to their results, the following was noticed:

The repeating of the acrobatic chain consists of a round off flic-flac salto backward layout. This acrobatic chain on the floor exercise apparatus was done by 100% of the girls with different difficulties and on the vaulting table it was done by 75% of the girls also with different difficulties. The compound acrobatic chain on the vaulting table is referred to as the Yurchenko Vault. It is included as part of the fourth vaulting table group for girls according to the classification of the technical committee of the International Gymnastics Federation. The fourth group is considered to be the most important and the most popular in the competition and it is the starting value, (4.4), in the progression of movements. In addition, the mastering of the Yurchenko Vault serves as a baseline in developing a sequence of movements progressing in

terms of the degree of difficulty until the starting value becomes (6.5). Also, the performance value of 10 points is added to this starting value of 6.5 points. The performance value is evaluated and points can be deducted due to mistakes regarding technique and form according to the International Code of Points for Women's Artistic Gymnastics. (7)

According to a review of references and scientific research, the researchers have not found any research that deals with the kinematic differences regarding the pushing and the landing stages of the Yurchenko with a 2 ½ twisting layout. The Yurchenko Vault will be referred to as (YV) while its counterpart on the floor exercise apparatus will be known as (RFSBTL). Of particular interest are the kinematic differences and the ideal value of the body joints through pushing and landing stages when performing (YV) and its counterpart (RFSBTL), in order to provide enough information about some biomechanical variables concerning the stages when performing them.

Therefore the purpose of this study was to know the following:

- 1- The kinematic differences of the pushing and landing stages of (YV) on vaulting table and its counterpart (RFSBTL) on the floor exercise apparatus.
- 2- The ideal value of the pushing and landing angles to perform (YV) on vaulting table and its counterpart (RFSBTL) on the floor exercise apparatus.

The Hypotheses:

- 1-There are differences in the kinematic parameters of pushing and landing stages of (YV) on the vaulting table and its counterpart (RFSBTL) on the floor exercise apparatus.
- 2-There are differences between the ideal values of the pushing and landing angles to perform (YV) on the vaulting table and its counterpart (RFSBTL) on the floor exercise apparatus.

The procedures:

Method:

The descriptive method was used based on the biomechanical analysis by using the computer.

The sample:

- The sample was intentionally chosen and it was one female player, Cheng Fei, from China who participated in the Olympic Games in Beijing "2008" and obtained the highest score in the final best 8 on the vaulting table (16.075) and she obtained the bronze medal, while on the floor exercise she finished seventh.
- She performed the given skill with the same efficiency on both apparatus: the vaulting table and the floor exercise.(11)

The sample main variables:

Table 1 the Main Variables of the Player

Height	Weight	age
152 cm	43 kg	20 years

Tools for collecting data:

- A CD including data collection with a recording of the two skills from the Olympic Games in Beijing (2008) - that CD used to complete the 2D analysis

The following steps have been used to complete the biomechanical analysis using win analysis - 2D program with a frequency of 26 frames / sec for both skills.

- Set the scale in order to refer data to a fixed scale and the process is called linear seizing which makes possible the defining of any fixed thing e.g. a player's height.
- Bernstein body model was chosen, designed and set according to the real form on the player's body in the first frame and the body parts of the left side of the model were eliminated given that the motor performance of the two skills for both the left and right side were identical. The model includes the markers of the following points: (right toe - right heel - right knee-right hip-right shoulder-right hand-right elbow -right wrist -head-COM of Bernstein)
- Trackers placed on the body of the player during her performance of both skills.
- Performance recorded frame by frame to assure that the markers are placed correctly on the body.

From the above procedures and the results of the biomechanical analysis and from the relevant studies, the researchers' intention was to classify the two skills technically from the biomechanical perspective to study easily the variables of the two skills. The two skills under observation included the following:

Preliminary stage: Includes the performance of a round off where either the feet land on the vaulting board regarding (YV) or on the floor when performing the acrobatic chain (RFSBTL) on the floor exercise apparatus. It starts at the frame of contact when the left foot lands on the ground after a running approach and finishes at the first frame when the feet touch the ground on the floor exercise apparatus.

Notice: A comparison between the two skills was done from the beginning of the preparation when the right hand touched the ground with the intention of pushing it because the form of movement matches both sides of the body. The right side is facing the camera to complete the analysis process. In this stage the following will be studied:

- Pushing stage in the round off (hand pushing): [Shoulder angle when pushing the ground: was defined as the angle between the humerus and the trunk; thigh angle: was defined as the angle between the thigh and trunk; COM angle was defined as the angle between the horizontal line and the line passing through the COM and the right toe. The value of the body's angle expressed in degrees was reported in table 3.
- Landing stage from round off: [the angle of the COM at the moment of feet landing on the vaulting board or on the ground, thigh angle, and shoulder angle].
- Angular velocity of the COM during this stage.
- COM resulting Impulse of this stage.
- Time of the stage.

Main stage: It starts from the first frame when the trunk returns back after landing from the round off and prepares the feet to push the vaulting board in (YV) or when the first frame of the trunk retires back after landing from the round off and prepares the feet to push the ground to start the flic-flac when performing the acrobatic chain (RFSBTL). On the floor exercise apparatus, it continues until the first frame touches the player's feet to the ground at the beginning of the final stage. Inside this stage, there are the following:

1-Take-off: Starts from the first frame of returning the trunk back after landing with two feet on the vaulting board from the round off and prepares the feet to push the vaulting board in (YV) and end the frame before breaking the connection with the vaulting board .

2- The first fly: After pushing is made and contact is broken with the vaulting board in (YV), the player performs the flic-flac (the first fly) and finishes the flic - flac on the first frame when touching the vaulting table surface with hands.

3- Support and pushing with hands: Starts from the first frame when touching the vaulting table surface with hands (end of the flic-flac) and ends in the frame before breaking the connection with hands with the vaulting table frame and the pushes to start the second fly (performing the salto backward layout).

Notice: Concerning the performance of the acrobatic chain of (RFSBTL) on the floor exercise apparatus it was found that after landing with feet on the ground from the round off and the push is done (take-off) to perform the flic-flac, there will be the following:

-First fly (a): Starts from the frame of breaking the connection of the feet with the ground after pushing (take-off) to start performing the flic-flac skill and ending on the first frame of landing hands on the ground.

- Support and push with hands: Starts from the frame of breaking the hand connection with the ground after pushing (middle of the flic-flac) and ending in the frame before the frame of breaking the hand connection with the ground and the push to start the first fly (b).

-First fly (b): Starts from the frame of breaking the c hand connection with the ground after the push (middle of the flic-flac) and continues until the frame before touching the feet to the ground again preparing for the pushing position to start the support and pushing with feet.

-Support and pushing with feet (take- off): Starts from the first frame of returning the trunk back after landing from the flic-flac and preparing for pushing the ground with the feet and ending in the frame before the frame of breaking the connection of the feet with the ground and pushing to perform the second fly (performing the salto backward layout) . This section will be compared with support and pushing with hand section when performing the skill on the vaulting table as both of them lead to the second fly.

4-The second fly: Starts at the first frame of breaking the connection of the hands to the vaulting table and the start of performing the salto backward layout in (YV) and continues until the frame before touching the feet to the ground surface.

-The second fly for the acrobatic chain (RFSBTL): starts at the first frame of breaking the connection of the feet to the ground and the beginning of performing the salto backward layout and continues until the frame before touching the feet to the ground surface and goes to start off the final stage. In this stage the following will be studied:

- Take – off (pushing stage and beginning of the first fly) in (YV) :- Angels of (COM, shoulder , thigh) at the moment that the feet push the vaulting board when performing the flic – flac on the vaulting table.
- (pushing stage and begging of the first fly (A) in (RFSBTL): Angels of (COM, shoulder ,thigh) at the moment that the feet push the ground when performing the flic -flac on the floor.
- Support the hands (stage of landing the hands) in (YV) : - Angels of (COM, shoulder ,thigh) at the moment that the hands on the vaulting table when performing the flic –flac.
- Foot support (feet landing stage) in (RFSBTL) :- Angels of (COM, thigh, shoulder) at the moment the feet land on the ground when performing the flic-flac on the ground.
- Pushing stage and going for the second fly: - Angels of (COM, shoulder , thigh) in (YV) at the moment that the shoulder pushes the vaulting table to start salto back ward with a two and a half twisting layout.
 - Angels of (COM, shoulder, thigh) in (RFSBTL) at the moment that the feet push the ground to start salto back ward with a two and a half twisting layout).

- Angular velocity of the COM during this stage.
- COM resulting Impulse of this stage, and Time of the stage.

The final stage: Starts with feet touching the ground and ending with knees stretching and arms raising up; in this stage the following will be studied:

- Landing stage: Angles of (COM, thigh, shoulder) at the moment the feet land on the ground.
- Angular velocity of the COM during this stage.
- COM resulting Impulse of this stage, and Time of the stage.

A comparison will be done between the results of the previous variables for (YV) and (RFSBTL).

The Results

Table 2 the Percent of the Time of Performing the Two Skills of Study

The 2 skills of the study		Preliminary stage	Main stage	Final stage
		Round off	Flic - Flac + Salto back word with a two and a half twisting layout	Landing of Salto back word with a two and a half twisting layout
(YV)	Frames	16:1	51:16	56:51
	Time (sec)	0.60	1.40	0.20
	%	27.27%	63.64%	9.09%
(RFSBTL)	Frames	16:1	55:16	55:64
	Time (sec)	0.60	1.56	0.36
	%	23.81%	61.91%	14.28%

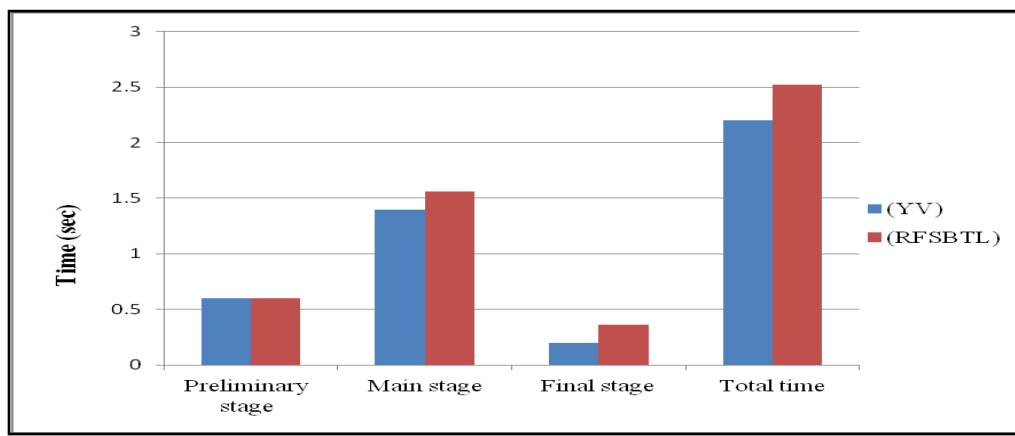


Figure 1 the Percent of the time (sec) of performing the two skills of study

Table (2) and Figure (1) revealed that the time structure of the two skills is almost the same,

as the total time of (RFSBTL) (2.25 sec) with an increase of (0.32 sec) in comparison to the total Time of performing (YV) vault (2.20 sec) concerning the time of performance stages. The time of the preliminary stage (round off) was identical for both (0.16 sec). For the main stage (Flic-flac + salto backward with two and a half twisting layout) the time increased in the acrobatic chain (RFSBTL) to the time in (YV) vault in the same stage, with (0.16 sec). Also the time of the final stage (landing of salto backward with two and half twisting layout) in the acrobatic chain (RFSBTL) to the time (YV) vault in the same stage was (0.16 sec).

Table 3 Joints and COM Angles of the Selected Moments of the Two Skills in the Study

Stage	(YV)						(RFSBTL)					
	Selected moment	Frames	T	Shoulder Angle	Thigh Angle	COM Angle	selected moment	Frames	T	Shoulder Angle	Thigh Angle	COM Angle
Preliminary stage	Pushing with hands	9	0.32	157	164	65	Pushing with hands	10	0.36	151	151	57
	Feet landing on vaulting board and the end of the round off	16	0.6	150	120	57	Feet landing on the ground and the end of round off	16	0.6	132	90	68
Main stage	(Take-off) pushing with feet to start the flic-flac	19	0.72	171	171	86	Pushing with feet to the start of flic-flac	18	0.68	151	126	95
	Hand landing to support on the vaulting board	22	0.84	175	197	156	Feet landing to support on the ground	31	1.2	155	135	65
	Hand pushing to the vaulting board to start Salto backward	27	1.04	148	174	88	(Take-off) Pushing feet to the ground to start Salto backward	33	1.28	165	190	88

Final stage	Feet landing on the ground to the end of the salto backward	51	2.00	70	132	105	Feet landing on the ground to finish the salto backward	55	2.16	55	143	103
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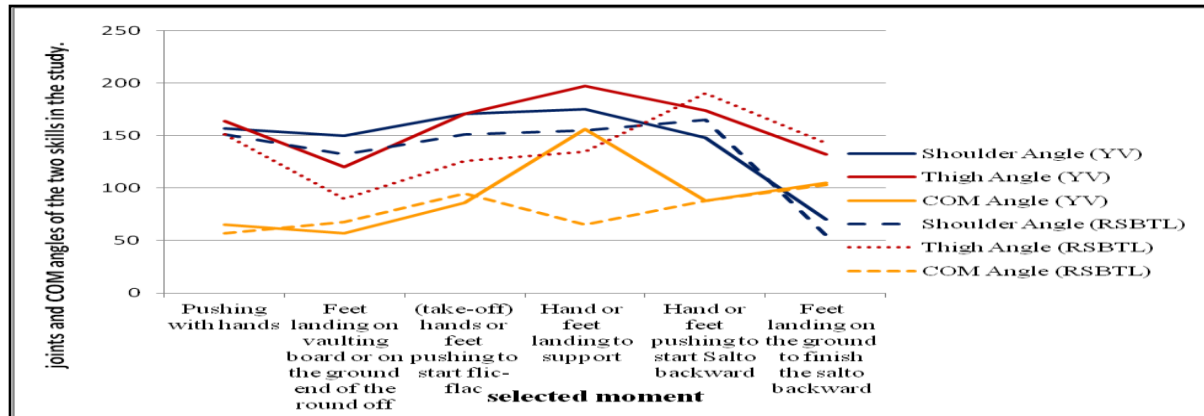


Figure 2 Joints and COM angles of the selected moments of the two skills in the study.

Table (3) and figure (2) revealed that selected body angle values were approximate in frame (9) and frame (10) in the preliminary stage, frame(51) and frame(55) in the final stage. Also COM angles in each of frame (16) (YV) and frame (16) (RFSBTL). Also, COM angles in frame (19) and frame (18). Kinematics analysis results revealed that they were identical in the angle values of COM in the frame (27) and frame (33) as the angle value for each was (88 degrees).

- There were significant differences in the angle values of shoulder and thigh for each of frame (16) (YV) and frame (16) (RFSBTL) and in all the selected moments in the main stage.
- There was also a significant difference between the values of each of the COM angles in frame (22) as the value was (156 degrees), the value of COM angle in frame (31) was (65 degrees).

selected moment	Pushing with hands	Feet landing on the vaulting board or on the ground	(take-off) hands or feet pushing to start Flic-flac	Hands landing to support on vaulting table or feet landing on the ground	Hands pushing to the vaulting table or pushing feet to ground	Feet landing on the ground to end Salto backward
Angular Velocity (YV)	-1.934	5.460	2.844	2.048	1.024	-2.275
Angular Velocity (RFSBTL)	-1.820	2.503	2.616	3.185	3.868	-4.664

Table 4 Average Angular Velocity of COM at the Selected Moments of the Two Skills

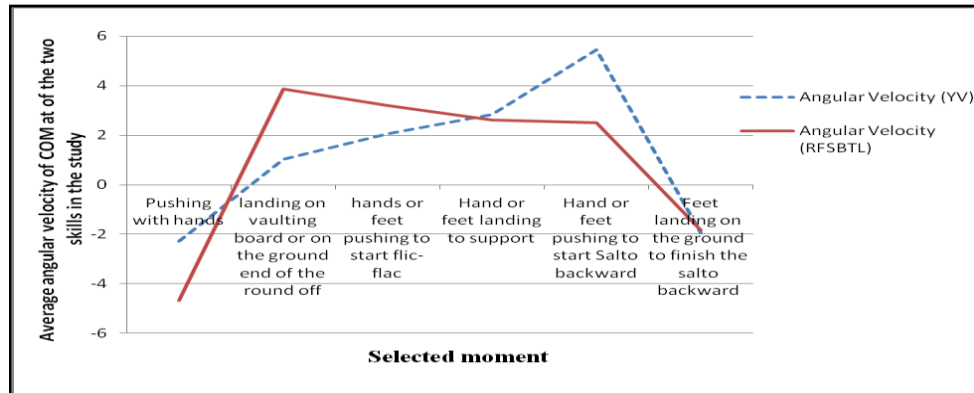


Figure 3 Average angular velocity of COM in the selected moments of the two skills in the study

Table (4) and figure (3) revealed that there is an approximation in the average angular velocity of COM at the moment of feet landing on the ground at the end of the flic-flac (RFSBTL) and the moment of hands landing to support on the vaulting table at the end of the flic-flac (YV). Although the two moments of feet landing on the ground from the Salto backward in the final stage of both (YV) and (RFSBTL). The value of the average angular velocity was varied in all other moments as it was the highest positive value of the average angular velocity of COM in (YV) vault at the moment of hands pushing the vaulting table, while the high positive value of the average angular velocity of COM in (RFSBTL) at the moment of feet landing on the ground at the end of the round off. While the highest negative value of the average angular velocity of COM for each of (YV) and (RFSBTL) at the moment of hands pushing to the ground at the end of round off.

Also the least positive value of the average angular velocity of COM in (YV) vaulted at the moment of feet landing on the vaulting board at the end of the round off, while the least positive value of the average angular velocity of COM in the acrobatic chain (RFSBTL) at the moment of the feet pushing the ground to perform Salto backward.

Table 5 COM Resulting Impulse at the Selected Moments of the Two Skills in the Study

Selected moments	Pushing With hands	Feet landing on vaulting table or on the ground	(take-off) hands or feet pushing to start flic-flac	Hands landing to support on vaulting table or feet landing on ground	Hand Pushing to the vaulting table or pushing feet to ground	Feet landing on the ground in the end of the Salto backward
Impulse of (COM)(YV)	23.112	9.379	27.094	13.032	16.026	24.521
Impulse of (COM) (RFSBTL)	27.445	6.14	17.334	29.178	45.802	24.179

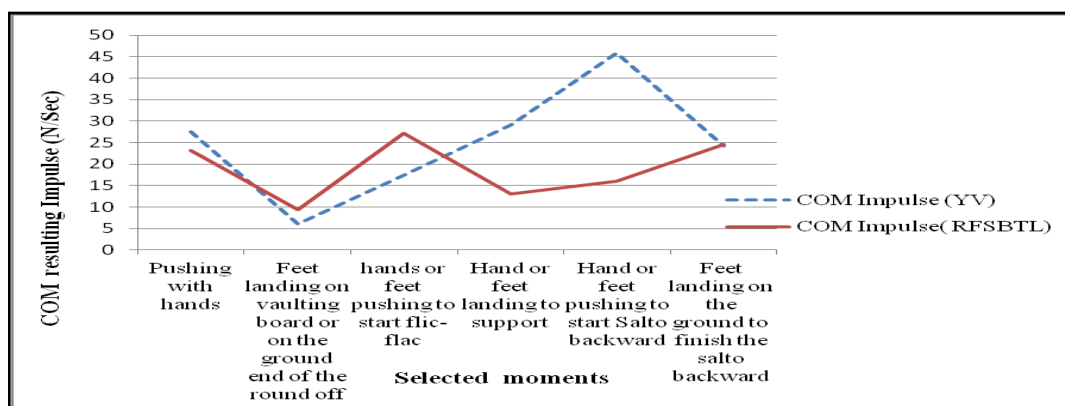


Figure (4) COM Resulting impulse at the selected moments of the two skills in the study

Table (5) and figure (4) revealed that there is a similarity in the resulting impulse value at the two moments of hand pushing in the round off for both (YV) and (RFSBTL). Also there was a similarity in the resulting impulse value at the moment of feet landing on the ground and feet landing on the vaulting board at the end of the round off for both (YV) and (RFSBTL). Also, there was a similarity in the resulting impulse value at the two moments of feet landing on the ground to the end of the Salto backward for both (YV) and (RFSBTL).

-There was a significant difference in the resulting impulse value for both (YV) (RFSBTL). At all the other selected moments as the value maximum resulting impulse at the moment of feet pushing to vaulting board in (YV), while the resulting impulse reached to its maximum value at the moment of feet pushing to the ground to the start Salto backward of (RFSBTL).

Discussion

Motor analysis results of the two skills in the study revealed that the time of the preliminary stage was identical and the number of the frames for each skill in this stage was the same. Reduction of the time is considered logical and in accordance with the nature of performance in this stage. As the player performs a whip movement through swinging legs with high speed to transfer COM outside of the balance base. This is being emphasized from the resulting impulse values at frame (9) of (YV) and frame (10) of (RFSBTL). Also, it was noticed there was an increase in the main stage time of (RFSBTL) from the time of the main stage of (YV) (0.16 sec.). This difference was due to that the (RFSBTL) contains a first fly part (B) as was mentioned before and this part takes 4 frames, and the time period between the frames was (0.04sec.). Accordingly, the total time difference in this stage was (0.16 sec.)

-It was noticed, also that there was a difference (0.16sec) in the final stage time of (RFSBTL). It was demonstrated the moor analysis where the player emphasized fixing her landing with a pause in the landing frame which elongated the time period of this stage in the (RFSBTL).

- Also in the preliminary stage at frame (16) the COM angle of (YV) at this moment was (56 degree angle)and its value in (RFSBTL) was (68 degrees angle) and this frame occurs body joint flexion then breaks until landing on vaulting board or on the ground at the end of the round off. This is in accordance with the nature of performing this moment of the two skills.

-It was also clear from the stick figures produced from the analysis that the higher value of shoulder angle, thigh angle, COM angle of the (YV) at frame (22) .The differences of these angle values were significant compared to the same angles at the same moment in (RFSBTL). This was

due to the arc or semi-circular form of the body during the first fly in the flic-flac as the shoulder angle is flexed and thigh angle is extended, i.e. entering to the vaulting table with a large body angle which led to maintaining the acquired angular velocity from the former stage and also to make the vault performance a successful one. The angular velocity at that moment was (2.844 radius degree/ sec.) while the motor performance form and its nature in (RFSBTL) at that moment where the support on feet and COM in front of the feet. Therefore the value of this angle at that moment was small compared to the COM angle in (YV) vault. Also, the angular velocity value was reduced at that moment because the whole body was stretched straight.

-Kinematics analysis results, also, revealed an identical value in COM angle at frame (27) in (YV) and frame (33) in (RFSBTL). The value of each was (88 degrees). This value is considered ideal for the release to achieve the largest capacity in the second fly to achieve the motor duty that allows for a stable landing in the final stage. The researchers refer to the increase in the angular velocity at frame (27) to the extension of the shoulder angle and the flexing of the thigh angle that led to the increase in the average angular velocity of the COM during those moments. Also, at frame (33) in (RSBTL), COM was located behind the feet and to the side and the upper body leads the rotation in an opposite side of pushing the feet to the ground.

-Kinematics analysis results, also revealed that the highest value of resulting impulse of (YV) at the moment of feet pushing vaulting board. Landing the feet on the vaulting board generates a great reaction force from the board which increases the resulting impulse value at that moment compared to the same moment of (RFSBTL). While resulting impulse value at the moment of hand pushing to the vaulting table in the (YV) was less than its counterpart in the (RFSBTL) at the moment of feet pushing the ground), this is logical as the result of the difference in the muscular strength between arms and legs muscles.

Recommendations

-Applying the same vault to elite players in addition to studying the performed Salto backward with all its degrees of difficulties but through 3D analysis to discover more information and facts to help the trainers and players to improve their technical levels to pursue the highest levels of players in the developed countries.

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The Effect of Training Using a Sand Playground to Improve Some Physical Fitness Components and Physiological Responses For Soccer Players

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This study aimed to identify the effect of training using a sand playground to improve some physical fitness components and physiological responses of soccer players. The researchers used the experimental method by using the experimental design for the two groups, one experimental (apply content of the physical preparation inside the sand playground), and another control group (apply content the physical preparation inside a soccer playground). This study was conducted on a sample of 22 players from the Arab contractors club (players under 21 years old). The implementation of the study took 12 weeks and included 3 training sessions per the week. The researchers used the power test, speed, agility, and co-ordination to determine the level of fitness. To measure the level of physiological responses, the following measurements occurred - maximum oxygen consumption of absolute and relative (VO_2) (VO_2/Kg), the production rate of carbon dioxide (VCO_2), ventilation in liters (VE), the rate of oxygen consumption Balumblyltr with each pulse of a heartbeat (O_2 PLUS), breath frequency per minute (BF). Data analysis was assisted by using the SPSS program for statistical analysis. Results found that there were significant differences between the two experimental and control groups on some of the physical fitness components and physiological responses of soccer players. It is recommended to use a sand playground during the preparation period for soccer players.

Introduction and research problem

The physical preparation of a soccer player means in its simplest form to give the player elements of physical fitness, and skills and tactical preparation. This depends primarily on the preparation of the player physically that largely determines the efficiency of his performance, regardless of the skill of the player. The sports training from the standpoint of biological is the status of the body's vitals under the influence of physical loads leads to physiological changes resulting in increased efficiency of the body and its ability to adapt and meet the physiological and physical requirements depending on the type of physical activity practice. The human body is considered a biologically complex structured organ, and this in turn leads to changes that occur in the respiratory and circulatory system and these changes vary from one activity to another and according to the nature and form of performance. Herbert et al (1994), Fox & Mathews (1981) and Howley (1992) agreed on the importance of aerobic training in the improvement of some physiological responses in the form of the maximum consumption of oxygen and vital capacity of the lungs 'ventilation in liters' and breathes frequency per minute.

The aim of the research:

This research aims at identifying the " training effect using a sand playground to improve some components of physical fitness and physiological responses of soccer players through:

- 1- Identifying the effect of the part of physical preparation of the training sessions within the sand playground to improve some components of physical fitness and physiological responses of the soccer players.
- 2- Identifying the effect of the part of physical preparation of the training sessions within the soccer playground to improve some components of physical fitness and physiological responses of the soccer players.
- 3- Identifying the differences between the part of physical preparation of the training sessions inside the sand playground and soccer playground to improve some components of physical fitness and physiological responses of the soccer players.

The research Hypotheses:

- 1- There are significant differences between the prior and the post measurements for the post measurement of the experimental group in some components of physical fitness and physiological responses of the soccer players.
- 2- There are significant differences between the prior and the post measurements for the post measurement of the control group in some components of physical fitness and physiological responses of the soccer players.
- 3- There are significant differences between the two post measurements for control group in some components of physical fitness and physiological responses of the soccer players.

The research methods and procedures

The research Methodology:

Researchers used the experimental method using the experimental design for the two groups (one experimental (apply part of the physical preparation of the experimental program inside the sand playground), and another control group (apply part of the physical preparation of the traditional program inside a soccer playground)).

The society and the research sample:

The research society:

Research society was selected from the soccer players under 21 years old and registered in the Egyptian Federation season of 2010/2011.

The Sample:

The Sample was selected from 22 players in a deliberate way from the Arab contractors club players under 21 years old and registered in the Egyptian Federation season 2010/2011.

Data collection tools:

Devices used:

- 1 - A device for measuring the Cardio respiratory.
- 2 - A device for measuring height and weight.
- 3 - Dynamometer back and legs.

Physical tests used:

- 1 - Sprint 30 meters Test.
- 2 - threw a medical ball test 1 kg of the hands as far away as possible.
- 3 - Zigzag run Test.
- 4 - running 2 km Test.

Physiological measurements used: (Attachment 1)

- 1 - Production rate of carbon dioxide.
- 2 - Maximum oxygen consumption of absolute and relative.
- 3 - Ventilation in liters.
- 4 - The rate of oxygen consumption Balumblyltr with each pulse of a heartbeat.
- 5 - Breathe frequency per minute.

Rationing of the proposed training program:

- Implementation of the program for three months - 12 weeks.
- The proposed training program was applied in the period of preparation.
- Number of training sessions was 3 sessions per week.

The main study:**The prior measurements**

A prior measurement was performed on the whole sample in Stadium (3) Arab Contractors Club from 24\7\2010 to 26\7\2010.

Program application:

Physical preparation program was applied by using sand playground on the experimental group, the traditional training program was applied by using soccer playground in the period from 27\7\2010 to 19\10\2010

The post measurements:

The post measurement was performed on the whole sample at the end of the period from 20\10\2010 to 22\10\2010.

Statistical treatments:

Statistical treatments were held by using the computer program SPSS & EXCELLE programs and achieve the goals of research and testing of hypotheses the researchers used the following statistical treatments:

- "T" Test
- advance percentage
- mean
- Standard deviation
- Sekwenss.

Presentation and discussion of results

Table (1)
Significant differences between prior and post measurements of the experimental group In
the variables under consideration

Variables	Group	number	mean	S.T	" T "	percentage
Weight	Prior	11	70.41	6.268	10.241*	3.29%
	post	11	68.09	6.76		
leg Strength	Prior	11	111.27	24.242	4.999*	13.15%
	post	11	125.91	23.751		
Back strength	Prior	11	116.36	22.142	5.537*	6.95%
	post	11	124.45	21.869		
Arm power	Prior	11	9.04	1.742	3.554*	5.84%
	post	11	9.56	1.718		
Speed	Prior	11	4.41	0.155	- 5.352*	5.49%
	post	11	4.17	0.138		
Agility	Prior	11	8.72	0.54	- 4.324*	8.94%
	post	11	7.94	0.397		
Endurance	Prior	11	4.8	0.746	3.72*	12.48%
	post	11	4.2	0.27		
Leg power	Prior	11	2.4	0.216	3.648*	8.60%
	post	11	2.61	0.183		
V co2	Prior	11	2.33	0.383	3.537*	10.86%
	post	11	2.58	0.39		
Vo2	Prior	11	3.34	0.849	3.683 *	10.45%
	post	11	3.69	0.725		
Vo2 \kg	Prior	11	45.13	5.628	3.025*	10.05%
	post	11	49.66	6.814		
VE	Prior	11	4.966	72.67	10.171*	17.34%
	post	11	4.384	85.27		
O2 pulse	Prior	11	27.5	4.447	2.154*	11.74%
	post	11	30.73	5.14		
Bf	Prior	11	50.09	6.22	3.145*	9.98%
	post	11	45.09	7.063		

The value of "T" tabulated at 0.05 = 1.812

Significant*

It Is clear from Table (1) the existence of significant differences between the measurement of prior and post of the experimental group in the variables under consideration for the telemetric as the value of "T" calculated more than Tabulated value at the level of significance 0.05. As shown in the same table that the highest percentage of improvement amounted to 17.34% and had variable pulmonary ventilation in liters, while the lowest percentage of improvement was 3.29% for the variable weight. Researchers found the reason that the impact of the training program proposed using sand playground which has led to improved efficiency, respiratory and breathing muscles, is consistent with the results of the study of

Impellizzeri FM, et al 2007, Maio Alves JM, et al (11), 2010, Abdelbasit Abdelhalim, Ashraf Abdelaziz 2006 (2) that there are rates of improvement in each of vital capacity and endurance run 1500 m and also the ability of legs muscles, especially the maximum consumption of oxygen.

Table (2)
Significant differences between prior and post measurements of
the control group In the variables under consideration

Variables	Group	number	mean	S.T	" T "	percentage
Weight	Prior	11	74.55	7.976	7.362*	3.29%
	post	11	72.09	7.622		
Leg Strength	Prior	11	103.36	15.08	3.959*	6.42%
	post	11	110	14.318		
Back strength	Prior	11	109.68	11.684	8.263*	5.26%
	post	11	115.46	11.157		
Arm power	Prior	11	9.69	1.141	2.798*	4.64%
	post	11	10.14	1.3		
Speed	Prior	11	4.49	0.167	2.011*	2.49%
	post	11	4.38	0.243		
Agility	Prior	11	8.73	0.589	2.937*	5.33%
	post	11	8.27	0.399		
Endurance	Prior	11	4.92	0.738	3.304*	5.21%
	post	11	4.66	0.62		
Leg power	Prior	11	2.42	0.125	2.677*	2.82%
	post	11	2.49	0.084		
V co2	Prior	11	2.16	0.103	1.98*	7.20%
	post	11	2.32	0.239		
Vo2	Prior	11	2.99	0.501	3.703*	6.52%
	post	11	3.18	0.509		
Vo2 \kg	Prior	11	42.6	3.375	6.113*	6.15%
	post	11	45.22	3.325		
VE	Prior	11	13.254	72.55	1.843*	7.77%
	post	11	12.09	78.18		
O2 pulse	Prior	11	25.19	4.075	2.388*	4.84%
	post	11	26.41	5.438		
Bf	Prior	11	50.64	3.668	1.936*	4.85%
	post	11	48.18	4.513		

The value of "T" tabulated at 0.05 = 1.812

Significant*

It is clear from Table (2) the existence of significant differences between the measurement of prior and post of the control group in the variables under consideration for the telemetric as the value of "T" calculated more than Tabulated value at the level of significance 0.05. As can be seen from the same table that the highest percentage of improvement was 7.77% and had variable pulmonary ventilation in liters, and lower relative improvement was 2.49% and

had a variable speed. The researchers found the reason that regular training and focus in the preparation period for members of the control group in the component of endurance types led to improvement in pulmonary ventilation better with members of the group, while the preparation period, the focus a bit on speed training. These results are consistent with the results of both the khirya Ibrahim, Youssef Dahab and Mohamed Briqaa 2001 and also Ali Elpick and Sabri Omar 1994 that the training regular physical played an important role in making adaptation to the body's vital organs to physical performance. As seen Abdelbasit Abdelhalim, Ashraf Abdelaziz 2006 that physical training consistently and regularly occur changes of the organs of the body and these changes are a result of adaptation occurred for these organs, and these changes may be continuously as a result of regular practice of physical training for a long period of time.

Table (3)

Significant differences between two post measurements of the experimental group and control group in the variables under consideration

Variables	Group	number	mean	S.T	" T "	Mean difference
Weight	Control	11	72.09	7.622	1.302	4
	Experimental	11	68.09	6.76		
leg Strength	Control	11	110	14.318	1.903*	15.909
	Experimental	11	125.91	23.751		
Back strength	Control	11	115.46	11.157	1.216	9
	Experimental	11	124.46	21.869		
Arm power	Control	11	10.14	1.3	0.889	0.577
	Experimental	11	9.56	1.718		
Speed	Control	11	4.38	0.243	-2.497*	0.21
	Experimental	11	4.17	0.138		
Agility	Control	11	8.27	0.399	-1.935*	0.328
	Experimental	11	7.94	0.397		
Endurance	Control	11	4.66	0.62	2.267*	0.462
	Experimental	11	4.2	0.27		
Leg power	Control	11	2.49	0.084	1.979*	0.12
	Experimental	11	2.61	0.183		
V co2	Control	11	2.32	0.239	1.92*	0.265
	Experimental	11	2.58	0.39		
Vo2	Control	11	3.18	0.509	1.906*	0.509
	Experimental	11	3.69	0.725		
Vo2 \kg	Control	11	45.22	3.325	1.945*	4.445
	Experimental	11	49.66	6.814		
VE	Control	11	12.09	78.18	1.829 *	7.091
	Experimental	11	4.384	85.27		
O2 pulse	Control	11	26.41	5.438	1.914*	4.318
	Experimental	11	30.73	5.14		
Bf	Control	11	50.46	5.733	1.955*	5.364
	Experimental	11	45.09	7.063		

The value of "T" tabulated at 0.05 = 1.812

Significant*

It is clear from Table (3) the existence of significant differences between the two post measurements of the experimental group and control group in the variables under consideration as the value of "T" calculated more than the tabulated value at the level of significance 0.05. While it appears that there are no significant differences between the experimental group and the control group in variables (weight - back power - the ability of arms) under consideration that the value of "T" calculated is less than the value tabulated at the level of significance 0.05, the researchers found the reason that the impact of the training program applied to the experimental group in the sand playground, the researchers found the reason that there are no differences in some variables as these variables aren't associated mainly with training in the sand playground. In addition to that the two groups practice the rest of the content of the training session together. This is consistent with Impellizzeri FM and others 2007, and Abdelmohsen Jamal aldin, Samir Abushadi 1994, Mohammad Muslim 1995, Hoff, 2005, that the training using the sand playground works to improve both speed - agility - the ability to jump - endurance and through that, the researchers see that the training in the sand playground contributes to improving the physical and physiological aspect by increasing the soft ground resistance and it gives the opportunity to touch the largest area of the foot. Thus the effort from the player increases, which led to the improvement of some of the physical fitness components and physiological responses of the soccer players.

Conclusions:

- 1- The experimental group which implemented the proposed training program using the training in the sand playground was improved better than the control group which implemented the traditional training program using the training within the soccer playground in some of physical fitness components for soccer players.
- 2- The experimental group which implemented the proposed training program using the training in the sand playground was improved better than the control group which implemented the traditional training program using the training within the soccer playground in some physiological responses for soccer players.
- 3- The researchers reached to a set of tests design of the physical fitness components in the sport of soccer and scientific transactions have been identified and have been used to determine the level of the players in the prior and post measurements.
- 4- They reached to a proposed training program design using a sand playground in the period of preparation for the soccer players.

Recommendations:

- 1- The necessity of using coaches for sand playground in the period of preparation for the soccer players.
- 2- Taking into consideration the iterative measurement and continuous assessment of the program during the application period after 2-3 weeks.

- 3- The necessity of using scientific bases in building and designing appropriate training programs to improve the physical fitness components and physiological responses of soccer players.

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The Relationship of Body Mass Index with Cardiorespiratory Fitness of Football Players

Ehab Ahmed Elmetwally Mansour

The aim of this study was to investigate the relationship between BMI and cardiorespiratory fitness in football players. Measurements included: body mass index of the sample, heart rate (HR), the rate of oxygen consumption with each pulse of a heartbeat (O2PLUS), ventilation in liters (VE), tidal volume (VT), breath frequency per minute (BF), the maximum oxygen consumption of absolute and relative (VO2) (VO2/Kg), production rate of carbon dioxide (VCO2), the relationship between oxygen consumption and the rate of work (VO2/WR), the ratio between the rate of production of carbon dioxide and coefficient of ventilation during pregnancy (EQCO2). These variables were measured at rest (REST), the threshold anaerobic (ANT), the maximum value (MAX) and the study was conducted on a sample of 16 players of the squad's first football club in Dakahlia. The sample was divided into two groups. The initial body mass index ranged between 18.5-24.9 and the second ranged between 25-29.9 and measurements were taken using apparatus (ERGOSPIROMETRY ZAN 680), and test application Polk. Data analysis was assisted through the use of the SPSS statistical program. Results showed no significant differences statistically between the two groups in most measures of the research variables. The study recommended further studies on different sports and the use of larger sample sizes.

Introduction

The world is witnessing in the present century advanced scientific and industrial technology including the development in physical education. Among the topics of importance is the development of fitness and the physiological capacity of individuals which is a key factor in sporting events (Hazza, 2000). The study calendar to the level of physical fitness and functional devices of the body and one of the trends that focus the attention of researchers in the field of sport physiology in order to stand on the evaluation of the optimal level of physical fitness, and that to know the extent of adaptations and physiological changes and the extent of the acquisition of fitness of the samples of designated research.

According to researchers the measurements of body composition is one of the important determinants of motor performance and key indicators related to health and fitness levels (Hencken, 2004, Lohman, 1998, Reilly, 2000).

Body Mass Index (BMI) is a number calculated from a person's weight and height. BMI is a fairly reliable indicator of body fatness for most people. BMI does not measure body fat directly, but research has shown that BMI correlates to direct measures of body fat and is calculated the same way for both adults and children. The calculation is based on the following formulas: $\text{weight (kg)} / [\text{height (m)}]^2$. The standard weight status categories associated with BMI ranges for adults are shown in the following table.

Table (1): Shows the level of body mass index and weight status

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Overweight
30.0 and Above	Obese

Adams (1990) has shown that the body mass index is one of the important indicators to determine obesity in personnel. There has been increased attention in recent years to this, due to the correlation of obesity with many diseases such as diabetes, high blood pressure, arthritis and lower back pain. A healthy body weight is associated with well-being and longevity. Carrying excess body fat increases the risks of heart disease, diabetes, stroke, gallbladder disease, sleep disorders, respiratory problems, and some types of cancer. Maintaining weight at a proper level reduces the risks of these diseases. For athletes, a healthy weight can also optimize performance (Lori et al, 2010).

According (Rushdie 1997) there is mixing between (obesity) and (over weight), although they are not synonymous, as the sports person has weight plus increased sections of muscle, while the non-sports person is overweight due to increased fat tissue, - with obesity defined as the accumulation of excessive amounts of fat in fatty tissue.

The importance of measuring the body mass index in association with physical fitness, counts as one of the key measurements for fitness and health (AAHPERD, 1988). Cardiorespiratory Fitness is the ability of the respiratory and cardiovascular system to take oxygen and move, and then deduced by the body's cells to provide energy for physical effort (Abdul-Fattah, et al, 2003)

The researcher believes that the physiological variables of the body was and is the most important objectives of physical education and the methods of measurement and development is one of the topics that have occupied the concerns of workers in the field of sports in general and football in particular. Given that there is a lack of research associated with measurements of physical and physiological variables linking the relationship between BMI and cardio respiratory fitness in football players, the researcher wanted to take advantage of modern apparatus such as the efficiency of the heart and lungs to give accurate results for the relationship between these variables and this prompted the researcher to conduct this study.

Materials and methods

The researcher used the descriptive method as the relevance and the nature of this study.

Sample:

The study was conducted on a sample of 16 players from the first team for the Bani-Ebeed football Dakahliya, and were divided into two groups as follows:

- First group included 10 players (G1=10), with body mass index limited between 18.5 to 24.9.
- The second group included 6 players (G2=6), with body mass index limited between 25-29.9.

The measurements were conducted in the laboratory of Sports Physiology, Faculty of Physical Education -Mansoura University, Egypt.

Measurements were conducted in the period from 26-29/6/2011.

Research methods – measurement of the variables:

The researcher used the Polk and others test (Bullock et al) Citing (Radwan, 1998) was applied on apparatus (ERGOSPIROMETRY ZAN 680) to measure the cardiorespiratory fitness, and the test as follows:

- 1- The type of pregnancy: ongoing pregnancy
- 2- The case of the laboratory: trained player.
- 3- Warm-up: walking or running for 5 min before the performance.
- 4- Start: Physical load (speed at 5.8 miles/hour for 3 min, degree of miles 0%).
- 5- Test time: 13 min connected
- 6- Speed: start of 5.8 miles / hour and continue until well as stress.
- 7- Degree miles of apparatus: it starts by zero% for 3 min, then increase by 2.5% every 2min.

The researcher measured cardiorespiratory variables that contained:

- Haemodynamic parameters: heart rate (HR), the rate of oxygen consumption with each pulse of a heartbeat (O₂PLUS).

- Ventilatory Parameters: Ventilation in liters (VE), tidal volume (VT), breath frequency per minute (BF).

- Metabolic Parameters variables: The maximum oxygen consumption of absolute and relative (VO₂) (VO₂/Kg), production rate of carbon dioxide (VCO₂), the relationship between oxygen consumption and the rate of work (VO₂/WR), the ratio between the rate of production of carbon dioxide and coefficient of ventilation during pregnancy (EQCO₂). (Attachment 2)

For the statistical analysis, the SPSS (SPSS for Windows, version 17.0) program was used for the statistical evaluation of data Mann Whitney U test was used for significance testing as non-parametric tests and calculate the Mean, Std.deviation, the Mean Rank , the Sum of rank , the P. value and the significance.

Results and Discussion

Table (2): Shows the body mass index in both groups.

group	number	mean	Std.deviation	Statas
G1	10	22.92	0.96	Normal
G2	6	26.07	0.60	Over weight

Table (3): The significant differences between groups in variables Haemodynamic.

variable		unit	number		mean		Mean Rank		Sum of rank		z	p. value	Sig.
			G1	G2	G1	G2	G1	G2	G1	G2			
HR	REST	b/min	10	6	69.90	81.67	7.20	10.67	72	64	1.411-	0.158	No
	ANT	b/min	10	6	172	157.33	9.85	6.25	98.50	37.50	1.475-	0.140	No
	MAX	b/min	10	6	176.7 0	171.5	9.15	7.42	91.50	44.50	0.707-	0.480	No
O2PLU S	REST	ml/beat	10	6	2.20	4	6.90	11.17	69	67	1.919-	0.055	No
	ANT	ml/beat	10	6	21.40	23.33	8	9.33	80	56	0.545-	0.586	No
	MAX	ml/beat	10	6	21.20	25.83	7.40	10.33	74	62	1.205-	0.228	No

Table (4): Shows significant differences between groups in variables Ventilatory Parameters.

Variable		unit	number		mean		Mean Rank		Sum of rank		z	p-value	Sig.
			G1	G2	G1	G2	G1	G2	G1	G2			
VE	RES T	l/min	10	6	2.98	6.45	6.25	12.25	62.5	73.5	2.442-	0.015*	Sig.
	ANT	l/min	10	6	85.65	94.07	7.70	9.83	77	59	0.868-	0.386	No
	MAX	l/min	10	6	86.67	105.62	7	11	70	66	1.627-	0.104	No
VT	RES T	l	10	6	0.38	0.43	8.15	9.08	81.5 0	54.5	0.380-	0.704	No
	ANT	l	10	6	1.72	1.98	8.10	9.17	81	55	0.434-	0.664	No
	MAX	l	10	6	1.73	2.24	7	11	70	66	1.627-	0.104	No
BF	RES T	l/min	10	6	13.70	18.5	6.75	11.42	67.5 0	68.5	1.928-	0.054	No
	ANT	l/min	10	6	49.70	49.33	8.55	8.42	85.5	50.5	0.054-	0.957	No
	MAX	l/min	10	6	50.10	49	8.70	8.17	87	49	0.217-	0.828	No

Table (5): Shows significant differences between the two group in Metabolic Parameters variables.

variable		unit	number		mean		Mean Rank		Sum of rank		z	p. value	Sig.
			G1	G2	G1	G2	G1	G2	G1	G2			
VO2	RES T	l/min	10	6	0.15	0.33	6.35	12.08	63.5	72.5	2.339-	0.019*	Sig.
	ANT	l/min	10	6	3.58	4.01	8	9.33	80	56	0.542-	0.588	No
	MAX	l/min	10	6	3.74	4.44	7.20	10.67	72	64	1.410-	0.159	No
VO2/ Kg	RES T	l/min/kg	10	6	2.17	3.92	6.7	11.5	67	69	1.952-	0.51	No
	ANT	l/min/kg	10	6	50.73	48,7	8.8	8	88	48	0.325-	0.745	No
	MAX	l/min/kg	10	6	52.94	53.8	8.2	9	82	54	0.325-	0.745	No
VCO2	RES T	l/min	10	6	0.12	0.25	6.85	11.25	68.5	67.5	1.794-	0.073	No
	ANT	l/min	10	6	2.95	3.41	8.05	9.25	80.5	55.5	0.488-	0.625	No
	MAX	l/min	10	6	3.01	3.77	7.10	10.83	71	65	1.519-	0.129	No
VO2/ wr	RES T	ml/min/w	10	6	0	0	8.5	8.5	85	51	0.00	1.00	No
	ANT	ml/min/w	10	6	10.48	10.6	8.05	9.25	80.5	55.5	0.488-	0.625	No
	MAX	ml/min/w	10	6	11.84	12.08	8.30	8.83	83	53	0.218-	0.828	No
EQCO 2	RES T	-----	10	6	12.04	17.13	6.75	11.42	67.5	68.5	1.90-	0.057	No
	ANT	-----	10	6	26.41	26.28	8.10	9.17	81	55	0.434-	0.664	No
	MAX	-----	10	6	26.30	26.77	8.2	9	82	54	0.325-	0.792	

Results in Table (3) showed that there were no statistically significant differences between groups in variables Haemodynamic.

Results in Table (4) showed that there were no statistically significant differences between the two groups Except for variable ventilation in liters at rest only in the variables Ventilatory Parameters.

Results in Table (5) showed that there were no statistically significant differences between the two groups Except for variable maximum oxygen consumption at rest only in the variables Metabolic Parameters.

The researcher believes the absence of statistically significant differences between the variables in the research among the two groups is due to the first body mass index has a range of 18.5 to 24.9 with an average of 22.92 as he entered in the normal weight group while the second group body mass index has a range of 25-29.9 an average of 26.07 as he entered in the overweight may be due to increase weight in the second group to increase the section of muscle and not to increase the proportion of fat and that the members of the group did not enter a stage of obesity. This is consistent with the results of a study by Ziad Zayed (2010) that the lower body mass index to the level natural whenever there is a strong correlation between it and the maximum consumption of oxygen.

These research results are different from what was confirmed by Rushdie (1997) in that the higher of body mass index about 23.3 for females and 27.8 for males has been linked to impaired athletic performance, as well as many health problems.

But the research results were confirmed by Naseeruddin (2003) in that the more the amount of body mass index of the person shown by the laboratory to increase the proportion of fat has with the exception of some cases of athletes who have large muscle mass.

Conclusions

- 1- The level of body mass index football players had (research sample) showed diversity between the two groups - first Normal and second Overweight.
- 2- No statistically significant differences between the second and third levels of body mass index levels appeared in most of the variables of cardiorespiratory fitness of the football players (sample).

Recommendations:

- 1- Dependence on the results of the current study, when studies linked.
- 2- The need to conduct studies related to various sports activities.
- 3- The need to use larger samples in varying the level of BMI.
- 4- Need to focus on measurements of heart and lungs functions of athletes practicing sports activities

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What Does a Role Model Australian Primary School Health and Physical Education Program Look Like?

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History of Health and Physical Education in Australia

Health and physical education (HPE) should be given a major priority in today's education, as it can be justifiably argued that it is necessary for holistic lifelong health and wellbeing. An issue greatly valued by governments responsible for costs involved with wellness of citizens, the influence of hypokinetic diseases and the strong correlation research indicates physical activity plays a role in enabling optimal health and quality of life (Corbin, Welk, Corbin & Welk, 2011; Robbins, Powers & Burgess, 2011).

Throughout the history of HPE many discourses have influenced the construction and delivery of the HPE curricula in Australia. These have included military, scientific, health and sporting discourses, which have been underpinned by ideologies of sexism, elitism, healthism, individualism and mesomorphism. These ideologies often permeate the hidden curriculum (Tinning, Kirk & Evans 1993; Hickey 1995), wherein students acquire knowledge and attitudes unintentionally while in the school environment (Kirk 1992). It was the presence of such discourses that influenced the last curriculum reform for the HPE key learning area back in the early 1990s and in particular the adoption of the socio cultural perspective.

The HPE National Statement and Profile (1994) in Australia promoted a socially just curriculum. The national 'health and physical education statement is based upon key principles of diversity, social justice and supportive environments' (AEC, 1994). The socio-cultural perspective according to Cliff, Wright and Clarke (2009, p.166) adopted by the HPE key learning area in the last reform emerged 'as a complex counter-discourse informed by critical pedagogues and critical pedagogy in Australia, the United Kingdom and New Zealand'. They state with clarity how this has changed the teaching and learning in HPE: As a perspective through which to interpret HPE content and issues, it has important implications both for the work of HPE teachers and for how these teachers are prepared through pre-service teacher education programs; first, because its sociological and cultural studies underpinnings represent a significant departure from the predominantly medioscientific, biophysical and psychological foundations of HPE; and second, because its attention to social and cultural influences on health put it in opposition to notions that locate responsibility for health almost solely in the individual and his or her decisions. (2009, p.165).

While the adoption of the socio-cultural perspective was national, the depth that this perspective filtered into the implementation of the HPE curriculum in each Australian state and territory has differed considerably and in some areas little appears to have changed (Tinning, 2009; ACHPER, 2011).

Promoting social justice and equity in education through the HPE curriculum materials and the socio-cultural approach does seem to have led the way for other curriculum key learning areas. This is evident through the National Curriculum and explicitly within the goals established at the Melbourne Declaration on Educational Goals for Young Australians (December, 2008): Goal 1: Australian schooling promotes equity and excellence, Goal 2: All young Australians become, Successful learners, Confident and creative individuals: Active and informed citizens (Ministerial Council on Education, Employment, Training and Youth Affairs.)

These goals have driven the new Australian curriculum reform, namely the National Curriculum Framework. They support a socio critical pedagogy in education and are underpinned by the socio-cultural perspective. ‘The most important driver for a National Curriculum should be about equity and social justice and improved learning outcomes for our most disadvantaged and isolated students’ (Ewing, 2010, p.127).

Another change that occurred with the release of the 1994 HPE National Statement and Profile was nomenclature (Dinan-Thompson, 2009). In Australia the Health and Physical Education curriculum consists of three strands; Physical activity, Health and Personal Development. Before this the key learning area was named Physical Education, the title used in the National curriculum of England and Wales.

Teresa Carlson Award

The Teresa Carlson Award is the Australian Council for Health and Physical Education (ACHPER) Queensland’s most prestigious. Dr. Teresa Carlson was an outstanding academic, teacher and ACHPER Queensland State President. The annual recipient is an ACHPER member who is dedicated to the teaching of Health and Physical Education (HPE) and the promotion of its benefits within the community. The award began in 2004 and recipients have included the likes of internationally renowned Professor Doune Macdonald, Head of the School of Human Movement Studies at the University of Queensland (Table 1). In 2002, Fellow of ACHPER, Dr Teresa Carlson, was involved in a terrible accident in Turkey which left her with severe intellectual and physical impairments. Terry had been an outstanding academic with a strong teaching and research profile in the education community. She had been totally committed to promoting Physical Education and supporting HPE teachers. Terry had been State President of ACHPER QLD for three years, was actively involved in organising conferences, and held a post editing the state newsletter. (<http://www.achperqld.org.au/events-workshops/achper-annual-awards-night>).

From the seven recipients, one was chosen for their significant contribution specifically within a Primary school.

Table 1
ACHPER Queensland Teresa Carlson Award Recipients

2004	2005	2006	2007	2008	2009	2010
Mark Waugh, Mansfield State High School	David Brown, St. Peter's Lutheran college	Dr. Timothy Lynch, St.Elizabeth's Primary School	Dave Mayfield, Wynnum SHS	Dale Linini, Advisory Visiting Teacher, Sunshine Coast North	Jim Armstrong St Joseph’s School, Stanthorpe	Professor Doune Macdonald, University of Queensland

Primary School Importance

Research suggests that the best time for children to learn and refine their motor skills is during preschool and early primary school years (Branta, Haubenstricker, & Seefeldt, 1984; Commonwealth of Australia, 1992; Espenschade & Eckert, 1980). Regular physical activity in childhood and adolescence improves strength, builds lean muscle, builds stronger bones and decreases body fat (U.S. Department of Health and Human Services, 1996). Therefore, HPE in

the early primary school years plays a fundamental role in establishing a healthy and full lifestyle for children. Children from the beginning of their schooling lives in pre-school should participate in the fundamentals of skill development and exercise, experiencing the enjoyment that all can attain regardless of age, ability or personal interests (Queensland Government, 2003a).

It is also recommended that more time and expertise be made available to improve fundamental movement skills in primary schools as these skills are necessary for building proficient movement forms. Included among these are the locomotor skills of walking, running, hopping, vertical jumping, horizontal jumping, galloping, sliding, skipping, and leaping, as well as the manipulative skills of throwing (underarm and overarm), catching, dribbling, striking, kicking and punting (Olrich, 2002). Children do not acquire fundamental movement skills naturally, rather they need to be provided with quality learning experiences to enable skills development (Doorn, 1999). This phase of child development has the advantage that it is aligned with the child's natural play structure and is likely to have fewer competing activities, therein allowing children more time to concentrate on developing their motor skills. The early detection of motor problems facilitates early intervention programs that can reduce many physical and related emotional problems (Arnheim & Sinclair, 1979; Commonwealth of Australia, 1992; Hardin & Garcia, 1982; Haubensticker & Seefeldt, 1974; Johnson & Robinson, 1983; Seefeldt, 1975; Smoll, 1974). Further, research indicates that active children become active adults, (Raitakari, et al., 1994), thereby increasing the likelihood of more healthy adult lives. Likewise, inactive children become inactive adults (Commonwealth of Australia, 1992; Sport & Recreation Queensland, 2005). The importance of fundamental motor skills acquisition in the early years of primary school also develops "the feeling of competence in movement" (Garcia, et al., 2002, p.1) which is necessary for children to develop their potential full range of movement: "Children need to develop fundamental motor skills to enable them to participate in the full range of human activities" (Commonwealth of Australia, 1992, p.58). These are essential because "without adequately developed motor skills, it is more difficult to experience success and enjoyment in physical and sporting activities, which may lead to inactivity and avoidance behaviours" (Morgan et al., 2001). Wankel and Pabich (1981) found in their study that many children stopped playing sport because they could not perform the skills well enough and therefore did not experience success or enjoyment. Within the early years of primary school, HPE has particular importance for children developing the fundamentals of movement and skill acquisition. A lack of opportunity for skill development can be detrimental to children's confidence and attitude towards physical activities, thus limiting healthy participation in lifelong physical activity (Queensland Government, 2003a).

Case Study: School context

St. Elizabeth's Primary School community is located in Brisbane, Queensland, Australia. It is a medium sized Primary School (360 children) and in 2006 when the author received the Teresa Carlson Award, St. Elizabeth's had two strands (form entry) from Year 1 to Year 7 (5-12 years). The author shared the specialist HPE teacher role (2 days) with that of Year 6 classroom teacher (3 days), he was responsible for co-ordinating the HPE learning area and for the teaching and reporting of the Physical Activity strand. He taught HPE Physical Activity lessons to each class in the school for forty minutes each week during which he connected the Health and Personal Development strands whenever possible. There was a Physical Education (physical activity strand) Whole School Program specifically designed by the author for the school that was updated each year. Clear communication enabled a common understanding that the classroom

teachers were responsible for the teaching and reporting of the Health and Personal Development strands and they were required to complete the assessment and reporting for these strands on their students' report cards.

Lack of space was an obvious problem at the school. The only grassed space for the 360 students was approximately twenty metres by twenty-five metres. To cater for the lack of space the school had a split playtime. At the first major break, Years Four-Seven play for twenty minutes, during which time the Years One-Three sat and ate their lunch in the eating shed. Then for the next twenty minutes the Years One-Three play while the Years Four-Seven ate. During the second break the same procedure was followed, only for ten minutes, thus the children could only play for a maximum of thirty minutes most days. It is recommended that children need at least 60 minutes (and up to several hours) of moderate to vigorous daily physical activity (Commonwealth of Australia, 2004). To compensate for the lack of grassed play area the school had other sporting facilities, including a basketball/ netball court which was three quarters undercover and a multi-purpose tennis court with a synthetic grass surface. Situated on a corner of the grassed play area was an adventure playground for the Years One-Three students. The school also had two sets of portable soccer goals for use on either of the play areas. Further, the school had a strong relationship with the local Junior Rugby club, located approximately 400 metres away. The upper school (Years Four-Seven) walked down to the rugby club most Tuesdays and Thursdays during their first and major break, where they had more room to play various sports. The school had keys to the park, giving them access to the toilet facilities and also to goal post protective pads. The school used the rugby field for most Physical Education lessons for students in Years Three-Seven, depending on the sporting facilities needed for particular physical activity skills. All sporting facilities maximized the little available space. The Whole School Physical Education program was designed in accordance with the 1999 Queensland HPE syllabus, consistent with the socio-cultural approach. Furthermore it used the Health Promoting Schools model.

Health promoting schools are schools which display, in everything they say and do, support for and commitment to enhancing the emotional, social, physical and moral well being of all members of their school community (Centre for Primary Education, 1998, p.2).

The Health Promoting Schools (HPS) concept was developed to promote health in education (World Health Organisation, 1996). The Health Promoting Schools Model encompasses program implementation as it describes the broad, holistic framework for the implementation of health education beyond the boundaries of the classroom (Queensland Government, 2003b). It offers "a suitable approach because it encompasses a range of influences internal and external to the school environment" (O'Dea & Maloney, 2000, p.4). The HPS model comprises three overlapping elements: (1) curriculum, teaching and learning; (2) school organization, ethos and environment; and, (3) partnerships and services (Figure 1).

The HPS model also promotes the school/parent partnership in the development of children's activity levels (Medland & Taggart, 1993). This partnership is necessary as it is essential that parents support healthy lifestyles at home and in this they need to be educated (Howard, 2004; Borra, Kelly, Shirreffs, Neville, & Geiger, 2003). Furthermore, health is created in the settings of everyday life (Kickbusch, 1991). The HPS model educates parents about the need for children to participate in physical activities and promoting parental modelling of physical activities (Saltmarsh, 2001). Such modelling has the capacity to reverse parents' tacit of support of children's indoor sedentary activities (Allen & Hammond, 2005).

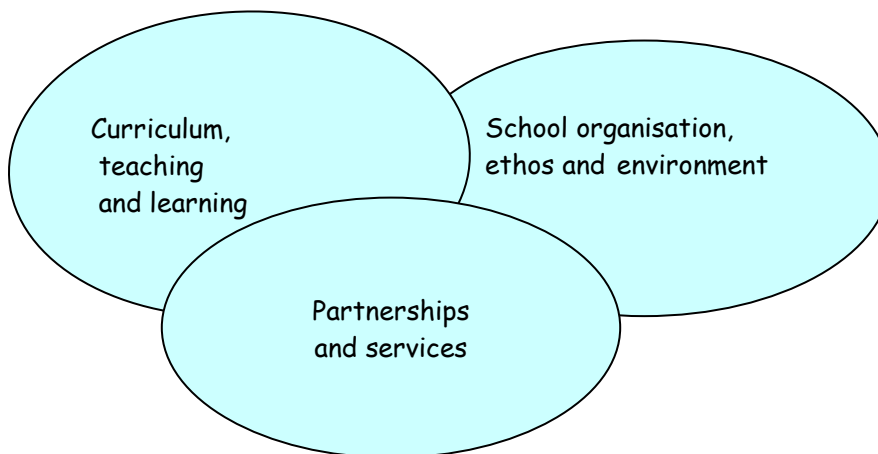


Figure 1. Health Promoting Schools Framework Model (World Health Organisation, 1994)

What does Physical Education using a socio-cultural approach look like?

In order for the HPE curriculum to fulfil a role in developing lifelong participation in healthy activities, it is imperative that a quality HPE curriculum be implemented in schools (Queensland Government, 2003a). “Improving the quality of physical education in schools is the best-documented intervention approach to promoting physical activity in youth.” (ACHPER WA branch, 1999, p.9). Research data from a national survey in the United States of America of students Years Four to Twelve revealed that enjoying physical education was one of the most influential factors for encouraging participation in physical activities outside school (Sallis, et al., 1999) and that if opportunities for physical activity were denied during school time, children would not voluntarily catch up on physical activity (Dale, Corbin, & Dale, 1999). Teachers can influence, for good or ill, students’ views about the value of physical education (Solmon & Carter, 1995), particularly students’ beliefs about physical activity (Lee, 2002).

The development of children’s fundamental motor skills occurs in the early years of the primary school and is influenced by both environmental and genetic influences (Branta et al., 1984; Gallahue, 1989; Malina, 1981; Malina & Bouchard, 1991; Rarick, 1981; Walkley et al., 1993). Genetic influences affect students’ motor performance and depend on factors such as heredity, trainability, age and maturation (Pangrazi, 2000). Unlike genetic influences, the environmental factors are variable and capable of being influenced by the teacher of physical activity. Environmental influences are determined by the physical education teacher and include opportunities to practise, interest in the child’s activities shown by significant others, and quality instructions (Espenschade & Eckert, 1980; Gallahue, 1989; Seefeldt, 1975; Singer, 1980, Walkley et al., 1993). A study by Kelly, Dagger, and Walkley (1989) found that when children had a HPE specialist teacher for PE they performed significantly better on fundamental motor skills than students who received supervised activity time only. This study further suggests that the physical education teacher can control the environmental influences that help promote a quality HPE lesson. Quality HPE “should be a developmentally appropriate educational experience designed to provide immediate and lifelong benefits, important benefits that are typically only taught in physical education classes” (Graham, et al., 1993, p.4).

Quality instruction is a vital aspect of any HPE program, yet other aspects to consider during the design and development stage of a program are enjoyment and fun for the participants (Garcia, et al., 2002). If children enjoy learning through movement they develop optimistic views about being physically active (Henderson, et al., 1999) and they “will be predisposed to

engage in it” (Garcia, et al., 2002, p.3). Therefore, the way the program is implemented is paramount to it being enjoyable and successful.

Consequently, ‘fun’ and ‘participation’ elements need to reach all children, in a class of diverse student interests and abilities. The provision of quality school HPE is not just for those children who excel in sport or in the competitive arena, but also for those who prefer individual activities such as bike riding, bush walking or swimming: “we need to offer something for all of them” (Boss, 2000, p.5). Physical activity benefits especially the unskilled and obese youngsters who need to be given priority as these children need to discover suitable physical activities that they enjoy (Pangrazi, 2000). Hence, contemporary HPE teachers need to incorporate critical pedagogy into their teaching practice (Tinning, 2004).

Inclusive programs can be implemented by “assigning open-ended tasks that allow kids to progress as far as they can individually and modifying traditional team sports so that teams are much smaller and everyone gets more opportunities to practise skills” (Boss, 2000, p.4). This replaces the relay races or large groups with minimal equipment, where many children are spectators waiting for their turn (Boss, 2000). Using modified games often involves Teaching Games for Understanding (TGfU) also known as Games Sense, Play Practice and playing for life. TGfU places an emphasis on the play, where tactical and strategic problems are posed in a modified game environment, ultimately drawing upon students to make decisions. It places the focus of a lesson on the student in a game situation where cognitive skills such as tactics, decision making and problem solving are critical (Webb & Pearson, 2008, p.2).

Hence, for quality programs to be implemented in the primary school it is essential that they have sufficient equipment and facilities for these to occur. Because of the skills and expertise necessary to implement these programs specialist HPE teachers are preferred, as some teachers “view physical education as a release from the classroom and ‘real work’ rather than an integral aspect of children’s education” (Clarke, 2000, p.7).

Model Primary School Early Years (Year 1 & 2)

Physical Activity School Program: The program for Year One and Two began using the Jack Capon Perceptual Motor Program (Level 1 & 2), although it was also extended by introducing assorted motor skills that are not used in this program. This program used five parent helpers and consisted of six stations of various movement patterns and manipulative skills over approximately twelve lessons. The students develop their balancing (static and dynamic), locomotor movements (hop, skip, run, jump, gallop), hand-eye and foot-eye coordination (throw, catch, strike and dribble balls of various sizes), body and space awareness, ocular pursuit (tracking with eyes), laterality (awareness of the difference between right and left), cross-laterality (use of limbs on the opposite side of the body) and kinesthesia (awareness of muscular movement and use of energy).

Swimming is conducted at the local pool by qualified instructors. The ‘Learn to Swim Program’ is taught once a week for six week blocks in Term One and Four. Dancing includes Rhythmic Movements through Perceptual Motor Rhythm Games, Motor Fitness Rhythm Games and Bush Dancing. Manipulative skills and body movement developed extraneous to the Perceptual Motor Program included ball, rope and hoop activities, bean bag and rhythm stick activities, skipping with a rope, throwing underarm and overarm, tracking and trapping, kicking, striking, dribbling, catching, and passing. All fundamental skills are developed using a variety of different sized objects.

Students train and develop the ability to run a long distance of 500 metres culminating in their participation at the annual school cross country. Athletics involves introducing and preparing the students for various relays, running using the correct technique, sprinting 60 metres and mini tabloid sports. The program includes assorted fun games used throughout the year, which often require the use of learnt skills in combinations. Listed games included Simpson circle race, Chain tag, Rats and Rabbits, Wicket stump hit, Boppa tee-ball, Mini red rover and Flag sprints.

There are four rules and expectations for Physical Activities: Every participant must wear a hat; the whistle signals to stop, look and listen; do not touch the sports equipment unless you are asked to, and be kind to others.

Model Primary School Middle Years (Year 3 & 4)

Physical Activity School Program; The middle years build on work done in the early years, with the following extensions: social dancing, swimming incorporating water polo skills, freestyle, backstroke, breast stroke and introductory butterfly. Movement and manipulative skills are extended. Taught skills are designed to be demonstrated with cues given and then practised by the students in closed motor skill environments, with the skills then further developed in an open motor skill medium, such as minor or modified games.

Specifically, in Term One the skills developed are: underarm throw; over arm throw; introduction to cricket bowling; catching using both hands/ one hand; and striking a ball using one hand/ two hands for a stationary target and a moving target. Modified sports include Mini (ace) tennis, Bucket ball, Zig-Zag tee ball, Boppa tee ball, Wicket stump hit, Tee cricket, Diamond cricket and Kanga cricket. Students train, and develop the ability to run a long distance of 1300 metres culminating in participation in the annual school cross country.

In Term Two, supplemented specific skills include: two hand pass to a stationary and moving target (chest pass and rugby pass); dribbling a basketball and soccer ball; hand pass (AFL); catching/marketing (hands outstretched and chest); kicking both oval shaped and round balls (soccer pass and kick/ from hands-drop punt); and kicking for accuracy. Modified sports include Tag (Aussie Footy), Touch rugby, Roo ball, Gaelic Football, Sideline netball and Sideline Basketball.

Term Three focuses on preparation for the Athletics carnival. Athletics involves introducing and preparing the students for various relays, running using the correct technique, sprinting 80 metres, starts, finishes, lanes and ball games (Captain ball and Tunnel ball). The program gives recognition to fun games such as the Simpson circle race, Chain tag, Rats and Rabbits, and Flag sprints. Students may be introduced to shot put. Basketball skills and Netball skills are further developed.

Term Four involves reinforcing and combining skills covered throughout the year to play modified games of European Handball, Newcombe ball (mini volleyball), Ten Pin Bowling, Tee ball and Kanga cricket. The Physical Education Whole School Program also involves many fun games such as Boppa tee-ball, Wicket stump hit, Tee cricket, Mini red rover, Tail tag, Scarecrow tiggy, Poison ball and bopper tag. Such Games often require the use of the skills in combination and are used interchangeably as fun warm up games and lessons. Rules and expectations for Physical Activities in the middle years included the same four rules used in the early years.

Model Primary School Upper Years (Year 5, 6 & 7)

Physical Activity School Program; Locomotor and manipulative skills are very similar to the ones introduced in Year Four only the students are extended through the use of distance, using their opposite side or non-preferred side of the body. There are also fewer rule changes used in the modification process for games. More time is also allocated to developing students' skills and understanding of the sports offered for inter-school sport.

Dancing increases in complexity as the students learn and perform more difficult dances. The swimming program is of the same duration as Year Four, with students usually able to swim twenty-five metres competently in freestyle, backstroke and breaststroke. More advanced students will also be able to swim twenty-five metres in butterfly. They should have competent skills for water polo and have an understanding of lifesaving and emergency survival procedures, rescue tows and safety dives. Cross Country running is increased to approximately three kilometres. Shot put is covered, as too is high jump and long jump if facilities can be made available. The students practise sprinting 100 metres, relays and the ball games such as Zig-Zag, Leader ball and Captain ball.

Conclusion: What can be learnt from this model Australian Primary school?

The author was employed in an English International school comprising of students from over 32 nations in Qatar (2007-2010). As Head of Foundation Stage and Key Stage One (3-7 years) pedagogy and curriculum aspects were adopted from the 2006 programme, which was successfully implemented and again was popular amongst students. Thus, offering a learning opportunity for other schools within the Middle East region and other countries.

The imperative concepts to learn about the schools PE program are;

- needs to begin as soon as possible (early years),
- quality learning experiences (not to be replaced with quantity),
- inclusive in that it caters for all needs, everyone feels comfortable (no fear of failure) and everyone can succeed in their own way
- sufficient equipment,
- enable maximum participation and be fun,
- teacher (specialist or not) needs to understand successful pedagogy for the age group and provide quality instruction,
- use parents and external partnerships to strengthen opportunities for the children,
- developmentally appropriate (whole school programme),
- wide range of activities,
- safe environment and clear communication amongst teachers

This case study school had many obstacles that needed to be overcome, similar to most schools, which relates to the final and essential concept; advocacy.

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Creative Thinking and Creative Teaching

Peter Chen

Creative thinking is creative philosophy and creative philosophy is creative wisdom. Creative thinking is to think what no one else has thought, to do what no one else has done, to see what no one else has seen and to imagine what no one else has imagined. Creative philosophy often begins with inspiration and imagination. Inspiration will normally enlighten imagination and as a consequence it will facilitate creativity. Inspiration may come from anyone, anything, anytime and anywhere. To be inspired one needs to develop sense of awareness and alertness. It involves observation and making the connection. The universe is a network in which all are interconnected. People are often inspired by the discovery of connection. When we learn about the development of computer science, medical science, space science and sport science, it is important some interdisciplinary approach is taken, if we wish to accelerate our progress and learning. In the future, no one can stand-alone. It is important to be independent and also to be interdependent. It is vital that we learn to be inspired from many things we come into contact through our everyday life and throughout our lifetime, if we wish to continue to improve our lives and to live an interesting and exciting life. Inspiration is the key to our progress. It inspires us to be successful as well as others to be successful as well.

The power of inspiration is to motivate people to make more effort towards a goal in whatever they wish to do and to achieve better results. We are all teachers and learners. We need to learn from each other. Darwin stated "It is not the strongest of the species that survive, or the most intelligent, but the one most responsive to change."

George Bernard Shaw indicated "Progress is impossible without change; and those who cannot change their minds cannot change anything." And he also stated "Imagination is the beginning of creation. You imagine what you desire, you will what you imagine and at last you create what you will".

Creative thinking is just as Thomas Edison said: "There is a better way to do it, find it." And Einstein also stated: "Imagination is more important than knowledge." Creativity is the most important wealth in life; we are often awakened or inspired by an invention and to realize the human potential and possibility. Inventions are interesting, exciting and often beyond our imagination.

In reflection, all discoveries and inventions certainly have greatly inspired our creative thinking. Out of all inventions; I have found the functions of computer the most fascinating and exciting with high tech learning, information gathering and worldwide communication which were well beyond our imagination. During the 20th century the research, development, and advancement in the scientific fields has improved the quantity and quality of services in many areas of our lives. The technologies developments in recent years have become more rapid, more extensive, and more powerful and the progress of science will be even faster in the future which will continue to affect the progress in all fields even further. Science also affects economics, politics, lifestyle, education, health and the well-being of people.

Creative thinking is also creative solutions. Through history, many great artists, scientists, musicians, thinkers, philosophers and athletes have proved that invisible is visible, impossible is possible, unpredictable is predictable and incomprehensible is comprehensive. Creative thinking mainly develops from our imagination, curiosity and questioning. We need to develop not only our curiosity but also our creative thinking as well.

The essence of education, for all students, regardless of their ability, background, belief, culture, gender or any other condition, is to provide equal opportunity for everyone, to encourage everyone to become an independent learner and to foster a healthy and creative lifestyle. Education needs to be creative, relevant, purposeful and useful for students, so they are able to apply the knowledge and skills into their lives personally and professionally. The future will require people who are highly adaptable, flexible, knowledgeable and skillful with modern technology and have sufficient national and international perception. We must teach how to think, change and create.

Physical education is an integral part of total education. The effective implementation of its curriculum includes psychomotor, cognitive, health and social aspects of well-being to achieve total well-being in life. Teaching is an art of sharing knowledge and wisdom with students to inspire and improve their learning. The efficiency of teaching can be judged by the achievement of planned objectives in the most effective way.

In the future, with the right pedagogy, technology and environment, it is possible for anyone to learn almost anything much faster, easier and better through self-direction, self-discovery and self-learning. It is important to promote continuing education throughout life. Plato offers his advice to educators that *“their main business was not to put knowledge into the mind which was not there before, but to turn the mind’s eye towards light so that it might see for itself.”* In education, it is important that a holistic approach is taken, so this gives insight into the influence of all interactions and enables us to understand their real relationships.

In the 21st century, the essential skills to get ahead are not just a matter of IQ or EQ but the ability to adapt, adjust, change, learn, think, and create. These are the important skills that everyone must learn at schools. The more you think, the more you learn, through all the possible questions and opportunities. The world our students are living in is changing much faster than school systems; therefore, we need to respond quickly and precisely to meet the need of both our students and ourselves. In reality, teachers must actively involve and participate in the changes. Education is self-growth, self-initiation, self-inspiration and most importantly self-awakening. Education is 1 % inspiration from teacher and 99 % imagination from students. Teaching styles in the spectrum represent two basic human capacities: the capacity for reproduction of ideas, movements, previous models, and the capacity for production of new knowledge, the discovery of new movements, and the creation of new models. All humans possess these capacities. (Mosston and Ashworth, 1994)

There are two main teaching approaches as direct and indirect teaching. The author has simplified and developed a model of combined direct and indirect teaching approach.

The advantages of combined direct and indirect teaching approach are as follows:

1) It offers the advantages of both direct and indirect teaching approach; (2) It uses both sides of the brain for effective learning and creative thinking (3) It caters for the needs of all learners regardless of ability or disability and (4) It shares the responsibility for effective learning between teacher and student.

Research shows that balanced activity in both sides of the brain will multiply the learning outcome, which is not 1 plus 1 equals 2 but 5 or more. (Ornstein, 1977) The linking of left and

right brain activities is important in producing a shift from learning to accelerate learning. The two halves of the brain may indeed be specialized; they are far from being isolated. Each compliments and improves the other. (Rose, 1992)

Nineteen-century French mathematician, Jules Henri Poincaré discovered that “*an interaction between two opposite matters initiates a unique outcome.*” It is clear that no one approach holds all the wisdom in developing the potential of all students. Each style has its own advantages and disadvantages. Therefore, a combination of approach best suits the diversity of personalities and capacities. A learning environment that combines teacher and student direction is most effective. (Rink, 1985)

The prime purpose of education is to develop students’ confidence and potential, so they are able to approach their learning with aspiration and inspiration. It encourages students to take initiatives and responsibilities for their own learning and total well-being. So the teachers should place an emphasis on the creative problem-solving approach, which includes exploration and discovery, based on the individual needs of the students.

The learning involves experiencing and practicing, so the students can see how well they are progressing and improving. The learning environment needs to be positive and a variety of creative learning possibilities should be provided for the mixed group of students. Students are treated and respected as capable of directing and teaching themselves.

Combined direct and indirect teaching also provides a constant change of slow and fast teaching episodes, which provide a variety of appropriate stimuli in teaching and learning. Direct teaching tends to be more fast episodes and indirect teaching tends to be more slow episodes.

An episode is a unit of time during which a teacher applies in teaching. The short episode keeps the students active, alert, focused, interested and on task. It is important to reduce the waiting time in any teaching session.

Although indirect teaching approach is considered as a very effective means of teaching to promote student-centered and creative learning. But many teachers still prefer to apply direct teaching, as it is easier to manage and control. Teachers are encouraged to review their own practices and search for the new opportunity for creative teaching.

Summary

From the author’s survey showed those who disliked physical education seemed to remember their negative experiences vividly, even after many years. When people repeatedly remember experiences of fear, failure, embarrassment and long waiting, they often become negative, disruptive, and uncooperative, and harbor a strong feeling of rejection. Those who liked physical education appeared to be active, cooperative, and positive and to enjoy their participation with confidence. (Chen, 2010)

It is desirable to allocate the last 10% of the class time for feedback. Students are able to express their feelings about their learning during this time. It is important for teachers to gain a better understanding of students through their regular feedback and reflection. By knowing how students think in their learning, teachers can maximize the learning and may focus more on the positive aspects of learning.

Creative thinking and creative teaching are important factors in making teaching and learning more interesting, challenging and exciting for students and for teachers, therefore, teachers need to create more opportunities and possibilities for creative teaching through their creative thinking.

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Traditional Turkish Oil Wrestling and its Olympic Values for Society

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Abstract

Kırkpınar oil wrestling culture has a 650-year old tradition. When comparatively examined, today's Olympic thinking may benefit and adopt many values from this culture. When one studies Edirne Kırkpınar Oil Wrestling it is a symbol of "Excellence". The oil wrestling field (it is a huge green area) is an arena for daring and fearless sportsmen. During the beginning ceremonial part of the match, the wrestler touches his opponent's heel of the foot then salutes him by a hand gesture, and lifts his opponent up by the waist in a symbolic way. These gestures exemplify respect for an opponent. Another obvious gesture of respect shown to an opponent, is the defeated combatant kissing and lifting his hand to his forehead at the end of the match. Pehlivan (the oil wrestlers) declare the winner after a contest without having a referee. This is another good example of the concept of fair play and respect for your opponent. The Head Auctioneer (Cazgır) shouts before the contest, "both wrestlers are tougher than each other, one is dark the other is light." This symbolizes the brotherhood of all races and ethnic backgrounds. Principle is one of the basic values of the Olympic Movement today. On the other hand when "Cazgır" addresses the wrestlers "When you fall down under your opponent do not fear, when you are top of him do not cheer" he warns the wrestlers. This warning carries a meaningful teaching for each wrestler's spiritual balance. Teaching of the expert (Usta) wrestler includes skill and character education of the student wrestler. An athlete who becomes an expert wrestler, will be accepted by the public as a sportsman who combines all the traditions and values of oil wrestling. He, now, is an expert wrestler with an educational formation that enables him to teach. Other principles, teachings and tenets that can serve as good examples for our contemporary sports world will also be discussed.

Introduction

Traditions reflect the culture of a society; in other words, they reflected the society's approach to education. The Kırkpınar (located in the city of Edirne in northwest Turkey) oil wrestling culture goes back 644 years. When we look at this fact from the educational point of view, it is impossible not to be influenced from this reality. When we study the phenomenon of "Kırkpınar", comparatively it is easy to see the many values of Kırkpınar oil wrestling, and the ideals associated with the Olympic movement.

This presentation will explain the Kırkpınar oil wrestling tradition and culture and its potential for the positive values and benefits which can contribute to the global sports culture. By doing this we will try to guide your attention to this educational tradition by presenting several examples.

As we all know, the sport of wrestling is as old as human history. The oldest archives and documents are found in the excavations of the Sumerians in Asia Minor (4000 B.C.), the Egyptian dynasty (3500 B.C.) and Greek culture (3000 B.C.). The most amazing historical

documents are found in the excavations of Beni Hasan district of old Egypt where the pictures of various wrestling plays are depicted - frame by frame- as a cinema film roll would.

The sport of wrestling is an old traditional sport of Turks as well. The origin of this sport goes back to Central Asia. Wrestling competition during Turkish holidays, festivals, weddings and various ceremonies were part of the tradition of the “Oguz Turks” that lived in Central Asia, Anatolia and Trace (European part of Anatolia) during the Ottoman Empire. Sultans and Hakans (commanders of Turkish military troops) were chosen among capable princes who were brave, wise and who held sportsmanlike qualities. Wrestling and wrestlers, were kept within the close watch and support of the Ottoman Turkish palaces and administrators.

One can say that the value of sportsmanship bestowed upon the sport of wrestling, kept wrestling alive for centuries and carried this rich tradition forward till today. The wrestler- being the symbol of heroism and bravery among the Turks- received continuous love and respect from the public. “Pehlivan” (the Turkish connotation for the wrestler) is known as fair, trustworthy and kind hearted; a specimen who is dependable and does not misuse his power. People are proud of his achievements.

The history of the oil wrestling tournaments in Turkey goes back to the Persian Era, -a period starting from 1065 BC- according to Ferdowsi's (Persian historian) Shahnameh. The word “Pehlivan” which describes a wrestler was first used during the period of “Parthian”s (Persian) who lived in Asia Minor (Turkey) from 2300 B.C to 224 A.D.

Traditional Kırkpınar oil wrestling was established as a sport during a campaign launched by Ottoman Sultan Orhan Gazi when he captured Thrace, the European side of the Marmara region. During that campaign Sultan and his brother Suleiman Pasha and their soldiers, captured a fortresses in that region which was located by the Turkish-Bulgarian border. On the place they camped, they started wrestling for fun. Twenty couples started to wrestle. Two of them wrestled for hours, but neither managed to win. Suleiman Pasha promised to give the winner a “kışpet” (leather pants) still worn today by the oil wrestlers in Turkey. These two wrestlers wrestled from morning till night, until they became exhausted and both died at the end. Their friends buried them under a big tree. When the riders visited the burial site years later, they noticed that several water springs had sprung up on the site and named this place Kırkpınar (Forty Springs) On the meadow, to which they gave the name, is known today as the city of the “Spring of the Forties” in memory of two riders who gave their lives. Today, this is the place where wrestling festivals are held traditionally every year.

Sport became a tradition in Edirne province where thousands of people come from Turkey and all over the world to observe these festivities annually. Every year since 1640 the best wrestlers – men and boys – have gathered for their national championships on a grassy field near the capitol of the old Ottoman Empire in the city of Edirne . The tournament is called “Kırkpınar” (which is translated as “Forty Springs,”) in honor of 17th Century wrestling legends. The champion wrestler at Edirne Kırkpınar earns around 100.000 US\$. The winner of the oil wrestling champion of Turkey wins also a title which is very prestigious in the Turkish sports culture and tradition. Many youngsters in Turkey dream to become Kırkpınar champion today. The Champion wrestler in this category becomes Baspehlivan (top wrestler) of the year. The wrestler that obtains this award for three consecutive years receives a precious 14-carat gold belt and additional cash awards. Companies, sponsors and individuals who give advertisements to the Kırkpınar Oil Wrestling Tournament, also give additional cash awards to wrestlers. These awards are distributed among different weight categories during the tournament. Municipality of the city of Edirne distributes both gold and cash to wrestlers in each weight category and pays cash to the

ones that could not get any award. The winner of the Kırkpınar Wrestling Tournament receives invitations to various wrestling tournaments in Turkey that take place in many parts of the country.

Non-Turkish observers reflect on their experience of Kırkpınar as follows:

Nearly 1,000 barefoot athletes compete, oiled up and stripped to the waist. The all-out style and the oiled trunks go back to the world-famous Janissaries, an elite fraternity of bodyguards to the Imperial Sultans. The modern stadium is located on the former site of the Sultan's palace, and Turkey's president crowns the champions. For three days the field is crowded with simultaneous matches in eleven divisions, ranging from school kids to forty-year-old masters. The sun is hot, but the fights are long. Only if there is no winner after a half-hour is the match decided with "sudden death" overtime. There are few forbidden holds, and grabbing of trunks is not off limits. Despite the fierce aggressiveness, however, and the obvious opportunities for fouling, these Turks demonstrate their essential brotherhood even when struggling to win. If one is injured or gets grass in his eye, for example, it is his opponent who assists him.

In the Kırkpınar culture "Pehlivan" (The Wrestler) gains his power from being considered a "role model" in the society. This characteristic is based on his status as a symbol of virtue and truthfulness. In the eye of the public, the wrestler is an example of perfectness still today.

During our age "the Olympic philosophy, which we are trying to convey to our young people today, aims to respect the opponent during sports competition. Kırkpınar competition ground was always considered the areas of the brave athletes who were symbols of truth and fairness. Each wrestler, before the competition starts, as a gesture of respect to his opponent – during the warm-up– leans forward to touch his opponent's heel of the foot and brings his hand up to his forehead to show respect to his opponent. Also, he lifts his opponent up in the air by holding him on his waistline again as a sign of respect. These traditions which all are very clear examples of respectfulness in today's sports world are almost lost. We feel that our athletes today need to carry the virtue of respect, which we do not see and witness in many cases on the sports scene. A very prominent Turkish historical oil wrestling figure Kel Aliço, who was the best wrestler for 26 years consecutively in Kırkpınar -during his retirement wrestling match- told his opponent Koca Yusuf, who was also a legend in Turkish oil wrestling, words of encouragement and kindness during the match. Yusuf, in return, began to cry at this stage of the wrestling match and wanted to leave the mastership of wrestling title to his opponent Aliço. This event was one of the meaningful examples of reflecting Kırkpınar ethic. This also should set an example of today's Olympic athletes of our day.

The Kırkpınar which is considered the Olympiad of oil wrestling was an educational arena for ethical value development, and held its own culture where positive human relationships flourished. Wrestling's basic skill development starts at the age of 15-16 with play forms. Later, a candidate wrestler is guided by an experienced wrestler. This age period, to educate and guide the young wrestlers, is a reasonable age when one looks at the pedagogical and physiological developmental aspects of sports. Education, given by the top wrestlers to the young wrestlers, contains skill and character development. Around age 22 is when young pehlivans become advanced wrestlers with all the skills obtained. Experienced wrestlers felt obliged to keep the total respect of the society throughout their life duration. Some of them chose to become referees

on the Kırkpınar arena where the public trusted and respected their decisions. The public considered them as examples of justice.

During the Kırkpınar festival, wrestlers usually called the result of their wrestling match as a gesture of fair play, even before the referee announced the result of the competition. This shows respect to the rules of Kırkpınar and commitment to the “fair-play” ideology. The wrestler, who lost the competition, would hug the opponent. Young wrestlers when they compete against older wrestlers, would kiss and raise the hand of his older opponent, to his forehead. This was the sign of respect for the older wrestlers. This act may be considered one of the traditional educational values out of Kırkpınar oil wrestling.

Spectators, who attended this festival, wore their most decent and clear clothing, shaved and cleansed themselves to show their respect to this traditional sports festival and to the wrestlers. “Kırkpınar” was a symbol of honor and virtue. To wrestle in Kırkpınar was the biggest dream of the oil wrestlers.

“Cazgır” (auctioneer) announces “both wrestlers are stronger than each other, one is dark the other is light”. A sample of prayer told by the auctioneer is reflected here:

***“Allah Allah Illallah
Men appeared in the field
One is stronger than other.
One is white and the other is dark,
God give strength to each of them.
This field is the men’s field,
Where the fourties, sevens wander.
Many heroes passed from this field,
Ate the sweet and the bitter and went away
Let us spar like horses,
Let us scramble like lions.
Hey Mohammed, hey Ali,
Master of the pehlivans Hazret-i Hamza-yi Veli.
Let the auctioneer get away now,
God give strength to all.”***

This saying was an example of accepting, in sincerity, ethnic and color differences in brotherhood of men that is one of the basic values of Olympism.

“Cazgır” would also yell at the wrestlers.

“Don’t be disappointed when you fall in the bottom; do not enter into festive mood when you are on the top during the competition.”

This example shows the psychological balance of being modest and humble that is expected from the Kırkpınar wrestlers. Acts of extreme cheering and spoiled behavior is not well received in Kırkpınar. There have been no security measures taken for the event, and no act of violence or incident has ever been reported in Kırkpınar.

A few of the important educational values that have been covered in this article could set up good examples for sports in our contemporary age. We must keep and protect these values as

part of the sports as an educational tool. Traditions of the Turkish culture contain sports cultural values that do not contradict with the modern culture. Some of the values, which we read from the historical documents, or even more, are found in the teachings of the Kırkpınar wrestling tradition.

Conclusions

1. Kırkpınar oil wrestling can be, from the sports perspective, the Olympics of wrestling with several Turkish wrestling categories. It can be combined with other wrestling styles to be part of a large sports festival. This festival may lead to a medium, where all the traditional wrestling styles in Turkey can be exhibited. Their rich historical teachings, traditions and values can be part of this organization.
2. Kırkpınar culture should be investigated in a chronological time span, including its educational, aesthetic, social, and technical aspects. There should be research groups to study the above-mentioned aspects. The results should be discussed at future conferences and workshops. Furthermore, these studies may be advanced into “Turkish Sports History Research Institute” as a part of the Thrace University in Edirne Turkey.
3. To expose Kırkpınar to the international experts, to expend on its scientific and athletic aspects, should be done after the necessary and planned research and studies are concluded.
4. Kırkpınar teachings and values can be reflected on individual, national and global settings. These teachings and values internationally can take their respectful place within the global culture.

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Dance Teacher Education: A Framework for the Development of an Undergraduate Dance Concentration with Licensure

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Introduction

The quality of public education in the United States has been an ongoing concern among parents, teachers, administrators, employers, politicians, and other stakeholders. In response to this concern, the No Child Left Behind Act (NCLB) of 2001 was enacted. This comprehensive federal law spurred a flurry of educational reform, representing significant changes to the education landscape. Among the reform was the mandate for “highly qualified” teachers and the identification of “core subjects.” NCLB requires local school districts to ensure that all teachers hired to teach core academic subjects are “highly qualified.”

A “highly qualified teacher” is defined as a teacher who: 1) holds at a minimum a bachelor’s degree from a regionally accredited 4-year institution of higher education; 2) is fully certified and/or licensed by the state department of education; and 3) demonstrates competence in subject matter knowledge in the core academic subject they teach. The core academic subjects are English, reading, language arts, mathematics, science, foreign languages, civics and government, social studies, economics, arts, history, geography, and kindergarten through Grade 6 (United States Department of Education, 2006).

For the first time, the arts (dance, music, theatre, and visual arts) were designated as core academic subjects elevating their status from that of extra-curricular activities. This designation requires arts teachers to meet the same requirements as all other teachers of core subjects. As a result, colleges and universities are charged with developing teacher preparation programs in the arts. The following illustrates the development of the Dance Teacher Education with Licensure concentration at North Carolina Central University. The framework is offered for similar teacher education programs.

Dance Teacher Education with Licensure

The Dance Teacher Education with Licensure (DTEL) program of study is designed to develop highly qualified dance teachers with the knowledge, skills, and dispositions for teaching dance in K-12 schools. The goal of the program is to provide a rigorous Dance concentration that results in graduates who are: highly competent dancers and teachers; aware of, sensitive to and responsive to social issues; contributing citizens with a global perspective and who hold an appreciation of diverse peoples and cultures; and skilled in best practices that facilitate teaching and student learning. Program completers receive the Bachelor of Science degree in Physical Education with a concentration in Dance Teacher Education from North Carolina Central University. The dance educators are eligible to obtain licensure from the North Carolina Department of Public Instruction and to teach dance at the elementary and secondary levels in the public schools in North Carolina and reciprocal states. Program and course outcomes are aligned with the *North Carolina (NC) Professional Teaching Standards* (NCDPI, 2008), *NC Teacher Education Specialty Area Standards* (NCDPI, 2009), *NC Arts Standard Course of Study* (NCDPI, 2000), and *National Standards for Dance Teachers* (NDA, 1997).

The Conceptual Framework

The development of a conceptual framework to establish a shared vision within the unit is a first step in developing a program. This process may take an extended period of time, from months to a year or more and a series of meetings, conferences, and retreats. The conceptual framework describes the knowledge, skills, and dispositions expected for candidates so that they can support the learning of all kindergarden-12 students. The conceptual framework is reflected in the curriculum through all professional education syllabi, which explicitly align course goals and objectives with the conceptual framework. The conceptual framework should clearly reflect the mission and goals of the university and the teacher education unit. The Dance Teacher Education with Licensure (DTEL) framework put forward in this article shares the vision of North Carolina Central University (NCCU) in its mission and the NCCU School of Education (SOE) in its expression of the conceptual framework.

Traditionally, the mission of NCCU has been to serve disenfranchised populations. In light of new knowledge and skills required for success in the 21st century, the University has expanded its mission to embrace multiple forms of diversity. Issues of race, class, gender, and exceptionalities at the forefront. The College of Education conceptual framework, "Preparing Educators for Diverse Cultural Contexts," focuses on the preparation of caring, competent, and culturally responsive educators (SOE, 2010).

1. Caring educators are compassionate professionals who acknowledge the significance of high standards and expectations, fair distribution of discipline, and uncompromised scaffolding of personal and academic success, regardless of family structure, exceptionality, and cultural background.
2. Competent educators are inquirers who examine their actions, instructional goals, methods, and materials in reference to their students' cultural experiences and preferred learning styles.
3. Culturally responsive educators actively critique educational opportunities available to individuals from diverse cultural backgrounds and actively advocate for social justice.

DTEL is committed to diversity. Curriculum and activities are designed to include a wide variety of experiences to assist candidates in developing and demonstrating knowledge, skills and dispositions that reflect a culturally responsive educator. Field experiences and student teaching provide opportunities for candidates to interact with exceptional students and students from different ethnic, racial, gender, socioeconomic, language, and religious groups. These experiences help teacher candidates confront issues of diversity that affect teaching and student learning and develop strategies for improving student learning and effectiveness. Course materials, activities, and projects provide candidates with opportunities to consider and reflect on the importance of diversity in society in general and the educational setting in particular.

Knowledge, Skills, and Dispositions

DTEL candidates preparing to work in schools as teachers know and demonstrate content, pedagogical and professional knowledge, skills, and dispositions necessary to help all students learn. To assure that candidates acquire these competencies, methods and instruments for

assessing the candidate's knowledge, skills, and dispositions derive from and incorporate state, national, professional, and institutional standards.

Specialty Area Content Knowledge

DTEL curriculum provides breadth and depth of knowledge in the dance content. Breadth of content knowledge is acquired in specialty area courses totaling twenty-nine (29) credit hours. DTEL candidates demonstrate depth of knowledge of specialty area content as outlined by state standards (NCDPI, 2009). Specialty area courses assure that candidates demonstrate appropriate content knowledge to teach and to positively affect student learning in dance. Candidates must pass all dance content courses with a grade of "C" or better. Specialty area courses in dance are listed in Table 1.

Table 1. Specialty Area Courses

Course	Title	Credits
DANC 2000	Dance Appreciation	3
DANC 2010, 3010	Modern Dance I/II	4
DANC 2020, 3020	Ballet Dance I/II	4
DANC 2030, 3030	Jazz Dance I/II	4
DANC 2040	International Dance	2
DANC 2060	Dance Production	2
DANC 4010	Dance Composition	2
DANC 4070	Senior Dance Project	2
DANC 4400	Elementary School Dance Pedagogy	3
DANC 4700	Secondary School Dance Pedagogy	3

In addition to the courses previously identified, DTEL candidates take seventeen (14) credit hours of supporting courses from the Physical Education curriculum. Supporting courses are listed in Table 2.

Table 2. Supporting Courses in Physical Education

Course	Title	Credits
PEDU 3000	Motor Learning	3
PEDU 3500	Emergency Care and Safety Techniques	2
PEDU 4120	Exercise Physiology	3
PEDU 4450	Motor Development	3
PEDU 4500	Adapted Physical Education	3

Pedagogical and Professional Content Knowledge, Skills, and Dispositions

Dance teacher education candidates demonstrate a thorough understanding of pedagogical content knowledge and skills by designing classroom instruction based on research-based practices. Candidates acquire pedagogical content knowledge in specific and general methods courses. Teacher candidates experience and learn decision-making in diverse cultural contexts through a continuing process of planning, predicting, implementing, reflecting, evaluating, and revising. This process: 1) ensures that teacher candidates possess in-depth understanding of

subject matter they plan to teach; 2) facilitates transfer and application of concepts, principles, and strategies; and 3) provides the foundation for the development of more advanced professional and pedagogical knowledge and skills. Based upon student assessments and careful reflection, candidates plan and modify instruction for students according to their abilities, learning styles, and prior experiences. Teacher candidates are able to explain how and why they modify instruction to improve learning for all students. Pedagogical courses provide a series of sequential and coherent classroom and field-based experiences that move candidates from observation through independent classroom teaching. More detail about field experiences and student teaching is included in the section on field experiences and the student teaching internship.

DEL candidates also demonstrate proficiency in the use of technology in the teaching-learning process. Dance methods courses focus specifically on the integration of technology in dance teaching and learning: e.g., lesson planning, student assessment, technology trends in dance. Acquiring and applying technology skills is integrated into and reinforced throughout the program. Methods courses are based on current research and developments in the field and provide an integration of theoretical and methodological knowledge and skills that include unit and lesson planning, instructional strategies (including technology), classroom management, and curriculum development.

DTEL candidates demonstrate a thorough understanding of professional knowledge and skills delineated in state standards and apply them in practice. Experiences provided in professional studies courses are designed to ensure that candidates acquire knowledge, skills, and dispositions that allow them to demonstrate a thorough understanding of learning theories, diversity, teaching strategies, assessment, technology, social and other contexts. Candidates study the effects of physical development, cognitive development, individual differences, language development and literacy, personal and social development in relation to student learners. Professional Studies courses enable candidates to 1) understand how students learn, 2) make ideas accessible to students, 3) consider school, family, and community contexts to connect concepts to students' prior experiences and 4) apply learned knowledge and skills to real-world problems.

To assure student success, DTEL candidates have experiences in schools throughout the program. They engage in interactions with students, teachers and other school personnel, and parents and families. Working with families is a critical issue in the support of student learning (U.S. Department of Education, 2001). Candidates develop strategies to communicate with parents regarding student progress, encouraging them to participate in school activities and offer suggestions on how to help their children with school-related tasks. Dance teacher candidates also encourage parents and families to share their diverse cultural heritage in the classroom as a part of curricular activities.

Candidates develop an electronic portfolio that they build throughout their program of study and complete during the internship semester. The portfolio demonstrates pedagogical and content knowledge, skills, and dispositions. Candidates select artifacts as evidence of their professional pedagogical development and content knowledge and reflect on how the artifacts demonstrate their ability to provide meaningful and challenging experiences that enhance student learning. The portfolio provides evidence of how the candidate accomplished each standard and reflected about the effect of the experience on student learning. Using the standards, candidates display their interaction with the school community (including parents/guardians) to enhance the learning of the students they teach. As well, candidates demonstrate their competency in content,

pedagogy, planning, assessment, management, human development and learning, adapting instruction for individual needs, multiple teaching strategies, and professional commitment and responsibility. Pedagogical and professional courses are listed in Table 3.

Table 3. Pedagogical and Professional Courses

Course Number	Course Title	Credits
EDU 2600	Orientation to Teaching	2
EDU 2800 or 4300	Computer Technology	3
EDU 3000	Educational Psychology	3
EDU 3030	Diversity Pedagogy	3
EDU 3150	Instructional Planning	3
EDU 4103	Methods and Materials of Dance	6
EDU 4203	Directed Teaching in Dance	6

Throughout the program candidates develop and refine appropriate dispositions and eliminate undesirable ones. A disposition plan is developed to assist Dance Teacher Education candidates who display temperament that is less than desirable. Dispositions are infused in courses and are assessed at each gateway through reflections, interviews, interactions and use of desired classroom management, instructional and assessment strategies. Dispositions are formally assessed at three points during the program: prior to admission to the Teacher Education Program, prior to entering the student teaching internship, and prior to exiting the student teaching internship. Additionally, formative assessment of attitudes occurs in courses. Candidate dispositions are demonstrated through writing samples, statement of philosophies, case studies, reflective papers, and discussions.

Student Learning

Dance teacher candidates demonstrate the ability to accurately assess and analyze student learning, make appropriate adjustments to instruction, monitor student learning, and have a positive effect on learning for all students. Student learning from teacher candidates is driven in part through the candidate's understanding derived from the assessment dimension of the teacher education program. Prior to the student teaching internship, candidates have the opportunity to learn, develop, and apply various kinds of assessments to evaluate and analyze student learning. Candidates learn to make informed decisions to ensure that student assessment is accurate, well developed, and, accurately reflects student-learning outcomes (Floyd and Allen, 2008). Candidates also learn to analyze student assessment and use the results to identify student needs, monitor student learning, and determine effectiveness of instruction. Various field experiences and the student teaching internship provide opportunities for candidates to administer multiple student assessments. Candidates and the supervising teacher monitor student learning, provide reflective feedback, and assist the K-12 student where needed.

Teacher candidates are reflective practitioners. This mandates that candidates reflect upon student learning and their instruction. They identify ineffective instruction and strategies and make appropriate adjustments, as well as develop a plan for improvement when needed. In addition to student assessment and instructional strategies, teacher candidates also understand other factors that affect student learning such as learning styles and cultural and other differences. Teacher candidates demonstrate knowledge, skills, and dispositions necessary to

help all students. Work samples and evidence that their instructional planning has impacted student learning in a positive way is demonstrated through a dance comprehensive student learning project. The project is included in the portfolio as a program completion requirement. The portfolio contains documented performance goals, reflections, teaching units, evaluations, technology infusion, and other artifacts.

Dance Teacher Education with Licensure Concentration Requirements

Course requirements for the Dance Teacher Education with Licensure concentration are shown in Table 4.

Candidate Assessment and Evaluation

DTEL uses an electronic assessment system for data collection, integrates the conceptual framework into the assessment process and incorporates candidate proficiencies outlined in state and national standards. Multiple assessments made at various transition points throughout the program are used to make decisions about candidate performance and to make changes in practices.

Assessment within DTEL is a continuous, data driven process that ensures that all candidates who enter the program exit as caring, competent and culturally responsive educators and decision makers who possess the knowledge, skills, and dispositions necessary to successfully teach and help all students learn in diverse cultural contexts. The assessment system provides the vehicle through which the program can assure that candidates meet the required standards as outlined by state and national standards.

The assessment system identifies gateways for assessment of candidates' knowledge, skills, and dispositions. The system identifies major performance assessments at each gateway. Detailed are a timeline for the implementation of the assessments and the design for collecting, analyzing, summarizing, and using the data.

The performance of candidates is assessed in multiple ways in courses and pre-teaching experiences aligned with relevant gateways. Each semester candidates seeking entry into the teacher education program, or who complete course requirements in a phase of the program, are evaluated based on pre-determined rubrics that denote decision points or “gateways” of achievement in the curriculum. Initial program gateways include Gateway I: Pre-Admission; Gateway 2: Admission; Gateway 3: Student Teaching Internship; and Gateway 4: Program Completion (SOE, 2010). Following is the four-year curriculum plan, which includes other coursework.

Table 4: Four-Year Curriculum Plan in Dance Education with Licensure

First Year			
Fall Semester	Credits	Spring Semester	Credits
ENG 1110 English Composition	3	ENG 1210 English Composition II	3
MATH 1100 College Algebra	3	MATH GEC Requirement	3
Modern Foreign Lang III	3	HIST 1320 World Societies	3
HUSC 1521 Dimension of Learning	2	BIOL 1300 Molecules & Cell Function	4
Soc. Sci. GEC Requirement	3	HEDU 1531 Health	2
PEDU 1541 Fitness	2	DANC 2020 Ballet Dance I	2
DANC 2010 Modern Dance I	2		
	<hr/> 18		<hr/> 17
Second Year			
Fall Semester		Spring Semester	
ENG 1250 Elements of Speech (SI)	3	HUM GEC Requirement	3
HUM 2410 OR 2420 Humanities	3	DANC 2060 Dance Production I	2
DANC 2000 Dance Appreciation	3	DANC 2040 International Dance I	2
PEDU 3500 Emergency Care	2	DANC 3010 Modern Dance II	2
BIOL 1610 Anatomy/Physiology	4	EDU 2800/4300 Computer Technology	3
DANC 2030 Jazz Dance Technique	2	EDU 2600 Orientation to Teaching	2
	<hr/> 17		<hr/> 14
Third Year			
Fall Semester		Spring Semester	
EDU 3000 Combined Course	3	DANC 4400 Elem Sch Dance Peda*	3
HEDU 3300 Human Sexuality	2	HEDU 3200 Communicable Disease	3
DANC 3020 Ballet II	2	PEDU 4450 Motor Development	3
PEDU 3000 Motor Learning	3	DANC 3030 Jazz Dance II	2
PEDU 4500 Adapted Physical Edu.	3	PEDU 4110 Kinesiology	3
EDU 3030 Diversity Pedagogy	3	DANC 4010 Composition I	2
	<hr/> 16		<hr/> 16
Fourth Year			
Fall Semester		Spring Semester	
DANC 4700 Sec Sch Dance Pedagogy*	3	EDU 4103 Methods & Mat Dance*	6
EDU 3150 Instructional Planning*	3	EDU 4203 Directed Teaching*	6
HEDU 4113 or 3420 Meth Health Edu.	3		
DANC 4070 Senior Dance Project	2		
PEDU 4120 Exercise Physiology	3		
	<hr/> 14		<hr/> 12

Gateway 1: Pre-Admission

Prior to admission to the Teacher Education Program (TEP), candidates engage in structured observations of teaching-learning interactions within the school setting and observe the culture of the school. They interview teachers and principals to determine how the school is structured and what educators do to meet the developmental needs of their student populations.

Gateway 2: Admission

Dance teacher education candidates are formally admitted to the TEP during the second semester of the sophomore year. Candidates are assessed at mid-program in courses and field experiences based on competencies expected at this level. At this gateway, candidates design lessons, micro-teach, and teach in the school setting. They also design, administer, and analyze student learning. Candidates are evaluated by teachers in the schools and by university faculty.

Gateway 3: Student Teaching

Toward the end of the student teaching experience, candidates complete a cumulative electronic portfolio demonstrating knowledge, skills and dispositions and participate in a mock interview comprised of a faculty member and two public school representatives. Other sources of evidence include a collaborative dance leadership project, individual classroom observations and mid-term and summative evaluation reports submitted by the university supervisor and the cooperating teacher.

Gateway 4: Program Completion

At Gateway 4 candidates complete entry of required documentation into the electronic portfolio, complete surveys, and any other required materials. Then they submit the licensure application to the School of Education. Table 5 lists the key assessment data collected at each Gateway in the Dance Teacher Education program.

Field Experiences and Student Teaching Internship

Field experiences and the student teaching internship require close collaboration with public school partners. The Dance Teacher Education Advisory Council (DPAC), created with the purpose of providing public school partners an opportunity to collaborate in the preparation of teacher candidates, consists of public school dance teachers, administrators, and university dance faculty. The DPAC reviews the curriculum, assists with planning and evaluating field and clinical experiences, and offers suggestions for updating and strengthening the program.

In methods courses, candidates experience a series of sequential field experiences. Observations occur throughout the program and are designed to introduce candidates to teachers, students, and the school community through observing and exploring in the school setting. The pre-internship provides an opportunity for candidates to observe, explore, plan, predict, instruct, and reflect. The observations and pre-student teaching experiences create a foundation for the student teaching internship. Table 5 reviews the previously described Gateways.

Table 5. Gateway Assessments

Gateway 1: Pre-Admission	Gateway 2: Admission	Gateway 3: Student Teaching	Gateway 4: Program Completion
<ul style="list-style-type: none"> •Complete GEC courses •GPA ≥ 2.5 •Pass English 1110, 1210, 1250 $\geq C$ •Pass Praxis I •Apply for admission to TEP 	<ul style="list-style-type: none"> •Maintain GPA ≥ 2.5 •Complete all course work $\geq C$ •TCER Self- and faculty- assessment and Goal •Lesson plans, including diverse learners and technology •Content knowledge project •Student Learning Project •Candidate Disposition Survey •Apply to student teach 	<ul style="list-style-type: none"> •Maintain GPA ≥ 2.5 •Individual Growth Plan based on TCER self-assessment •Formative Teaching Evaluations •Candidate Disposition Survey •Midterm Certificate of Teaching Capacity •Final Certificate of Teaching Capacity •Positive Impact on Student Achievement •Leadership and Collaboration Project •Mock Interview •Complete electronic portfolio 	<ul style="list-style-type: none"> •Transcript •Complete and submit Licensure Application •Submit Completer Surveys

Conclusion

The Dance Teacher Education with Licensure concentration provides candidates with the kinds of knowledge, skills, and temperament to ensure they are prepared to teach standards-based dance education in kindergarten through twelfth grade. The courses and field experiences prepare them for the real world where students with different needs and backgrounds enter the classroom. Program completers will know and demonstrate content, pedagogical and professional knowledge, skills and dispositions necessary to help all students learn in dance.

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Osteoarthritis: Can Exercise Help Sufferers to Cope with it, Remain Active and Live a Good Quality Of Life?

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Abstract

Arthritis is inflammation of one or more joints. It is the main cause of disability among people over 50 years of age. In Nigeria, people are now living longer than before, and for this reason this degenerative joint disease has become a major health problem. It is therefore necessary to look at this joint disease in order to see how it can be managed since it is not curable. Experts think that exercise can be an adjunct in the management of arthritis. This paper therefore focused on the courses, symptoms and management of osteoarthritis, which is the most common form of arthritis. It also looked at the contribution specific exercises can make in the management of osteoarthritis. Exercises suggested include: Low impact aerobic activity also known as endurance exercise; range of motion exercise for flexibility and strength training exercise for muscle tone. Recommendations were also made. These recommendations include among others: Regular low level impact aerobic exercise (duration 3 to 4 times a week); enough sleep (8 to 10 hours or day); loss of weight if overweight; avoiding staying in one place for too long; eating a healthy diet full of fruits and vegetables and eating foods rich in omega -3 fatty acids such as salmon, mackerel and herring

Key words: Degenerative disease, adjunct, management

Introduction

The word arthritis comes from the Greek “arthron” meaning joint and the Latin “itis” meaning inflammation. Arthritis can thus be defined as inflammation of the joint. Arthritis can affect any joint in the body. It is the main cause of disability among people 50 years of age and beyond. It affects both men and women but predominantly women. People live a lot longer these days than hitherto was the case. Many older people are afflicted by this condition. It is thus important that people learn how to manage it in order to continue to live an active life. It is also important to find out what experts know about the disease, in terms of causes, symptoms, treatment, as well as management techniques. There are over 100 types of arthritis. This paper will however discuss osteoarthritis (OA). Osteoarthritis sometimes called degenerative joint disease or osteoarthrosis is the most common form of arthritis. While OA can affect any joint in the body the disorder most commonly affects hands, hips, knees, neck and lower back. It gradually worsens with time and no cure exists. Treatment can relieve pain and helps one remain active. Taking steps to actively manage it may help one gain control over the symptoms. (<http://www.mayoclinic.com/health/osteoarthritis/D500019DSection.Retrieved> 27-08-2011)

Causes Of Osteoarthritis

OA involves the breakdown of cartilage. In this condition, the cartilage loses its elasticity. If the cartilage is stiff, it becomes damaged more easily. Cartilage, which acts as a shock absorber will gradually wear away in some areas. As the cartilage becomes damaged tendons and ligaments become stretched causing pain. Eventually the bones may rub against

each other causing very severe pain, swelling, inflammation and stiffness. (What is arthritis? What causes arthritis? 2009; Arthritis- Public Medical Health, 2011)

Signs And Symptoms Of Osteoarthritis

The symptoms of OA develop slowly and get worse as time goes by. There is pain in a joint during or after use, or after a period of inactivity. There is point tenderness when pressure is applied to the joint. The joint will be stiff, especially first thing in the morning. The patient may find it harder to use the joint. Hard lumps or bone spurs may appear around the joint. In some cases the joint might swell (What is arthritis? What causes arthritis? 2009; Public Health, 2011). As pointed out earlier in this paper OA is a degenerative disease with no known cure. It gets worse as time goes by. The fact that one suffers from this, ailment does not mean that life cannot go on. It is thus important that one finds out how to manage the condition in order to stay active.

Management Of Osteoarthritis

Osteoarthritis can be managed in a number of ways. The traditional ways include drugs, surgery and physiotherapy. The goal of treatment is to reduce pain, improve function, and prevent further joint damage. For osteoarthritis, it is believed that life changes that include exercise and a prudent diet are treatment modalities that can help in its management. The body is made for exercise. It must be moved on a regular bases or it deteriorates. According to Mooney (2011), exercise need not result in heart pounding fatigue to be beneficial. In fact exercise does not and in the case of osteoarthritis sufferers should not include high impact activities such as, running or sports such as tennis, basket ball or racquet ball, which require a lot of stopping, changing directions and jumping-all of which can stress vulnerable joints and jar bones together. Therefore, an exercise program which is a combination of exercises that increase flexibility, build strength and provide due impact aerobic conditioning will deliver substantial benefits.

Flexibility

Flexibility is range of motion around a joint. It is that quality of muscles, ligaments and tendons that enables them to move easily through a complete range of motion. Joints that are exercised regularly will remain flexible, while ones not exercised will become stiff. It is important to note here that flexibility is very important. When you are flexible you have the ability to move freely. It is also important to note that flexibility is specific. This means that an individual might for example demonstrate a high degree of flexibility in the shoulder joint but have limited flexibility in the knee joint. This is because the shoulder joint is a freely moveable joint that allows movement in all directions. On the other hand the knee joint is a hinge joint and allows movement only in two directions (flexion and extension). This important distinction must be taken into consideration when doing flexibility exercises to avoid injury. This bit of information is very important for osteoarthritis sufferers in order to avoid further injury (Igbunugo, 1995; Igbunugos, 2000).

Flexibility Exercises

Flexibility can be developed and maintained by specific exercises. There are two forms of stretching/ flexibility exercises - ballistic and static. The osteoarthritis sufferer needs to use the static form. Static stretching is done slowly and steadily. This is also called passive stretching. In this method the patient stretches slowly and pulls into a position, holds this position for 15-30 seconds, then releases. The patient should pull past the point of mild comfort each time. There

are flexibility/stretching exercises for joints in every region of the body (Hoeger & Hoeger, 2002; Igbanugo, 2002).

Strength

Strength is the ability to exert force. The strength of a muscle or group of muscles refers to their capacity to exert force against an external resistance. Muscle strength is important because it is like a foundation of a house upon which other structures depend. When muscles are weak, the quality of our performance decreases. Stronger muscles better protect the joints they cross (Housh & Devries, 2003). This is of the essence for osteoarthritis sufferers. The muscles supporting the affected joint must be exercised to prevent faster deterioration of the joint.

Strength Exercises

Strength is developed and maintained through performing specific exercises. There are two basic forms of exercises that can be used - static and dynamic. In static exercise the patient needs to tighten and relax selected muscles. Tighten and hold 5-10 seconds and then relax. This should be done a number of times. In dynamic exercise, the patient needs to lift weight using the specific muscles around the affected joint. The osteoarthritis sufferer who has an arthritic knee for example, will need to strengthen the muscles that support the knee joint. He needs for example, a sand bag (Sand bags come in 1kg or 2 kg) tied to his ankle, he sits on a chair and extends and flexes the knee, thus working the extensors and flexors of the knee (quadriceps and hamstrings muscles). It is necessary to perform these exercises through a comfortable range of motion. It is also necessary to overload as improvement occurs. It is important to note that maintaining muscle strength is necessary to control impact to the joints. Good muscle strength acts as shock absorbers around the joints.

Cardiovascular Endurance

Cardiovascular endurance is the fitness of the heart and blood vessels. A person with an optimal level of cardiovascular fitness has a strong heart, blood vessels that are pliable so that the system is able to function effectively and efficiently in performing its functions of supplying oxygen and nutrients to every cell in the body and removing waste products of metabolism from the cells. The fitness of this system is as important to osteoarthritis sufferers as it is to every one else.

Cardiovascular Endurance Exercise

Cardiovascular fitness is important for good health. It is necessary to develop and maintain it. This can be achieved through low impact aerobic exercises. Aerobic exercise that increases heart rate produces endorphins, the body's natural pain relieving hormone that in turn lessens the pain associated with osteoarthritis (Mooney, 2011). Low impact aerobic exercise include, walking swimming cycling. Mooney (2011) suggested an exercise program that incorporates a combination of exercises that improve flexibility build strength and provide low impact aerobic conditioning. There are certain forms of exercise that are particularly easy on the joints. These include water therapy, Tai chi, Yoga, Pilates, and walking or using a treadmill, stationary bicycle or an elliptical trainer.

- **Tai Chi.** This Eastern exercise approach is especially beneficial for building strength and flexibility and balance and provides moderate aerobic benefits. For elderly individuals

Tai Chi is considered a relatively safe form of exercise because the movements are slow and fluid. The Arthritis Foundation recommends tai chi as an activity for seniors because it provides balance of body and mind. It is sometimes called “moving meditation” because the focus is on breathing and creating inner stillness –quieting the mind, relaxing the body. One small randomized controlled study concluded that older women with osteoarthritis were able to safely perform 12 forms of Sun-style tai chi exercise for 12 weeks and this was effective in improving their arthritic symptoms, balance and physical functioning.

- **Yoga.** Another Eastern exercise approach is especially beneficial for building strength balance and flexibility- all factors that help control osteoarthritis pain. For many the meditative nature of yoga also provides mental benefits such as peace of mind and a feeling of overall well-being, which are positive factors in pain control can help reduce the feelings of stress and anxiety that often go hand in hand with osteoarthritis pain and disability
- **Pilates.** This is primarily a strengthening program that provides an overall workout that slightly elevates the heart rate and incorporates stretching the limbs and joints to increase flexibility. While this form of exercise is typically more demanding than many forms of Tai Chi and yoga, in general pilates exercise is effective for building strength especially the strength in the core body muscles and is gentle on the joints.
- **Exercises that include walking or using a treadmill, stationary biking, or using an elliptical.** These are all relatively low-impact forms of exercise that primarily provide cardiovascular benefits meaning that they provide a good workout for the heart, lungs and burn calories. For those with osteoarthritis pain these forms of exercise provide a good aerobic workout with relatively little stress on the joints. Stationary biking and the elliptical trainer cause less stress on the spine than walking or using a treadmill (Mooney, 2011).

Recommendations

It is recommended that 20 to 30 minutes of aerobic conditioning be done daily, combined with 10 minutes of stretching after the aerobics conditioning. Strengthening exercises should be done every other day to allow muscles time to repair themselves between sessions. Initially when pain makes everyday movement difficult, the motivation for exercise is not readily there, and it may be necessary to first address the pain. A variety of options are available with the help of the patient’s doctor. These include heat therapy, and cold therapy as appropriate, as well as the use of anti-inflammation drugs, as well as elastic supports. People should get plenty of sleep. Sleeping 8 to 10 hours a night and taking naps during the day can help you recover from a flare-up more quickly and may even help prevent flare ups. Avoid staying in one position for too long and void positions or movements that place extra stress on your sore joints. Change your home to make activities easier. For example install grab bars in the shower, the tub and near the toilet. Eat a healthy diet full of fruits and vegetables, which contain important vitamins and minerals, especially vitamin E. Eat foods rich in omega 3 fatty acids, such as cold water fish (salmon, mackerel, and herring). Flaxseed, rapeseed (canola) oil, soybeans, soybean oil, pumpkin seeds, and walnuts. Apply capsaicin cream over your painful joints. You may feel improvement after

applying the cream for 3-7 days. Loose weight, if you are overweight. Weight loss can greatly improve joint pain in the legs and feet.

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Sports and Physical Activity as a Part of a Healthy Lifestyle

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Abstract

Exercise is a non-medical procedure attaining wellness that is taken for granted by most people. This paper highlighted the benefits that accrue an individual who makes exercise or physical activity part of their routine life style. Physical activity is a means through which the adverse effects of stress can be managed for wellness. Depression, which disorganizes both the individual and societal health was extensively discussed. Lifestyle disease reduction through exercise was emphasized and some lifestyle factors were highlighted. Fitness, defined as being fit would enable healthier lives, as it would aid people in moving around and carrying out their daily chores even at old age. Smoking habits are adopted by some people as a lifestyle, and the adverse effects, which oftentimes may lead to death, were discussed. Obesity and overweight and the need for weight control through exercise for wellness were emphasized. Physical activity should be advocated as a major tool for mental development from childhood to adulthood and the benefits that may be derived from mentally well-developed individuals, as a mentally unstable person may bring about an unstable society in all its ramifications. Diabetes as it relates to exercise is another major issue and a diabetic patient experiences relief when they participate in physical activity. Individual lifestyles should be directed toward the avoidance of the lifestyle diseases by the inclusion of physical activity in the individual's daily lifestyle, so as to attain wellness.

Introduction

It is a fact that exercise is good for physical health but recently there has been a decline in the level of physical activity in the developing world. Man, has become too busy to create time for daily exercise with an excuse that engagement in "hard work" daily can replace exercise even for 30 minutes. Sports and physical activity is being used to improve the mental, physical and social well-being for some people. The promotion of healthy lifestyle choices combat inactivity and increase the awareness of communicable disease. For example a football player involved in a campaign on the awareness of HIV/AIDS in Nigeria will greatly enlighten people on its existence and measures taken to curb its spread in society. The state of inactivity affects the totality of the human body. Muscles may atrophy and discomfort occurs when it is engaged in extreme activity. Sport and physical activity has long been used as a means of improving mental, physical and social wellbeing. Physical activity in a developing country like Nigeria has not been changed, especially among the pre-school and school children, as schools do not pay attention to physical activities. In schools no provisions are made for playgrounds when schools seek approval from the government. This trend is most common among the government approved 'private schools' that have sprung up to fill the gap created by the inability of government owned schools to accommodate all school attendees. Physical activities is seen by most private

schools as a waste of time, as some parents consider physical activity as an avenue to get children dirty and incur injuries. So physical education is now equated with only inter-house competitions and preparation takes just a few weeks, with emphasis on only calisthenics and after the meet, everything about physical activity is kept away until the following year as no effort is made by both the parents and school proprietors to inform students on the immediate benefits that will accrue to them if they engage in forms of physical activity. When there is a discussion on physical activity in Nigeria, all minds immediately think of football. However, this new interest came about because of monetary gains attached to the game of football. In the recent past, parents would not encourage their children to participate in any form of physical activity; reasons were that it would jeopardize their chances of excelling in other professions. Unfortunately, most person do not know that physical activity is necessary for the effective performance in other professions such as Medicine, Law, Engineering etc as people can fall ill due to inactivity. Inactivity is a major factor associated with a large number of lifestyle diseases such as cardiovascular disease, cancer, diabetes and obesity.

The lifestyle of a person to a greater extent determines the health status as those that adopt a sedentary lifestyle tend to be obese. Although, the obese are overweight, the two conditions differ. Overweight simply means that the person weighs more than the desirable weight for his/her age and size. Many well-developed athletes are overweight because of their muscular development, but they are not obese. To be obese means excess deposits of fat or adipose tissue in the body. The body needs adipose tissue, but serious problems can develop if excess fat accumulates. The World Health Organization (WHO 2006) opined that the prevalence of obesity has dramatically increased in the past decades in both developed and developing countries and that 1.6 billion adults are overweight and at least 400 million are obese. Calle (2007) and Lin, Yao, Wang et al (2006) postulated that the prevalence of obesity has been recognized as important and independent risk factors for many chronic disease such as diabetic mellitus, hypertension, stroke, cardiovascular diseases and malignant diseases. Substantial epidemiologic evidence shows that obesity is associated with an increased risk of cardiovascular-related and all-cause mortality (Pischon, Boeing, Hoffmann et al, 2008) and Kannel, D'Agostino and Cobb, (1996). Therefore, obesity is a major public health problem around the world. A sure way of losing weight is that you must use up more calories than you consume. Sports attract a large number of spectators and can be used to communicate vital health-related information to a risk group e.g. in inter-house and School Sport Competition, health information such as the use of condoms in the prevention of STDs such as AIDS can be passed on to youths while free condoms are shared among youths. In this way sports is being used to mobilize the hard-to-reach groups as part of large-scale health campaigns. Sports are recreational and employed to reduce tension (stress) and depression.

Depression is a prevalent problem in society and it is estimated that patients suffering from critical depression make up 6-8% of general medical practices (Katon & Schullerg 1992). Depression is also costly to the healthcare system in that, depressed individuals annually spend 1.5 times more on healthcare than non-depressed individuals and treatment with anti-depressants spend three times more on out-patient pharmacy costs than those not on drug therapy (Simon, Vonkorffi & Barlow 1995). Exercise has been proposed as an alternative or adjunct to more traditional approaches for treating depression (Hales & Travis 1987., Martinsen, 1987, 1990). When workload is heavy, a break should be taken to let-off steam by participating in sporting activities as most "Executives" do by playing golf to reduce occupational stress. The positive attitude of regular involvement in sports should be inculcated in the pre-primary and primary

school children, and be encouraged to take time off to engage in sport which would ultimately be a part of their daily routine and not see sport as a waste of time and resources. However, physical inactivity is a global challenge, as most adults do not participate in sufficient levels of physical activity, as physical inactivity is common among the disabled or challenged women and older adults. Lifestyle diseases can be reduced with regular exercises.

Lifestyle disease reduction through exercise

The lifestyle of an individual influences his or her health status. Obesity is when one adds excess weight due to inactivity or doing jobs that minimal force is needed to carry out. Lifestyle simply means the way you carry out your daily activity in relation to your habits, dietary patterns, food intake and patterns of exercises. Lifestyle either negative or positive will to a greater measure determine health status. Adopting a faulty lifestyle is tantamount to committing suicide, as it is common knowledge that daily activity enhances health and longevity. Many either due to ignorance or neglect of themselves degenerate to very low health before seeking treatment. In Nigeria, other factors such as poverty determine if an illness merits been treated in the hospital or the chemist as drugs are freely purchased over the counter exposing them to fake ones, which may result in death from treatable and preventable diseases.

A way of life or style of living reflects the attitudes and values of a person or group. (The American Heritage Dictionary of the English Language, 2009). Many of these diseases could be prevented if people practiced a few simple health habits. Merki and Merki (1987) postulated that lifestyle factors included the following: Between 8 and 9 hours per night sleep, three meals a day at regular times, no smoking, daily breakfast, moderate aerobic exercise daily, or at least three to four times a week, and maintenance of recommended weight. These lifestyle habits may appear quite simple, but how many people practice them? Practicing good health habits involves more awareness of its existence or what to do. For people to practice good health habits people must have faith in the benefits that may accrue to them and not engaging or practicing good health could lead to low health status, as a result from complications of inactivity. The younger a person is, the least he thinks of his health because younger persons tend to be strong and healthy. So, minimum attention is given to one's health as a careless attitude toward health when younger, has given rise to many sickly, weak adults. To motivate a change in health behaviour, the benefits of good physical health and fitness must be embarked upon. However, many teenagers have one or more of the risk factors associated with disease, such as overweight, high blood pressure, high cholesterol, cigarette smoking or lack of exercise (Merki and Merki 1987). There is the need, for all to be fit irrespective of age as this will ward off many diseases and increase wellness and longevity. However, being active is an important part of a healthy life style for all ages. In society, we see persons adopting smoking as a lifestyle. They are people who are even addicted to smoking despite their awareness of the negative impact of smoking on their health. Governments have placed a ban on smoking in public places. Adverts are on the mass-media of its negative effects on health. It is sad to note that as hot as Africa is, people still smoke there probably for the "kick" they derive from it. Many people who smoke have low body weight and most often come down with diseases such as tuberculosis (TB). Gu, Kelly, Wu et al (2001) and Wilson, Clark Hotz et al (2001) opined that smoking is associated with lower body weight and an increased risk of death.

Fitness a way of life

For people to exhibit some level of wellness they must develop a positive attitude toward being fit and getting involved in regular exercise. Many equate fitness to physical education or physical fitness; however, fitness is not limited to the physical. Fitness simply means one is ready and is better equipped to handle what they faced on a day-to-day basis than non-fit people. One's fitness level affects the totality of his being as his level of fitness that affects his sleep, eating and learning. A fit individual looks well, has energy and generally feels good about himself, as keeping fit is a life long endeavor which should not be seen as something you do but what you are. A fit person is physically, mentally, socially and emotionally prepared for what lies ahead and enhances their self-image. Sedentary living means inactive living, a way of life that is mostly spent sitting down which is not good for our health.

A person who is physically fit will enable them to stay independent and still get around even when they are old. Aerobic fitness refers to the health of the heart and lungs of people who are aerobically fit, these organs will be able to deliver oxygen around the body more efficiently, so the heart is under less strain. However, aerobic fitness and muscle strength tend to degenerate naturally with age. Bupa's health information team (2010) posited that studies show that many aspects of the ageing process such as finding it more difficult to get around, can be slowed down by staying physically active for as long as possible. Regular exercise can reduce the risk of developing: heart disease and strokes, diabetes osteoporosis (osteoarthritis and back pain), high blood pressure and some cancers, such as bowel cancer. Exercise can improve muscle strength and tone, which may mean you are less likely to have accidents or a fall that could lead to an injury. Benefits of regular exercise improve your flexibility, mobility (speed and stamina), cognitive abilities (such as memory and reasoning skills), sense of well-being and quality of life.

Weight gain results when you consume more calories in food and drinks than you burn up. Maintaining a steady body weight involves the using up of the same number of calories as was taken in. Adding weight is quite easy, most especially when you spend too much time in front of the computer or T.V or doing an office-based job can mean that you burn up less energy than you need to keep weight off (Bupa's Health Information 2010). It is saddening to see individuals gradually slipping or engrossed in inactivity as inactivity is a prerequisite to obesity. A little time away from physical activity will increase one's body mass index and a continuous stay may end in obesity. The obese are bedeviled with many terminal illnesses, which may lead to death. Substantial epidemiological evidence shows that obesity is associated with an increased risk of cardiovascular-related and all-cause mortality (Kannel 1996; Pischon, Boeing, Hoffmann et al., 2008). However, obesity is now a major public health problem that simple daily exercise could help prevent.

Physical activity and mental development

Scientific evidence abounds that people who are active are less likely to be ill and more likely to live longer. Exercise not only makes you physically fitter, it helps you to look and feel good as building activities into your every day life, such as walking is good and will cost you nothing. An attitude of engaging in daily activities should be imbibed because it is most beneficial. A mentally well-developed individual is of immense benefit to the society, so children should be well guided to ensure they are developing positively mentally. Mental health is considered to be illness state (i.e. pathological depression) as well as conditions that limit wellness or quality of life (i.e. anxiety, low self-esteem). It is known that exercise is good for

one's physical health and only recently we find in magazines and health newsletters that exercise can promote a sound mental health.

The urge to be successful in life has made many anxious and the individual anxiety has increased with civilization and modernity. The craze with which people face life and its activities has made many depressed due to excessive anxiety. Lander and Petruzzello (1994) examined the results of 27 narrative reviews that had been conducted between 1960 and 1991 and found that in 81% of them the authors had concluded that physical activity/fitness was related to anxiety reduction following exercise and there was little or no conflicting data presented in these reviews. For the other 19%, the authors had concluded that most of the findings were supportive in anxiety, but there were some divergent results. None of these narrative reviews concluded that there was no relationship. The world is moving faster and the inability of the individual to cope with this rate, has raised too many anxious and depressed persons, at an alarming rate and a way out of these anxious moments must be sought. Stress-related emotion, such as, anxiety are common among healthy individuals (Cohen, Tyrell & Smith 1991). With the way things are worldwide, people are full of fear of the unknown. Lazarus and Cohen (1977) postulated that this usually arises...in the face of demands that tax or exceed the resources of the systems or ... demands to which there are no readily available or automatic adaptive responses. There is an urgent move to curb the fast and crazy move of society, leading to the creation of many emotionally unstable individuals with exercise as a preventive measure. The current interest in prevention has heightened or adjusts to traditional interventions such as psychotherapy and drug therapies (Landers 1996). Erroneously people believe that only vigorous exercise or playing sport is regarded as physical. However, considerable health benefit accrues from regular activity without needing special equipment or sporting ability as you do not even need to get very hot and sweaty to have been engaged in physical exercise.

Exercise and diabetes

Exercise has the ability to control diabetes by non-medical means as the severity of the ailment can be drastically reduced, and a reduction of the long term complications and risk. Mullen (2008) opined that diabetes mellitus is a condition where the body has trouble taking glucose from the blood, delivering it to the rest of the body so that it can be used as energy from a lack of or an inability to use insulin, the hormone required to "escort" glucose from the blood cells of the body. Aerobic exercise increases insulin sensitivity and along with proper nutrition, helps restore normal glucose metabolism by decreasing body fat, strength training (a.k.a resistance or weight training) also decreases body fat by raising the metabolism. It's main benefit, however, is increasing glucose uptake by the muscles and enhancing the ability to store glucose. For non-medical means of the management of diabetics, a physical assistance is necessary as other complications may arise if the person has other medical conditions which may not be visible physically which exposure to exercise may trigger. The most common type of diabetes is type 2-which means people who are "insulin resistant", that is they do produce insulin, but it is not effective in escorting the glucose into the cells.

Aerobic exercise may assist in the management of type 2 diabetes as many of them are sedentary and overweight. Low impact exercises such as walking or stationary cycling are recommended, alongside other exercises that could promote weight management. Strength training is recommended for those who have no other complications, strength training is safe and can provide many benefit such as increase lean mass which will help in weight management as well as increase glucose uptake by the muscles and help the body to store glucose (Mullen 2008).

However, strength training programs should be designed to suit the person's needs, desire, level of conditioning and time factors. Exercises are known to reduce body fat, as it helps to normalize glucose metabolism. Exercise and good nutrition provide real physical pay off... they are essential to conditioning diabetes. Exercise can help prolong life and improve the quality of added months and years. She further stated that diabetics who play the "numbers game" commonly see a 20 percent decrease in their blood-glucose level after exercise. However, exercise should be seen as fun and people should be exposed to a variety of them. Family support is necessary when diabetics use exercise for the management of disease condition.

Conclusion

Caring for your health is a responsibility owed to oneself as nobody can care for your health more than you. Caring for oneself starts by determining to know all about how to stay healthy or improve your health and taking action based on health information gathered. The human body is a complex set of parts that work together, and how well these parts work depends greatly on the day to day care given to the body, as your health is greatly determined by your choices. Your wellness is in your hands and it's a personal decision, so you can decide to operate in total health or in low health. Unfortunately, many claim ignorance of their health status until they fall sick, whereas illness may be ward off by regular and constant care of the body. The human body can be likened to a machine and if not serviced will definitely breakdown but most people consider the human body as a machine that can never breakdown and so to expose it to over use with little or no care. Even "fuel" (food) that the humans take with the singular reason that funds are insufficient (poverty). However, there are means of keeping the body in a good state of health without necessarily involving finance, which is by exercise. Exercises have been known to relieve stress, control weight, clear the mind and promote one's self-esteem. Exercise takes time and discipline, but it is mandatory as it not only keeps one in shape, but may actually be a cure for some health problems. The physical, mental and social choices that one makes affects how healthy one will be and is responsible for one's choices. Zummer(2010) defined wellness as the pursuit of a healthy, balanced lifestyle. Wellness, as an alternative concept, is generally thought to mean more than the mere absence of disease; rather it is an optimal state of health. Wellness is pursued by people interested in recovering from ill-health or specific health conditions or by those interested in optimizing their already good state of health.

Wellness generally means a healthy balance of mind, the body and spirit that results in an overall feeling of well-being. Wellness, as a luxury pursuit is found obviously in the more affluent societies because it involves managing the body state after the basic needs of food, shelter and basic medical care have already been met. Many of the practices applied in the pursuit of wellness are aimed at the control and prevention of obesity and inactivity. Wellness is a state that combines health and happiness. To achieve a state of wellness, one has to work on its determinants such as physical stress, chemical stress and mental stress etc. The wellness level of an individual is also determined by living in a clean environment, eating good food, regularly engaging in physical exercise, balance in career, family and relationships and developing religious faith.

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Exercise Behavior as a Correlate of Selected Health Indicators among Female Nurses in a Suburb in Lagos Nigeria

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Abstract

This study investigated the relationship between exercise behavior and selected health indicators among female nurses in the public services of Lagos State Government in a suburb within the State. These health indicators included body mass index [BMI], resting heart rate [HR] and resting blood pressure [BP]. Purposive sampling technique was used to select 62 participants, and a Self-developed questionnaire with reliability value of 0.91 was used to collect data on exercise behavior. Data collected also included those on age, height, weight, resting heart rate, and resting blood pressure. The data were analyzed using percentage, mean and Pearson's Product Moment Correlation Coefficient. Findings showed poor exercise behavior among the female nurses, and significant relationship between their exercise behavior and the health indicators.

Introduction

Enhancing efforts to promote participation in physical activity and sports among people is a critical national priority that may require urgent attention from all stakeholders (Onifade, Dansu, Williams & Adefuye, 2009). According to National Centre for Chronic Disease Prevention and Health Promotion (CDC, 2006), physical activity has been identified as one of the nations' leading health indicators in Healthy People. Agbanusi (2006) is of the opinion that regular exercise makes one become more health conscious, and it appears that an increase in fitness level achieved via positive exercise behavior leads to an increase in self-esteem; and as one feels better about oneself, one is more likely to have a greater sense of control over the factors that influence ones health. The Surgeon General's report as stated by CDC (2006) made it clear that the health benefits of physical activity are not limited to any age-group or status. Regular participation in physical activity during childhood, adolescence, youth, and adulthood

- helps build and maintain healthy bones, muscles, and joints.
- helps control weight, build lean muscle, and reduce fat.
- Prevents or delays the development of high blood pressure and helps reduce blood pressure in some adolescents with hypertension.

On therapeutic benefits, Okuneye (2002) opines that exercise can reduce mild to moderate hypertension, which are results of chronic elevation of the blood pressure above optimal level (Musa, Uzonicha & Dikko, 2003). The antihypertensive effect of exercise manifests from improved cardiac functioning that results in a reduced resting heart rate, increased maximal oxygen consumption, and decreased cardiac work (Okuneye, 2002). Musa et al. (2003) also propose exercise training as an initial approach in the treatment of essential hypertension and its associated diseases (such as obesity), especially for individuals with mild to moderate cases. They also propose exercise as a strategy to reduce the likelihood of developing hypertension in high-risk individuals and to reduce mortality in hypertensive individuals.

It is sad to note that despite these benefits of exercise, there are still numerous negative exercise behaviors among various groups of people (Okuneye & Dansu, 2007; Adeogun & Dansu, 2006; O'Brien, 2005; National Centre for Health Statistics, 2003; Okuneye, 2002; CDC,

1999). Okuneye (2002) observes that physical activity behavior of people have been tremendously altered due to modernization or technological development in the society. The way people spend their leisure nowadays, particularly television viewing, result in people being less active.

Accumulating evidence indicates that low cardiorespiratory fitness increases the risk of CHD, independent of other known risk factors. Physical activity is associated with cardiorespiratory fitness and with other CHD risk factors such as obesity; and exercise can improve lipoprotein profile and lower blood pressure, and is an important component of weight control (Okuneye & Dansu, 2007; Adeogun & Dansu, 2005, 2006; Agbanusi, 2006; Okuneye & Adewale, 2004; National Institutes of Health [NIH], 1994). Resting heart rate, blood pressure, and body mass index (BMI) are major health indicators. Resting heart rate is often used as indicator of fitness (Howley and Frank, 1992), which is a major factor of health and wellness. Maintaining an optimal level of blood pressure is very important to the health of individuals (Musa et al., 2003). One becomes hypertensive when the blood pressure is chronically elevated above optimal level. According to Musa et al. (2003), the National High Blood Pressure Education Program define optimal level of blood pressure as 120/80mmHg. BMI is used to estimate healthy weight of average people. Many health or physiological variables that include heart rate and blood pressure are dependent on factors such as BMI (Nwankwo, Ene & Nwankwo, 2008). A BMI of 20 to 24 is desirable for most adults (Encyclopaedia Britannica, 2008).

Studies have revealed sedentary living among various groups of people (Keep Kids Healthy, 2007; CDC, 2006; 2005; & Mason, 2002), and sex variation is of a particular interest. In the Surgeon General report on physical activity and health, a greater percentage of female than their male counterparts do not exercise (Padden, 2003). Similarly, U.S. Department of Health and Human Services (DHHS, 2002) reports women to be generally less active in comparison with men. This study was designed to investigate the relationship between exercise behaviors and selected health indicators including BMI, resting heart rate, and blood pressures for female nurses in the public services of Lagos State in a suburb of Lagos Nigeria. The following null hypotheses were therefore tested in this study.

- i. There would be no significant relationship between exercise behavior and BMI of participants of the study
- ii. There would be no significant relationship between exercise behavior and resting heart rates of participants this study.
- iii. There would be no significant relationship between exercise behavior and systolic blood pressures of participants of this study.
- iv. There would be no significant relationship between exercise behaviors and diastolic blood pressures of participants of this study.

Methods

Participants

The population of this study included all female nurses in the service of the Lagos State Government in the suburb areas within Lagos in Nigeria. Purposive sampling technique was used to select 62 of them who participated in this study. They were selected from their various stations of work – higher institutions, Local Government Secretariats, and primary health care centres within Ojo Local Government Area of Lagos State Nigeria.

Instrumentation

A self-developed questionnaire was used to collect data on exercise behaviors of the participants. It sought information on how regularly they exercise, and the duration and type of exercise engaged in. The questionnaire was given to three colleagues for the purpose of validation and was also subjected to test-retest method of reliability. Its r value was 0.91. Ages of participants were taken and recorded to be nearest their birthday, while the standard measurements procedure as described by the International Society for the Advanced of Kinanthropometry (ISAK, 2001) were followed to measure height and weight for BMI. The resting blood pressures were measured using Alcoson's Product Mercurial Sphygmomanometre and Stetoscope. These were done following the procedure described by Okuneye and Adewale (2004). Resting heart rates were taken through palpation of radial and carotid pressure points following the procedure described by Corbin, Welk, Corbin and Welk (2004).

Data Collection

The researchers visited the work stations of the participants within the hours of 8:00am to 10:00am on each working day within two weeks for data collection. Administration of the questionnaire was done at the point of measurements. A data sheet of measured characteristics of each participant was attached to her copy of the questionnaire to avoid mix up.

Data Analysis

Data collected were coded; points were assigned to responses of participants to the maximum of 10 points on exercise behavior. All data were subjected to statistical analyses of simple percentage, mean, standard deviation and Pearson's Product Moment Correlation Coefficient (PPMC). Pictorial analysis of scattergram was used to further describe results. WINKS Statistical Data Analysis Package was used for the computation of results while hypotheses were tested at the 0.05 level of significance.

Results

Table 1.

Mean, Standard Deviation and Range Results on Selected Physical Characteristics and Health Indicators of Participants

VARIABLE	AGE (Yrs)	WT. (Kg)	HT. (Cm)	BMI Kg/m ²	SBP (mmHg)	DBP (mmHg)	RHR (b/min)
\bar{x}	38.33	71.15	158.18	33.21	127.50	86.27	76.21
sd (\pm)	10.12	12.42	6.58	9.56	11.00	6.22	7.40
RANGE	25-57	51-113	148-171	23-44	110-150	70-100	72-96

Table 1 shows that the mean age of the participants of this study was 38.33 ± 10.12 within the range of 25-57 years. Their BMI was 33.21 ± 9.56 within the range of 23-44kg/m², and the mean resting heart rate was 76.21 ± 7.40 within the range of 72-96b/min. The mean resting blood

pressure (BP) of the participants was 127.50/86.27±11.00/6.22 within the range of 110/70-150/100mmHg.

Table 2.

Frequency and Percentage Distributions of Participants by Exercise Behavior

Exercise Frequency	Everyday (%)	3-4 times/wk (%)	1-2 times/wk (%)	Occasionally (%)	Not at all (%)	TOTAL (%)
	06 (9.7)	08 (12.9)	16 (25.8)	21 (33.9)	11 (17.7)	62 (100)
Average Exercise Duration	≥60mins (%)	40-50mins (%)	20-30mins (%)	≤10mins (%)	Not at all (%)	TOTAL (%)
	03 (4.8)	07 (11.3)	23 (37.1)	18 (29.1)	11 (17.7)	62 (100)

Results in Table 2 shows that a very low percentage of the participants engaged in exercise everyday (9.7%) or at least 3 to 4 times per week (12.9%). Also, a low percentage of the participants accumulated 60 minutes (4.8%) of exercise per day, and 17.7% of the participants did not exercise at all.

Table 3.

Summary of Pearson's Correlation Analysis on Exercise Behavior of Participants and Measured Health Indicators

Variables	\bar{x}	sd (±)	r	r²	T	P
BMI	33.21	9.56	0.77	0.59	4.36	0.00
Resting HR	76.21	7.40	0.52	0.27	2.46	0.03
Sys BP	127.50	11.00	0.86	0.74	4.76	0.00
Dia BP	86.27	6.22	0.45	0.20	2.21	0.04

Note. $df = 61$.

The results presented in Table 3 were used to test the hypotheses stated in this study. The results indicate a significant relationship between exercise behaviors of the participants, and all the health indicators measured in this study (Body Mass Index: $r = 0.77$; $p < 0.01$, Resting Heart Rate: $r = 0.52$; $p < 0.05$, Systolic Blood Pressure: $r = 0.86$; $p < 0.01$, Diastolic Blood Pressure: $r = 0.45$; $p < 0.05$). Based on these results, all the null hypotheses tested in this study were rejected.

These results are further described in figures 1 to 4

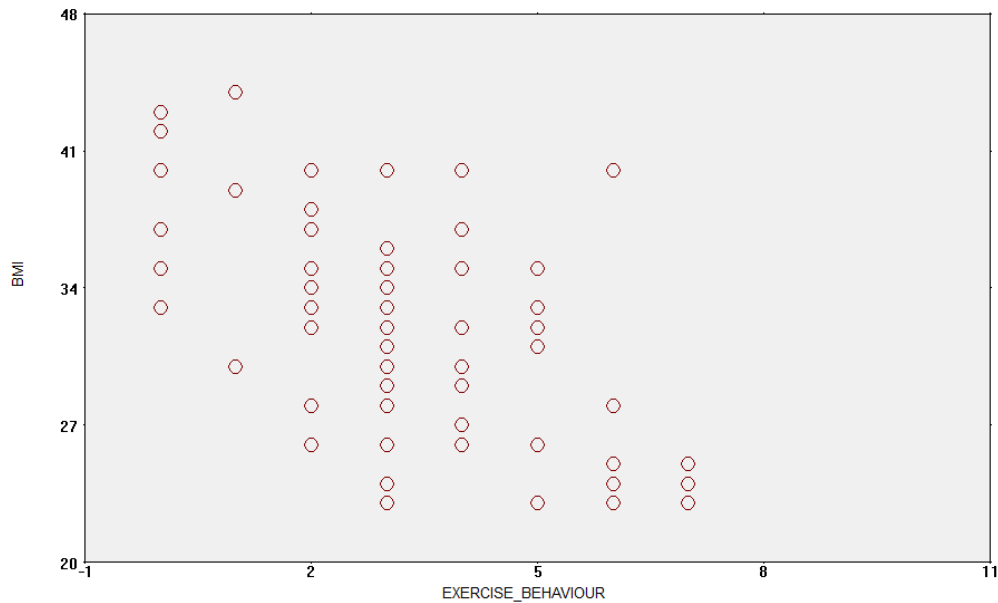


Figure 1. Scatter Plot on Exercise Behavior and Body Mass Index

The scatter plot in figure 1 shows greater number of participants scored below 5 points in the 10 points allotted to exercise behavior in this study. Most of those who scored low points on exercise behavior recorded high body mass index ($>30\text{Kg/m}^2$).

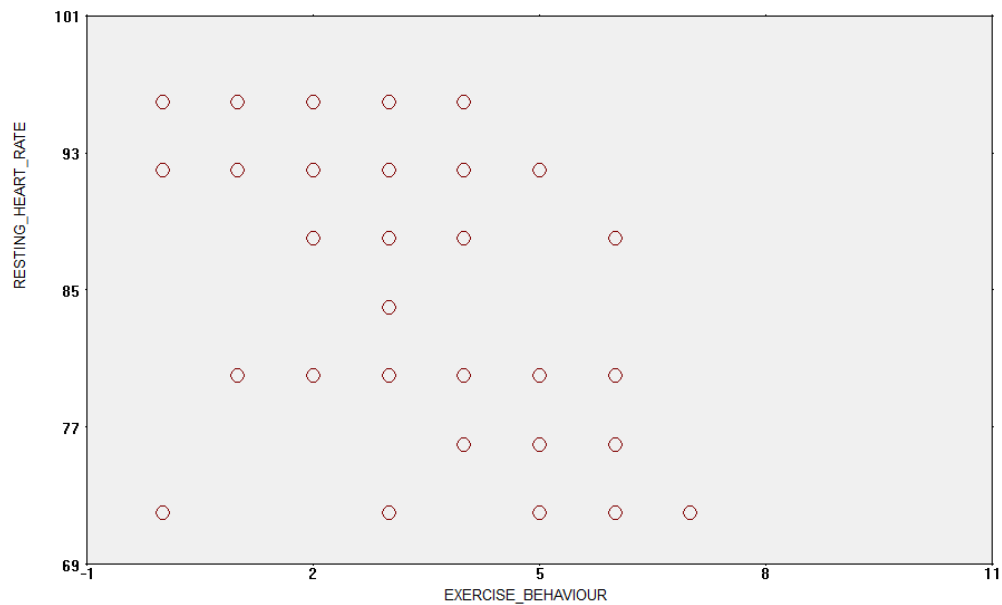


Figure 2. Scatter Plot on Exercise Behavior and Resting Heart Rate

The scatter plot in Figure 2 shows high number of the participants scored below 5 points in the 10 points allotted to exercise behavior in this study. Most of those who scored low points on exercise behavior recorded high resting heart rate (>90b/min).

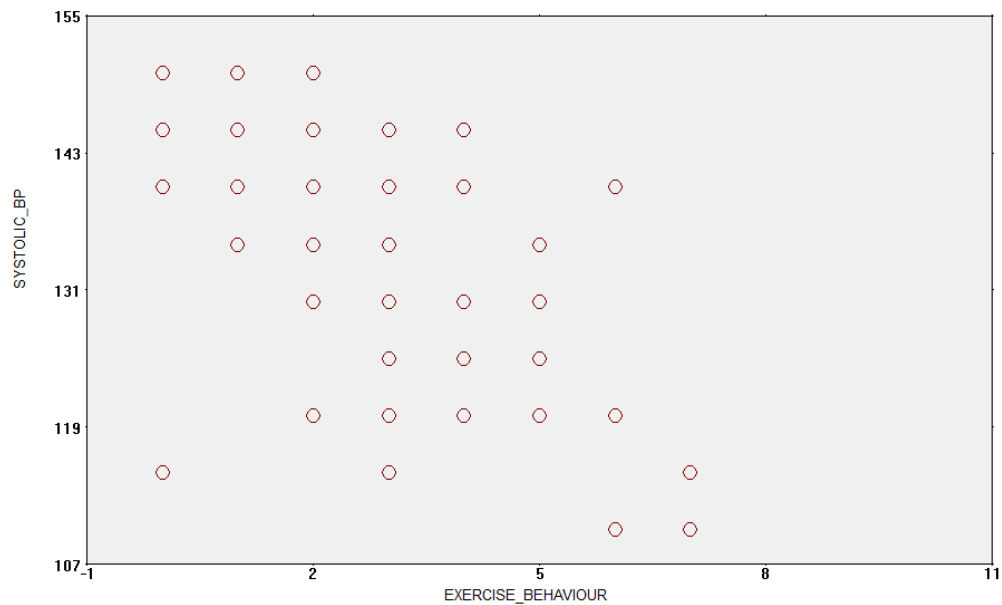


Figure 3. Scatter Plot on Exercise Behavior and Systolic Blood Pressure

The scatter plot in Figure 3 shows the high number of the participants scored below 5 points in the 10 points allotted to exercise behavior in this study. Most of those who scored low points on exercise behavior recorded high resting systolic blood pressure ($>130\text{mmHg}$).

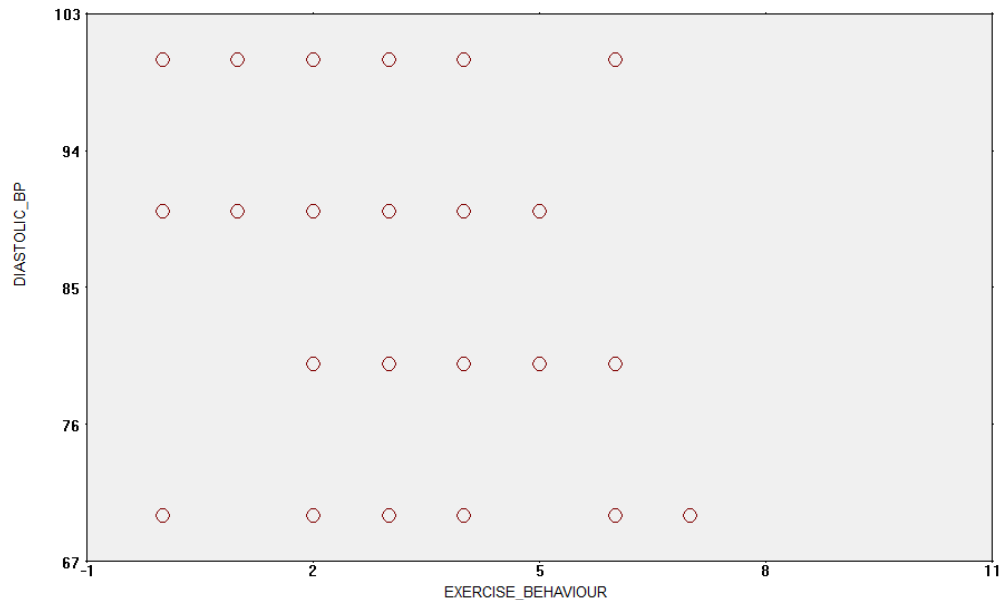


Figure 4. Scatter Plot on Exercise Behavior and Diastolic Blood Pressure

The scatter plot in figure 4 shows a high number of the participants scoring below 5 points in the 10 points allotted to exercise behavior in this study. Most of those who scored low points on exercise behavior recorded high resting diastolic blood pressure ($>90\text{mmHg}$).

Discussion

Findings of this study showed poor exercise behavior among the participants (see table 2). It could be expected that nurses who are health practitioners should be more conscious of the health values of exercise, and this should reflect in their exercise behavior. But the interview of the participants during the study showed that many of them developed this poor behavior as a result of tight work and domestic schedules. Also, a misconception of fitness and wellness as “absence of disease” is another factor responsible for the poor exercise behavior. Okuneye and Dansu (2007) reported similar behavior among female employees of Lagos State University, Nigeria, and recommended that the university management should initiate policies and practices that would motivate employees to cultivate active lifestyle.

Results of this study further show strong relationship between exercise behaviors of participants and their body mass index (see table 3 and figure 1), resting heart rate (table 3 and figure 2), resting systolic blood pressure (table 3 and figure 3), and resting diastolic blood pressure (table 3 and figure 4). These findings indicate that exercise is related to these health indicators. Okuneye, Dansu and Idowu (2008) found high BMI among a group of child-bearing age women and recommended that these women should be encouraged to participate in programmes that work against gaining excessive weight, as exercise will prevent obesity and

associated diseases. In a related study, Adeogun and Dansu (2005) report high systolic and diastolic blood pressures among a group of undergraduate students who on average had negative exercise behavior. The findings of this study also agrees with the report of Musa et al. (2003) that exercise training appears to reduce systolic blood pressure and diastolic blood pressure for people of hypertension, and this make exercise an effective non-pharmacological modality in the management of hypertension.

According to Nabofa and Muoboghere (2006), there are clear differences between individuals who participate in physical activity regularly and those who do not. These differences are in physiological parameters such as resting heart rate and resting systolic and diastolic blood pressures, with those who exercise regularly relatively better than their counterparts who do not exercise. Nabofa and Muoboghere (2006) report mean resting heart rate of 71.17 and mean resting blood pressure of 110/70mmHg for a group of combat sports athletes. Boroffice, Adeogun and Idowu (2002) also report mean resting blood pressures of 115/72mmHg and resting heart rate of 75b/min for Lagos State Sports Council coaches. These should be expected since these populations are regular at exercise and physical activities.

Similarly, O'Neill (2000) reports a significant improvement in resting heart rate, and resting systolic and diastolic blood pressures of selected females who were engaged in eight-week exercise programme. Citing other studies, O'Neill (2000) also reports 9% reduction in resting heart rate and 6% and 5.7% reduction in resting systolic and diastolic blood pressures respectively. Okuneye and Adewale (2004) also report that adolescents with high blood pressure participate in sports and exercise as a way of avoiding or reducing the risk of hypertension.

Conclusion

Based on the findings of this study, it is concluded that there was poor exercise behaviors among the female nurses in the public services of Lagos State Government in the suburb area of Lagos, Nigeria. Also, there was a negative linear relationship between their exercise behaviors and their BMI, resting heart rate, resting systolic and diastolic blood pressures.

Recommendations

This study perceives a strong need for re-educating the nurses on wellness and fitness, to erase the common misconception of "absence of disease". It is therefore recommended that the government in collaboration with experts in exercise and wellness should organize workshops for the nurses on exercise, health and wellness. Such workshops should be rich in pragmatic approaches to positive exercise behavior, targeted at changing individuals' attitudes and practices of exercise. The nurses should also be motivated via provision of fitness facilities at places of work, and a compulsory break period should be initiated to allow everybody to make use of these facilities. Fitness kits clothing and shoes, could also be customised by management of different offices, and given or sold at affordable prices to workers to motivate them for participation in exercise.

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Stress as a Cardiovascular Disease Risk Factor among Selected Senior Staff of Bayero University, Kano

Lawal Ibrahim Yazid

Abstract

This study investigates the prevalence of Stress as a Cardiovascular Disease Risk Factor and how exercise could be used in the management of stress conditions among Senior Staff of Bayero University, Kano. To achieve this objective a descriptive design was used. The sample of the study was selected using proportionate and simple random sampling techniques, and a sample of 309 respondents of the Academic and Non Academic staff of the University was comprised. The instrument used for this study was a self-constructed questionnaire on Cardiovascular Disease Risk Factors (CDRFQ) validated by experts in the field of Health and Exercise Science. Copies of questionnaire were administered on the subjects. Of the 309 questionnaires distributed, 287 copies were dully filled and returned. An anthropometric measurement of blood pressure, weight and height were taken of the subjects. The data collected were statistically analyzed using descriptive statistics of simple percentage for the demographic data, while inferential statistics were used of Chi Square at 0.05 level of significance. Two research hypotheses were formulated. Findings revealed that Physical Inactivity and Stress were significant Cardiovascular Disease Risk Factors among Senior Staff of the University. It was therefore recommended, among others that keep fit programs should be properly organized and supervised by the Department of Physical and Health Education on either a weekly or monthly basis and adequate physical fitness equipment and recreational facilities should be provided.

Introduction

The term stress refers to frustration, anxiety, tension and fatigue, which was derived from the Latin word 'stringere' meaning to be in a tight state. The word is hard to define, because it is a relative term due to the subjective nature of the word, according to Obadofin, (2009) who explained stress as any physical, chemical or emotional factor that causes bodily or mental unrest and that may be a factor in diseases causation. The physical and chemical factors that can cause stress include trauma, infections, toxins, illnesses and injuries of any sort, stress occurs when one is confronted with events that are perceived as inimical to their physical and psychological wellbeing.

Because of the psychosomatic nature of man and interacting nature of man, stress may be classified as competitive stress, which is seen among peers. Furthermore, stress varies in nature, amount, direction and in reference to the individual (Akeredolu & Adeogun, 2004). In the same vein, Wiley (2000) viewed stress as a process in which the environmental events or forces threaten the wellbeing of an individual in the society, it is a disruption of the emotional stability of the individual that induces a state of disorganization in personality and behavior, it is a biological phenomenon that is experienced by all persons regardless of their socio-economic status, occupation or age. Fawole (2003) posits that in response to daily strains, our bodies automatically increase blood pressure, heart rate, respiration, metabolism and blood flow to the muscles. This response is intended to help the body react quickly and effectively to a high pressure situation. However, when such reactions are constant without making adjustment to

counter the effect, the stress level will increase to the extent that the wholesome state of the person's health and well-being may be seriously threatened.

Stress and Stressors

American College of Cardiology (2005), asserts that many of the psychological and social factors that influence other areas of wellness are also important risk factors for CVD such as:- Stress, Stroke, Osteoporosis, Obesity, Heart Diseases, Hypertension (High Blood Pressure) Depression, Anxiety, Mood (mental health) and Diabetes. Excessive stress can strain the heart and blood vessels over time and contribute to CVD. A full-blown stress response causes blood pressure to rise; blood platelets become more likely to cluster, possibly enhancing the formation of artery-clogging clots. Stress can also trigger abnormal heart rhythms (arrhythmias), with potentially fatal consequences.

Hypothesis:-

Stress is not a significant Cardiovascular Disease risk factor among senior staff of Bayero University Kano.

Physical inactivity will not be a significant Cardiovascular Disease risk factor among senior staff of Bayero University Kano.

Methodology

Sample

The sample of 309 subjects formed the sample and were drawn from four faculties comprising of 24 departments, made up of six departments from each faculty, were selected using proportionate sampling technique, while stratified sampling technique was employed in selecting the sample, that made up of 148 teaching staff (134 males & 14 females) respectively, and 161 made up of non teaching staff represented by (males 130 & 31 females) respectively.

Instrument

The instruments for data collection was a self-developed, modified Likert type questionnaire named the cardiovascular disease risk factors questionnaire (CDRFQ) which is divided into two sections: Sections A sought information on demographic data of the subjects, (Age, Sex, Designation Weight, Height and blood pressure). Section B sought information on physical activities; cigarette smoking, alcohol consumption and stress. The scoring mode of the questionnaire is a close-ended questionnaire on a five-point modified Likert scale type in positive form, with scores thus: Strongly Agreed 5points, Agreed 4points, undecided, 3points, Strongly Dis-agreed 2points, Dis-agreed, 1point. (Thomas, Nelson, & Silverman, 2005 and International Society for the Advancement of Kin- anthropometry (2001).

Data Analysis

The data were analyzed using frequencies, percentages (%) and one tail t – test and inferential statistic of chi-square (X²) was used to test the hypothesis.

Results

Table 1

Statistics of Bayero University, Kano senior staff

SALARY SCALE CONUASS	TEACHING STAFF	TOTAL NO.OF TEACHING STAFF	NON TEACHING STAFF	TOTAL NO. OF NON TEACHING	TOTAL NUMBER
6 and above	Male	673	Male	651	1324
6 and above	Female	74	Female	158	232
Total number		747		809	1556

Source: Bayero university Kano Academic Planning unit, 2010

Table 2

Descriptive Statistics and Summary of Demographic Characteristics of the Subjects

Age	Freq.	Percentage (%)	Gender	Freq.	Percentage (%)	Description	Freq.	Percentage (%)
25-30	23	8.0	Male	242	83.3	Teaching	133	46.3
31-35	46	16.0	Female	45	15.7	Non Teaching	154	53.7
36-40	61	21.3						
40& Above	157	54.7						
Total	287	100		287	100		287	100

An examination of the table above revealed that the respondents whose age are 40 and above were 157 representing 54.7%, those between the age range of 36-40 years were 61 that is 21.3%, 46 respondents representing 16.0% were between 31-35 years, while those between 25-30 years were 23, representing 8.0% of the total. On gender male respondents were 242, 83.3% while female respondents were 45, 15.7%. One hundred and fifty four (154) respondents representing 53.7% were non-Academic staff, while 133 (46.3%) were Academic staff.

Table: 3*Chi-square Analysis on Stress as a Risk Factor of CVD*

Variable	Agreed	Disagree	Total	df	X ²
Prob.					
Teaching Staff					
FO	44	89	133	1	4.66
FE	65.3	67.7			
Non Teaching Staff					
FO	46	108	154		
FE	39.4	114.6			
Total			287		

X² 4.66 @ df 1 (P< 0.05)

Table 3 indicates that the calculated **X²** value is greater than the **X²** critical value at 5% level of significant, $p < 0.05$ (**X²** = 4.66, $p = .0001$). Based on this, the above stated hypothesis was rejected, suggesting that stress is a significant cardiovascular disease risk factor among senior staff of the University. The observed frequency on stress of the Academic staff indicates that those spending most of their working hours in their offices are 89 (31.1%) and those not spending most part of their working hours in their offices are 44 (15.3%). On the other hand, non-Academic staff of those spending most of their working hours in their offices are 108 (37.6%), and not spending most part of their working hours in their offices are 46 (16.0%). The finding reveals that non-Academic staff have higher number of staff spending most part of their working hours in their offices, by implication non-Academic staff are more at risk of cardiovascular disease than their counterpart as a result of their life style.

Table 4*Chi-square Analysis on Physical Inactivity as a Risk Factor of CVD*

Variable	Exercise	not Exercising	Total	df	X2	prob.
Teaching Staff						
FO	59	74	133	1	6.07	.0001
FE	60.6	72.4				
Non Teaching Staff						
FO	12	142	154			
FE	29.4	124.6				
Total			287			

X2 = 6.07 @ df 285, (p<0.05)

Table 4 indicated that the calculated X2 value is greater than the X2 critical value at 5% level of significant, $p < 0.05$ ($X^2=6.07$, $p=.0001$). Based on this, the above stated hypothesis was rejected, suggesting that physical inactivity is a significant cardiovascular diseases risk factor among the senior staff of the University. On Exercise the observed frequency of the Academic staff indicated that those who take part in physical Exercise are 12 (4.2%) and those not participating in physical activities are 142 (49.4%). The finding revealed that non-Academic Staff had higher number of non-exercising staff than the Academic staff. By implication they are more at risk of inactivity as a risk factor of cardiovascular disease than their counterparts.

Table 5

T-test Analysis on Gender as a RISK FACTOR of CVD

Variable	status	N	\bar{X}	SD	df	t	Gender
prob							male
242	5.19		2.96	285	3.01	.310	
T	Female	45	4.73	1.17			
Total		287					

T=3.01@df285, ($p>0.05$)

Table 5 indicated that the calculated t value is less than the t critical value at 5% level of significant, $p>0.05$ ($t=3.01$, $p=.310$). Based on this, the above stated hypothesis was accepted; suggesting that there is no significant difference in the cardiovascular disease risk factors between male and female senior staff of Bayero University, Kano, Nigeria. Male frequency was at 242 (84.3%), while females were 45 (15.7%).

Discussion

The outcome of this work points out that stress is a significant cardiovascular disease risk factor among senior staff of the University. This finding agrees with the work of Cardiac Society of Australia and New Zealand (2003), who worked on safety and performance guidelines for clinical exercise and stress testing. They stated that **stress could trigger abnormal heart rhythms (arrhythmias), with potentially fatal consequences and concluded that people sometimes also adopt unhealthy habits such as smoking or overeating as a means of dealing with severe stress, which is found to be detrimental to their health.** The finding on physical inactivity indicates that it is a significant cardiovascular disease risk factor among senior staff of the University. These finding is in consonance with the findings of the research work of Howley and Iyariboz (2001) who conducted work on the effect of aerobic exercise training on serum levels of High-Density Lipoprotein. They found that the more active or fit an individual was, they tended to develop less cardiovascular disease risk factors than their sedentary counterparts. Tthey further concluded that if cardiovascular diseases developed in an active individual it occurs at a later age and tends to be less pronounced. Lee (2001) supports the finding that individuals who accumulate at least three hours of brisk walking each week cut their risk of cardiovascular risk factors by more than half.

The finding further indicates that there is no significant difference in the cardiovascular disease risk factors between male and female senior staff of the University. Jodi (2003) conducted research on the risk factors of cardiovascular diseases, and stated that although cardiovascular diseases are the leading killer of both men and women in the United States, men face a greater risk of heart attack than women, especially earlier in life, until age 55 years. Men also have a greater risk of hypertension than women, but on the other hand both are at risk of cardiovascular diseases in the same magnitude. Finally, this study shows that there is no significant difference in the cardiovascular diseases risk factors between Academic and non-Academic staff of the University. These finding coincide with the research work of the (WHO) World Health Organization report (2002) on career and exercise for health. They found that most of the time, what you do professionally can either improve your health if it involved a lot of physical activity or compromise your health if it involved 80% mental work.

Stress Management

Everyone experiences stress just as some stress is needed to perform the daily task of life and to stimulate growth and development. Exercise has been noted to be useful in reducing stress, although it does not eliminate the problems that sometimes lead to stress, it certainly increases one's capacity to cope with stress and to make one feel better. According to Leppaluoto and Jamsa (2008) stress management involves making emotional and physical changes in order to control and reduce tension that occur in stressful situations. The key to stress management does not lie in its avoidance because it is an inevitable element in the fabric of modern life. Cooke and Butterly (2000) noted that stress management is the application of behavioral strategies to reduce stress and improve coping skills. Among various coping techniques, regular exercise has been discovered to have wider benefits and remedial effects. Tonga (2005) suggested that since exercise improves well-being, it might be an effective way of managing stress. Anxiety is associated with the emergence of a negative form of cognitive appraised typified by worry, self-doubt and apprehension. It usually arises in the face of demands that tax or exceed the resources of the system or demands to which there are no readily available or automatic adaptive responses (Lee, 2001). Plowman and Smith (2008) reported that exercise is significantly related to reduction in anxiety and that meta-analyses show that the larger effects of exercise on anxiety reduction are shown when - The exercise is aerobic (e.g. running, swimming, cycling) as opposed to non-aerobic (e.g. power, strength, and flexibility training), the length of the aerobic training program is at least 10 weeks and preferably greater than 15 weeks and the subjects have initially lower levels of fitness or higher levels of anxiety. The finding that exercise can produce an anxiety reduction similar in magnitude to other commonly employed anxiety treatments is noteworthy since exercise can be considered at least as good as these techniques, but in addition it has many other physical benefits (Landers, 2008).

The surgeon general's report (2008) mentions the possibility of exercise improving mood. According to Baclay and Lee (2008) 83% of people with mental health problems in Europe looked to exercise to help lift their mood or to reduce stress. Exercise and self-esteem: related to the area of physical activity/exercise brought about small, but statistically significant increases in physical self-concept. Restful sleep following exercise: another area associated with positive mental health is the relationship between exercise and restful sleep. Studies reviewed in this aspect shows that exercise significantly increases total sleep time and aerobic exercise decrease rapid eye movement sleep (REM) (Hunsberger, Newton and Bennett, 2007). REM sleep is a paradoxical form in that it is a deep sleep, but it is not as restful as slow wave sleep

(i.e. stages 3 & 4 sleep). Insel and Roth (2004) found that acute and chronic exercise was related to an increase in slow wave sleep and to the sleep time but was also related to a decrease in sleep onset latency and REM sleep. Exercise had the biggest impact on sleep when - the individuals were female, low fit or older, the exercise was longer in duration and the exercise was completed earlier in the day.

Conclusions/ Recommendations

From the finding of this study, stress is a normal part of living and is therefore a significant cardiovascular diseases risk factor. Physical inactivity has also been established as a risk factor for the development of cardiovascular health disease and it also contributes to other risk factors including obesity, high blood pressure and low level HDL cholesterol among senior staff of the University. Stress management is the only coping strategy to control stressful situations and individual's response to stress, such as recreational and leisure activities, keep fit programs, brisk walking, taking stairways instead of the lift. Programs such as seminars and workshops should be organized by the department of physical and health education, Bio-kinetics or exercise sciences to educate the University community on cardiovascular health.

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Analysis of Family Structure on Children's Health and Well-Being

Shishu Zhang, Gregory Soukup & Tim Henrich

Abstract

The U.S. Census Bureau (2010) reported births from 1980 to 2008 to unwed mothers rose from 18.4% to 40.6% and children in single-parent households increased from 19.5% to 29.5%. Different family structures can significantly impact the well-being of children. The Medical Expenditure Panel Survey (MEPS) (2001-2005) collected data on 13,582 American children 5 to 19 years-old. A multiple-regression analysis tested for differences regarding family structure, income, and region and the MEPS results on physical health, mental health, BMI, and class attendance. Level of significance for the study was $p < .05$. Children from single-mother households had significantly higher absentee rates than children from single-father households. Children from higher income households had significantly better rates of mental and physical health and lower BMI and absentee rates. There were no significant differences among single-father and single-mother families from the midwest, northeast, and west regions of the United States with regard to physical health, BMI, and school absences. However, in the south, the mental health status of children born into single-mother families was significantly worse by 3.4% compared to children born into single-father families.

Key Words: Single-Parents, Mental/Physical Health

Introduction

The traditional two-parent family structure has changed dramatically in the United States in the last 30 years. Different family structures have been shown to significantly impact the physical, social, mental and economic well-being of children. The latest U.S. Census Bureau's Current Population Survey reported that from 1980 to 2008, the number of births to unwed mothers in the United States rose from 18.4% to 40.6% and the number of children that live in single parent households increased from 19.5% to 29.5%. In 2006, Cavanagh and Huston reported that 80% of single parent households in the United States were headed by single mothers. Recent estimates indicate that two fifths of children are expected to spend some time in a cohabiting parent family (Bumpass & Lu, 2000), and 41% of cohabiting unions have children present (Fields & Casper, 2001). Half of American children will spend some part of their childhood in single-parent families (Bumpass, Raley & Sweet, 1995, Fields, 2001).

The latest U.S. Census Bureau's Current Population Survey (2011) defined a family group as "any two or more people residing together, and related by birth, marriage, or adoption. "The researchers have defined a two-parent family/household as an arrangement where two parents are present and are responsible for caring for children as a result of birth (biological parents), marriage (biological and step-parent), or adoption. A "single-parent family/household" was defined as, "A household where only one parent is present in the home. The parent may be never-married, widowed, divorced, married, or spouse absent" (US Census Bureau, 2011). Single-parent households also could be the result of divorce, adoption, artificial insemination, surrogate motherhood, death of a spouse, and/or abandonment by a spouse. For use in this study, the researchers will define a single-mother as a female parent that cares for one or more children

without the assistance of another parent in the home, and a single-father is defined as a male parent who cares for one or more children without the assistance of another parent.

A large body of research has focused on single-parent families where the parent is the mother, but less attention has been focused on single-parent families where the father is the lone parent (Pong, Dronkers, & Hampden-Thompson, 2003). Much research has also been done by scholars as to how economic and psychological problems impact single-parent family members. National surveys have been used to obtain significant information on single-parent families. Economic measurements are used by researchers to measure several different abstract social concepts regarding children's life conditions, success conditions, parental resources, and community resources.

The concept of well-being is frequently used and studied by academicians in the literature but is not consistently defined. The authors define well-being as a combination of several different cognitive, economic, physical, psychological, and social factors that in combination contribute to the overall health of an individual. This study will analyze the effect that family structure has on children's well-being. Four measurements were used to illustrate children's well-being: children's physical health status, children's mental health status, children's body mass index (BMI), and children's school absences. The four measures were used in order to obtain a precise picture of the effect of family structure on children's well-being.

Children's body mass index is highly correlated with the physical and mental health status of children. Body composition has a significant influence on school attendance and school absences amongst American children (Geier, et al., 2007). Regular school attendance and attainment of education are considered to be important factors related to children's human capital accumulation. This study will analyze the overall effect of single-father and single-mother family structure on children's well-being. Data were also analyzed to determine the impact of regional influences and family income on child well-being. The major questions addressed in the study were:

1. Are single-mother families different from single-father families in their effect on children's well-being?
2. If so, what causes the negative effect of family structure on children's well-being after income and other family characteristics are controlled for?
3. Are there any differences of the effects of a single-parent structure on children's well-being within the same income and regional categories?

Review of Literature

Beller and Chung (1992) and Krein and Beller (1988) argued that living in a single-mother family had a significantly negative effect on the educational attainment of children between 16 and 20 years of age. In general, living in a single-mother family showed a negative effect on three different measures of educational attainment used in the study. Remarriage tended to restore higher levels of economic well-being and was found to mitigate the negative effect of living in a single-mother family on a child's educational attainment.

Thomson, Hanson, and McLanahan (1994) argued that economic resources and parental behaviors are the most important factors that affect children's well-being. They divided family structure into five groups: original families (two-parent families), single-mother families, never-married mothers, mother-stepfather families, and mother-partner families. Their paper reported the following results: 1) original families had more income and less poverty than single-mother

families, especially when headed by never-married mothers; 2) mother-partner families were less economically protected than mother-stepfather families, but mother-partner families were much more protected than single-mother households; 3) employment rates for mothers from all kinds of families were almost the same except for never-married mothers; 4) and children in original families received more support from their mothers and were under more parental control than children in other types of families.

Manning and Lamb (2003) concluded that children in biological two-parent families generally were far better-off than children in other kinds of family structures like single-mother, cohabiting stepfather, and married stepfather families. The advantage of marriage appeared to exist primarily when the child was the biological offspring of both parents.

In 2004, Painter and Levine reported that children of single-mothers had significantly higher rates of teen childbearing out of wedlock, dropping out of high school, and lower rates of entering college than children from two-parent families. The findings were consistent with a large body of research which implies that the educational attainment of children from single-mother households could be significantly increased by raising the incomes of single-mothers.

Cavanagh and Huston (2006) studied the dynamic nature of family structure. They reported a direct link between the family structure and a history of problem behavior at the start of formal schooling. The study asserted that family instability and children's behavior were not uniform, but were conditioned by the family context in which it occurs.

Fomby and Cherlin (2007) used nationally representative data from the NLSY79/CNLSY to examine how parent-child interactions influenced cognitive development in children. They suggested that the components of parent-child interactions that were associated most with cognitive development were influenced by the instability of family structure.

This study wants to build on prior research and move beyond previous works in several key ways. First, the effect of the single-mother family was compared to the single father family¹ to address the “role model” effect of father and mother on children. Second, the researchers wanted to identify the “role model” effect of family structure on children’s well-being and to compare this effect within certain income categories and regions. Third, this study was not limited to a single indicator of well-being and focused on multiple measures of children’s well-being. Fourth, by employing a large data source with over twenty thousand observations (Medical Expenditure Panel Survey), our analyses were based on a relatively large number of single-mother and single-father families.

Data

Five years of data from the Medical Expenditure Panel Survey (MEPS) - (2001-2005) were used for analysis. For each panel of respondents, MEPS included three rounds of interviews over two-and-a-half years. There were two observations of annual data for each child in the study sample. The sample has 27,164 observations for 13,582 children between the ages of 5 and 19.

Children’s mental health status is represented by a set of dummy variables indicating a parent’s assessment of the child’s mental health (MH) over the prior year. The parent reports whether the child’s mental health is excellent, very good, good, fair, or poor. Fifty-one percent of the children reported excellent mental health, 29% of the children reported very good mental health, 17% of the children reported good mental health, and only 3% of the children reported

¹ Single-father households may be comprised of a father and his children only; a father, his children, and a

fair and poor mental health.

School absence (S) is the third measure used to represent the general well-being of the children. School absences are measured as the number of school days a child missed due to illness or injury. The average number of days missed in the study sample was approximately three days per year.

The fourth measurement used is children's body mass index (BMI). BMI was used to determine whether a child was underweight, desired weight, overweight or obese. The average BMI for children in the sample was 21.1, which is within the desired BMI range.

The parents' marital status (SINGLEMOM, SINGLEDAD) was the independent variable which was the major focus of the paper. Thirty-two percent of the children had single-mothers and six percent of the children had single-fathers.

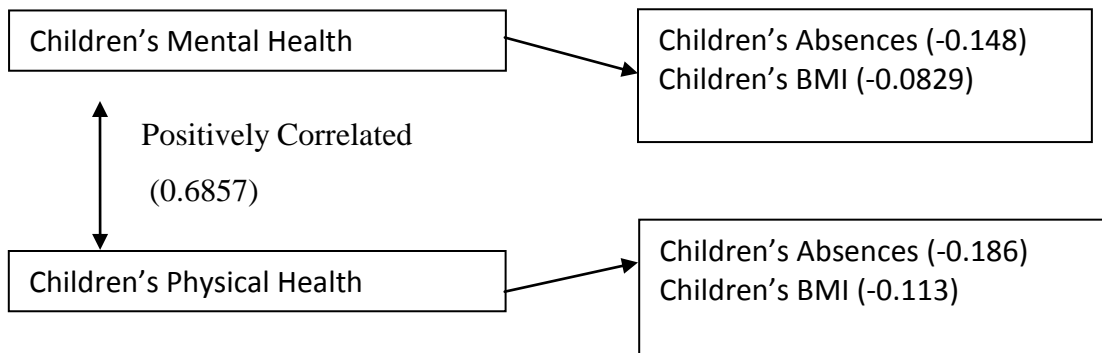
Medicaid and private health insurance were represented by two dummy variables (MED, PRIV). Other control variables included family income, parents' education, children's age, gender, race and ethnicity.

Empirical Method

One contribution of this paper is in the use of multiple variables to represent children's overall well-being. The relationship between the four independent variables is demonstrated in Chart 1 (the correlations are in the brackets):

Chart 1

Correlation of Children's Physical Health Status, Mental Health Status, Body Mass Index, and School Absences



Children's mental health status and physical health status were positively correlated. There was a significant correlation between children with better mental and physical health status and fewer school absences. Children with better physical health status rates also had significantly lower BMI rates.

Results

The Effect of Single-Father and Single Mother Structure on Child's School Absences

Compared with children born in a single father family, children born in single mother families have more school absences (0.679), with a p-value of 0.018 which is statistically significant. This means that if a child is born in a single mother family, the child's school

absences will increase by 0.679 compared with children born in single father family. Since the average school days missed is around three days, this means that if a child is born in a single mother family, his school absences increase by around 23%.

Results by Income Level

Family income had a significant impact on child well-being in single-parent families. A families' income level significantly affected children's mental health, physical health, school absences, and BMI. This study attempted to identify the effect of family structure on children's well-being. In order to identify and analyze the family structure effect within each income category, data were divided into five income levels. Income levels were calculated per person per year of income. Level 1 equals to less than \$11,904, Level 2 equals \$11,904 - \$25,000, Level 3 is \$25,000 - \$50,000, Level 4 is \$50,000 - \$74,000 and Level 5 is equal to more than \$74,000 per year (Banthin & Seldin, 2006). The researchers compared the effect of single parent family structures on children's well-being within each income category and the results are presented in Table 1.

Table 1

Average of Mental Health Status, Physical Health Status, Absences and BMI for Different Income Levels

	MH	PH	Abs	BMI
Income Level 1	4.070 (0.949)	4.063 (0.923)	3.169 (6.075)	21.769(6.951)
Income Level 2	4.174 (0.910)	4.108(0.906)	3.004(6.410)	21.705(7.265)
Income Level 3	4.177(0.892)	4.146(0.876)	2.856(5.877)	21.238(5.892)
Income Level 4	4.325(0.821)	4.314(0.799)	2.917(5.630)	20.854(5.342)
Income Level 5	4.480(0.740)	4.485(0.718)	2.739(4.291)	20.242(4.888)

Note: the standard deviation is in the bracket. MH refers to mental health, PH refers to physical health. Abs is school absences, and BMI refers body mass index.

The average for mental and physical health of children went up as income increased. Children's school absences and BMI decreased as family income went up. This result confirmed the hypothesis that children's well-being was positively related with family income. The percentage of change results were obtained by combining the coefficient and average income results.

Table 2

Effect of Single Parent Family Structure on Children's Mental Health, Physical Health, School Absence, and BMI at Different Income Levels (Single Mother and Single Father Family)

Family Type	Single Mother				<i>Note:</i> The reference group is single father family. The percenta ge is calculate
Measurements	MH	PH	Abs	BMI	
Income Level 1	↓ 6.4%*	↓ 7.2%**	↑ 77.3%**		
Income Level 2					
Income Level 3					
Income Level 4			↑ 34.1%*		
Income Level 5					

d by the average level of the four measurements within each income category. * $p < 0.05$,

** $p < 0.01$.

Compared with single-father families, the effect of single-mother family structure on children's well-being in each income category is summarized in Table II. The effects were significant at two income levels. Children from single-father families at income level one, had significantly better rates of mental and physical health and fewer school absences when compared with children from single-mother families. Children from single-mother families at income level four also had a significant increase in school absences when compared to children from single-father families from the same income category. In general, children from single-father families were better-off than single-mother families in all income categories.

1.1. Results from the Data Divided by Region

The data were divided into four different regions in the United States (Midwest, Northeast, South, and West). Single-mother and single-father families in these regions were compared to each other. Significant differences on children's mental health status, physical health status, school absences, and BMI were determined between the different regions.

Table 3

Average of Mental Health Status, Physical Health Status, Absences and BMI for Different Regions

	MH	PH	Abs	BMI
Midwest	4.114 (0.917)	4.179 (0.886)	3.570 (7.676)	21.331(5.910)
Northeast	4.080 (1.008)	4.124(0.962)	3.988 (7.177)	21.891(5.979)
South	4.154(0.919)	4.137(0.907)	3.105 (6.273)	21.895(6.426)
West	4.160(0.938)	4.152(0.906)	3.573 (6.649)	21.439(5.683)

Note: the standard deviation is in the bracket.

Average mental and physical health status of children was highest in the west and lowest in the northeast. Children in the northeast had the highest rate of school absences and children in the south had the lowest. Children from the Midwest had the lowest average BMI rate while children in the south had the highest. The impact of single parent family structure on the percentage change in all four measurements based on the average result is shown in Table III.

The results also demonstrated there were no significant differences among the four measurements in the midwest, northeast, and west region. In the south, the mental health status of children born into single-mother families was reduced by 3.4% when compared with children born into single-father families.

Conclusion

Researchers have suggested that children raised in families with higher socio-economic status have significantly higher cognitive and social developmental indicators of well-being (Carlson & Corcoran, 2001; Duncan & Brooks-Gunn, 1997; McLanahan & Sandefur, 1994). The results of this study support those findings. Children from wealthier single-parent families had significantly better rates of well-being than children from poorer single-parent families. It seemed that income alone did not explain the effects of family structure on child well-being; however, for some outcomes it did significantly reduce the effect of family structure (Carlson & Corcoran, 2001; Duncan & Brooks-Gunn, 1997; Hill, Yeung, & Duncan, 2001; McLanahan & Sandefur, 1994).

The researchers have determined that children from single-father families had significantly better rates of well-being related to physical health, mental health, school absences, and BMI when compared to single-mother families in general, by income level, and by different regions in the United States.

There were different limitations to this study that impacted the final results. First, a cross-sectional dataset were used in the analysis. The findings of this study provide a one-time analysis of the effect of family structure on children's well-being related to data collected by the Medical Expenditure Panel Survey (MEPS) from (2001-2005). Longitudinal data were not collected from subjects to determine the long-term impact of family structure on children's well-being. Some potentially important variables were also omitted from our analyses. One factor

also associated with child well-being is genetic factors, such as the parents' mental and physical health, especially maternal depression (Brown, 1997). Unfortunately, measures of parents' mental and physical health were not included in the MEPS dataset. The findings from this study represent a step toward comparing the effects of single-father and single-mother family structure on children's well-being.

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The Impact of Sex Education Intervention on Knowledge of Male Undergraduates Towards the Use of Family Planning Methods in Ogun State, Nigeria

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Abstract

This study examined sexuality education intervention on knowledge of male students in Tai-solarin University of Education, towards the use of family planning methods in Ijebu-ode, Ogun State, Nigeria. The study employed the quasi-experimental pre-test, post-test control group design. The participants for the study comprised 60 volunteer male students. A hypothesis was generated and tested at 0.05 level of significance. A self-structured questionnaire and sexuality education intervention (family planning) training package were instruments for data collection. A reliable coefficient $r = 0.78$ was obtained for the questionnaire. The data obtained were analyzed using independent sample t-test. The results showed that the treatment had significant effect on the participant knowledge in the experimental group ($t=4.141$, sig. $0.000 < 0.05$) and a mean gain of 1.88462 at 29 degree of freedom. It also revealed that only a few male students accepted family planning programmes and therefore had a positive attitude. The study, therefore advocated that the government as well as non-governmental organizations and people in position of authority should ensure that: Adequate education is given to the male students on various types of family planning methods, its effectiveness as well as its side effects, information about safe sex, and the skills necessary to negotiate and adopt safe sex practices.

Introduction

The promotion of reproductive and sexual health among young adults involves equipping them with the relevant knowledge, motivation and behavioral skills to enhance sexual health and avoid sexual health related problems. Health Canada (2003) described a broad conceptualization of adolescent reproductive and sexual health to a wide range of issues including sexual attitudes, behaviors and personal social factors that influence young adults. Sexuality-related problems, such as sexually transmitted infections (STIs), including Acquired Immunodeficiency Syndrome (AIDS), and unintended pregnancies (UIPs) are issues of worldwide concern (International Planned Parenthood Federation (IPPF), 2006). A number of population-based surveys document that adolescents initiate sexual activity at an early age without adequate use of contraception (Khan, 1999 & Toure, 1996). The spontaneous nature of their initial sexual experience is reflected in the finding that one of the most important reasons for not using contraceptives is because they did not expect to engage in sex (Bongaarts & Bruce, 1995). An important knowledge gap exists as a result of a lack of systematic information about the participation and roles of adolescent males in sexual and contraceptive decision making in which young people grow up in an environment of change. This information is necessary in order to achieve a reduction in the high incidence of STIs and UIPs in both developing and developed countries (Drenna, 1998). Odelola (2004) postulated that the world is now a global village because of technological advancements that provides adolescents with unlimited access to information about sex that may be inaccurate and may have a profound effect on their sexual behavior. However, there exists a substantial gap between knowledge and contraceptive use. For example, only 31% of sexually active adolescents have used a modern contraceptive method (Babalola, Claudia,

Jane & Regina, 2001). Another report presented a review of literature on male attitudes and behaviors concerning family planning and male initiatives in Africa, the results indicated that men often have positive attitudes toward family planning, but women believe that their husbands disapprove of family planning (Araoye, 1995). In addition, social stigma related to adolescent sexual activity is often associated with contraceptives, resulting in additional barriers in seeking sexual and reproductive health care, since many male adolescents hope to deny their sexual activity precisely by avoiding the contraceptive methods which symbolizes their behavior (Bruce, 1994; Green, 1990).

Male involvement in family planning means more than increasing the number of men using condoms and having vasectomies; their involvement also include the number of men who encourage and support their partner and their peers to use family planning methods and who influence the policy environment to be more conducive to developing male-related programs. Male involvement should be understood in a much broader sense than male contraception, and should refer to all organizational activities aimed at men as a discrete group that have the objective of increasing the acceptability and prevalence of family planning practice of either sex. By nature, young people are more vulnerable to the adverse consequences of unsafe sexual relations, unintended pregnancy and sexually transmitted infections, including HIV/AIDS, than any other age groups (Bearinger, Sieving, Ferguson & Sharma, 2007). The involvement of men in family planning would therefore not only ease the responsibility borne by women in terms of decision-making for family planning matters, but would also accelerate the understanding and practice of family planning in general (IPPF, 2006). Family planning association has only recently recognized the importance of the men's role and motivation in fertility decision-making, particularly in Africa. The question is "what can family planning and reproductive health programs do to encourage men's cooperation?" (Khan, Khan & Mukerjee, 1997). Some programs aim at increasing the awareness and knowledge for men. How to address the needs of men through different service delivery strategies is also an important question (Khan, et al., 1997). Various service delivery strategies to meet those needs can be provided in a variety of ways, including primary health care facilities, and special hours for men in MCH/FP.

Adolescent sexual and reproductive health is a critically important policy and programmatic area in Sub-Sahara Africa. There appears to be a consensus among Nigerian researchers and observers that many traditional values are changing rapidly and for the worse (Arumala, 2005; Ezeh, 2001; Eruesegbefe, 2005; Naswaan, 2001). One area of life in which the decline of traditional values is obvious is in the area of sexuality. Osisioma (1998) lamented that in Nigeria, culture no longer has a grip on the youth as the society seems to be plagued with a decayed moral code and values and so the sense of right and wrong has been eroded. Others have opined that the use of pornographic materials as well as knowledge and use of contraceptives, especially the condom that has been excessively advertised, has contributed immensely to the involvement of adolescents in sexual practices (Onuzulike, 2002). Many adolescents do not have the ability or social support to resist pressure to have sexual relations, negotiate safer sex, or prevent pregnancy and STIs. In recent years, there has been a renewed recognition of the role of men in the reproductive and sexual health of women and the importance including them in programmatic efforts. Interest in family planning for men has waxed and waned over the last three decades, and the debate about male responsibility has taken a new turn and the question is increasingly being raised: what is in it for men? Therefore, this study investigates male students' knowledge towards the use of family planning methods in Tai Solarin University of Education Ijebu-Ode, Ogun state.

Hypotheses

There will be no significant difference in the pretest-posttest scores of male students' knowledge of family planning methods in Tai-Solarin University of Education following a six (6) week sex education program in the experimental and control group.

Methodology

The design that was adopted for this study was the non-randomized pretest-posttest control group quasi-experimental design. The population for the study was comprised of male students from the 100 level to the 400 level in Tai-Solarin University of Education, Ijebu-Ode, Ogun State. Sixty male volunteer students were selected as participants for the study using purposive sampling technique. Fifteen students from each level (100 - 400) were selected as participants for the study. A pretest was taken for the two groups, and the treatment followed for six weeks, a week after the pretest had been taken.

The instrument for the study was a self-structured questionnaire. The instrument was validated by experts. The reliability of the instrument has an alpha coefficient value of 0.78 Cronbach alpha reliability estimate. While the training package was based on the comprehensive sexuality education (CSE) package (family planning methods) and also used the intervention mapping toolkit format for the family planning program. The data was collected during the second week after the training of the research assistants. The week that followed was the treatment administration for the experimental group for six weeks, while the control group was given a placebo which was based on personal health plan (short note on personal health plan for healthy lifestyle). After six weeks of treatment administration, the posttest data was collected from the two groups, the control group was notified before the data for the posttest was collected. The data collected was analyzed using descriptive statistics for frequency counts, mean, range and standard deviation while a T-test was used to test the hypothesis at the 0.05 level of significance.

H_{01} : There will be no significant difference in the pretest-posttest scores of male students' knowledge of family planning methods in Tai-solarin University of Education following a six week sexuality education program in the experimental and control group.

Table 1*Analysis of Participant Responses on Knowledge of Family Planning Methods*

		Pretest		Posttest					
Group	N	Mean	SD	Mean	SD	Mean Gain	T	Df	Sig
Experimental	30	9.000	1.29615	10.8846	1.92514	1.88462	4.141	29	.000
Control	30	11.1667	2.2604	11.2667	2.3771	0.1000	4.255	29	.000

The table shows the analysis of participant responses on knowledge of family planning methods. The students in the experimental group had a mean score on the pretest of 9.000 and posttest of 10.8846 in the knowledge of family planning methods. The mean gain was 1.88462 for the experimental group that was higher than the mean gain of 0.10000 in the control group. This suggests that the intervention program on the male students' knowledge of family planning could be effective. Hypothesis one was further subjected to a paired T- test. In hypothesis one there was a significant effect of the sex education intervention on male students' knowledge of family planning methods by the experimental group. Table 1 also shows a high mean score of the posttest score 10.8846 and standard deviation of 1.92514 to the experimental group than the mean of 11.2667 and standard deviation of 2.3771 for the control group. When the data was subjected to paired testing a statistically significant effect of the treatment on the experimental group ($t_{4.141}$, 0.0000, 0.05) was determined. Thus the hypothesis was hereby rejected. This means that there was a significant effect of the sex education intervention on male student's knowledge of family planning methods in the experimental group.

The result showed that the male students in the Tai-Solarin University of Education need to acquire more information about family planning methods, after all, information they say is power. This supports the claim of Mitchell (2007) who revealed that an important knowledge gap exists as a result of the lack of systematic information about the participation and roles of males in sexual and contraceptive decision-making. This information is necessary in order to achieve a reduction in the high incidence of STIs and UIPs in both developing and developed countries. This was further corroborated by health timing (2008) that there exists a substantial gap between knowledge and contraceptive use. Guttermacher (2005) also revealed that adolescents' knowledge of reproductive health issues varied widely, but misconceptions were common. The case of catching these misconceptions when students are young should apply to youths in this circumstance because it is important to educate them on the need for proper family planning and reproductive health rights for both men and women. From the study, it was

discovered that there was a significant effect of the sex education intervention on the knowledge of male students' towards the use of family planning in Tia-Solarin University of Education.

The relatively high prevalence of sexual activity and the lack of knowledge regarding STIs and contraceptives poses a significant threat to the sexual and reproductive health of adolescent males in TASUED. Programs are needed to provide adolescents with the information and skills to make safe sexual decisions. Cultural sensitivities may also be a factor in young people's knowledge about reproductive health. Many hold permissive attitudes on the acceptability of premarital sex.

Recommendations

This study advocates that the government as well as non-governmental organizations and people in position of authority should ensure that:

Adequate education is given to male students on various types of family planning methods, its effectiveness as well as its side effects and information about safe sex and the skills necessary to negotiate and adopt safe sex practices. In addition, there should be an adequate television campaign and jingles like "the abule oloke merin" a popular radio program on HIV/AIDS. Such a program can be a useful source of information to youths. Books, videos and magazines with appropriate information should be developed. Adequate information should be given to parents especially fathers to help address misconceptions and improve knowledge of their children on sexual and reproductive issues. There is also need to educate youth on issues relating to family planning methods since they are going to be the husbands of tomorrow and future fathers.

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Preferred Anti Ageing Strategies among the Ogus and Aworis in a Suburban Area of Lagos State Nigeria

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Abstract

Ageing is inevitable; some of its effects on individuals can be slowed down however. These prevention strategies involve interventions to improve health and wellness in the event of illness. They also involve efforts to reduce the risk of disability and decline in functions. This study investigated the preferred strategies for slowing down the effects of ageing processes among the Ogus and Aworis in a suburban area of Lagos State, Nigeria. Variables selected for the study were use of diet, nutritional supplements, herbal remedies, exercise and combination of exercise and diet. A total of 1277 respondents that were sampled via purposive technique participated in the study. The descriptive survey research design was adopted and a self-developed and validated Adults Anti-ageing Strategy Preference Questionnaire (AASPQ), with reliability value of 0.68 was used to generate data for the study. Simple percentage, chi square and Cramer's V coefficient were used for data analyses and inferences were made at 0.05 level of significant. Findings show that the Ogu and Awori people of suburban area in Lagos State, Nigeria preferred the use of herbal remedies, nutritional supplements and diet to exercise, and combination of exercise with diet as strategies for slowing down the effects of ageing process.

Introduction

There are evidences that Africa is the continent with the youngest population in the world [Kalasa, 2001], but it does not, however, mean that its population is not on transition to the ageing process. In fact, with declining fertility and mortality, it is estimated that Africa will be one of the continents with the fastest growing elderly population in the world by 2050. It is important to recognize that the ageing of population is inevitable. According to [Kasala, 2001], ageing of individuals may be measured in many ways including chronological age, degree of physical or mental functioning or performance of given social roles. Thus, perceptions of old age vary greatly between societies, conditions of life (favorable or unfavorable), life expectancy, poverty and other factors. Ageing has been viewed as the steady decline of organic functions and body systems. It was also described by Gavrilov (2002) as a summary term for a set of processes that contribute to health deterioration and ultimately to death with the passage of time. According to Gothelf (2008), ageing cannot be avoided but how fast people age varies from one person to another and depends on such factors as genetic make-up, environmental influences and lifestyle.

Although ageing is inevitable, some of its effects can be slowed down and even prevented [Okuneye, Idowu & Abiola, 2009]. These prevention strategies involve interventions to improve in the event of the occurrence of an illness and include efforts that reduce the risk of disability and decline in function. In later life, the goals of prevention also include maintaining function, vitality and quality of life. Seventy percent of longevity has been attributed to lifestyle factors. According to Gothelf (2008), seven health practices to a long healthy life were identified in a research of 7000 individuals. These seven health practices that promote good health and increase average length of life are; sleeping seven to eight hours at night, weight control and

exercise, limited alcohol consumption, not smoking; eating breakfast and seldom snacking. Good diet had been variously commended as a key to good health, but Grossman and Jones (2007) observe that essential minerals and micronutrients have been depleted in foods due to civilization to the extent that foods consumed today are the processed and packaged types which had been loaded with carcinogenic chemicals, preservatives and dyes or are simply devoid of adequate nutritional value while nutritional value of cultivated foods is at an all-time low.

Nutritional supplementation is also recognized as a strategy in slowing the ageing process and the use had been widely reported. The reason is unconnected with the fact that to get complete nutrient value from foods, an exorbitant amount of the right types of foods has to be consumed at every meal that seems impracticable [Jones, 2007]. Therefore, to protect the body, nutritional supplements containing high levels of anti-oxidants are being recommended. Gothelf (2008) submitted that to slow down the ageing process, a comprehensive proactive anti-ageing strategy focusing on nutritional supplementation with other scientifically designed processes is necessary. Haastrup and Adeogun (2005) observe that the use of nutrient supplementation is very high in Nigeria today and these supplements come in various brands and packages with enticing marketing mix, promising to give good health. For the dangers associated with taking mega doses of nutrient supplements, Haastrup and Adeogun (2005) are of the opinion that taking a balanced diet everyday and eating three times a day will give all the minerals and vitamins the body needs to function effectively without necessarily resorting to the use of nutrient supplements.

The use of herbal remedies has long been in existence and is widely documented. In records kept in ancient China, India and Egypt, they have been found to be effective and efficient compared to conventional modern medicine (Fajimi and Taiwo, 2005). According to Saxena (2001), an estimated 80% of the world's population living in developing countries still relies on herbal remedies for health care. In view of the large dependence on traditional medicine and practices, the World Health Organization (WHO) recognized the implicit role of herbal medicine and approved the use of these natural products. The medicinal properties of certain herbs in Nigeria have been reported (Odukoya, Idika & Odugbemi, 1993, Sofowora, 1993, Irobi, 1992 & Iwu, 2004).

Exercise has also been commended and recognized as one of the effective tools recognized globally in maintaining a healthy body [Onifade, Dansu, Williams & Adefuye, 2009; Okuneye & Dansu, 2007; Okuneye, 2002], and slowing the ageing process and reducing the effect of ageing (Ogundipe, 2008). As explained further, exercise has been shown to be an important means of preventing cardiovascular diseases, falls, depression and other degenerative diseases that are related to ageing [Okuneye & Dansu, 2007; Okuneye, 2002].

This study was designed to investigate the preferred strategies for slowing down the ageing process among the Ogus and Aworis in a suburban area of Lagos State, Nigeria. The Ogu and Awori are two of the three major ethnic groups that are natives of Lagos State. The Ogus dominate Badagry Local Government Area [LGA] of the State and some parts of Ojo LGA, while the Aworis can be found majorly in three of the five main geo-political divisions of Lagos State – Badagry, Ikeja and Lagos. The study specifically focused on whether:

- i. diet alone will be the preferred strategy in slowing down the effects of ageing process
- ii. nutritional supplements will be the preferred strategy in slowing down the effects of ageing process
- iii. herbal remedies will be the preferred strategy in slowing down the effects of ageing process;

- iv. exercise alone will be the preferred strategy in slowing down the effects of ageing process; or
- v. combination of exercise and diet will be the preferred strategy in slowing down the effects of ageing process.

Methods

Participants

The population for this study comprises all adult residents in Badagry Local Government Area of Lagos State. The sample, selected purposively [from ten communities] for this study comprised of 1277 male and female adults whose ages ranged between 35 and 66 years. Of these participants, 17% had no formal education, 32.4% went elementary school, while 30.7% obtained post-primary school certification. The rest of the participants [19.9%] studied in higher institutions.

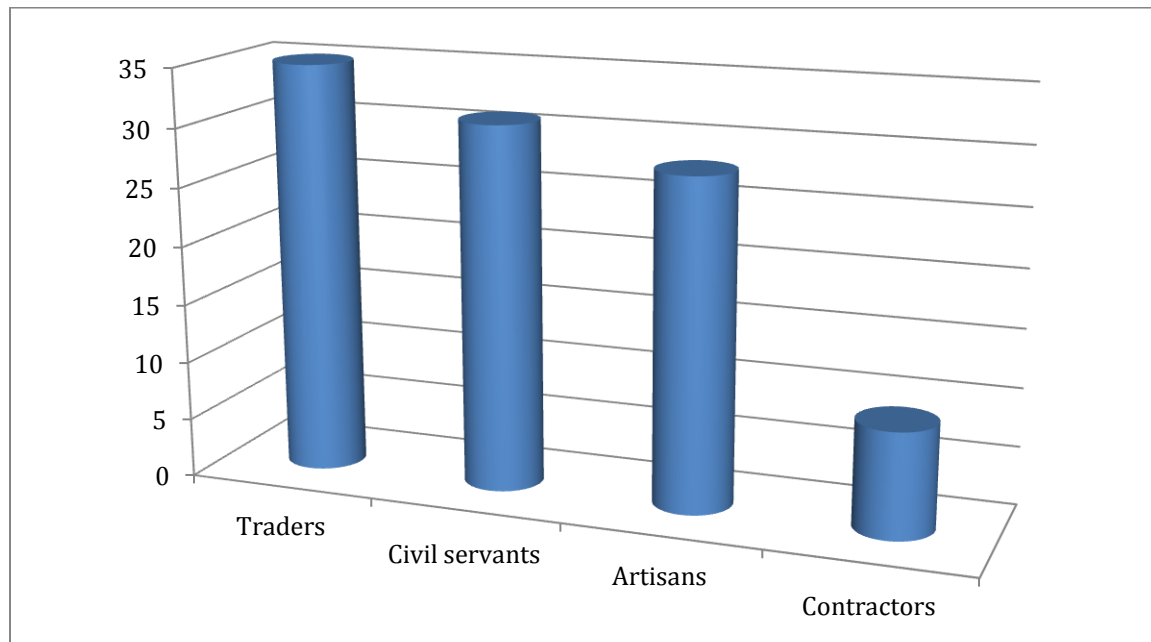


Figure 1: Component bar chart of participants' occupation

Percentage distribution in figure 1 show that the traders recorded the highest percentage among the participants, while the contractors had the lowest.

Instrumentation

The descriptive survey research design was adopted for the study. A self developed and validated Adults Anti-ageing Strategy Preference Questionnaire (AASPQ) designed in line with the variables of diet, diet and supplements, herbal remedies, exercise and exercise and diet were used to generate data for the study. The questionnaire was divided into Part A and B. Part A measured demographic information such as gender, age, educational background, occupation and religion while Part B contained 20 item statements designed in line with the modified Likert four point scales. Respondents were required to indicate their level of agreement or disagreement to the supplied statements in the following order-Strongly Agree (4), Agree (3), Disagree (2) and

Strongly Disagree (1) for positive statements and in ascending order for negative statements. The instrument was validated by two independent research fellows and subjected to test-retest method of reliability on 25 young and middle adults in Amuwo area of Lagos State. Pearson's Product Correlation Coefficient (PPMC) was used to determine the reliability of the instrument which gave a value of 0.68 on computation.

Administration of Instrument

Administration of the instrument was done by the researchers and three research assistants who retrieved completed copies of questionnaires on the spot. Those that could not be completed instantly were retrieved at a later day not exceeding three days from the day of distribution. In all, distribution and collection took about four weeks. One thousand, three hundred [1300] copies of the questionnaire were administered, and 98.2% retrieval rate was recorded.

Data analysis

Demographic information of respondents was analyzed using descriptive statistical tool of frequency counts and percentages while inferential statistical tool of Chi-square (X^2) was used to determine the preference of the respondents in relation to the variables tested at 0.05 alpha level. Cramer's [V] coefficient was used to determine relative strength of association between variables measured. Pictorial analysis was also used for further description of results. The results are however, presented in table 1 and figure 2.

Results

Table 1

Percentage, Chi Square and Cramer's V Coefficient Results on Ageing and Tested variables

VARIABLE	SA[%]	A[%]	D[%]	SD[%]	X^2	V
Diet Alone	412.66 [32.3]	383.02 [30.0]	312.66 [24.4]	168.66 [13.2]	*111.24	0.30
Nutritional Supplement	432.31 [33.9]	401.76 [31.4]	285.72 [22.4]	157.21 [12.3]	*147.14	0.34
Herbal Remedies	509.51 [39.9]	434.65 [34.0]	120.47 [9.4]	212.37 [16.6]	*305.31	0.49
Exercise Alone	307.67 [24.9]	286.66 [22.5]	332.46 [26.1]	350.21 [27.5]	7.35	0.08
Exercise & Diet	344.09 [26.9]	279.01 [21.9]	299.10 [23.4]	354.80 [27.8]	12.23	0.10

$$X^2_{cri} = 21.03 [P < 0.05] df = 12$$

Results presented in table 1 shows that a high percentage of responses indicated that herbal remedies [73.9%], nutritional supplements [65.3%], and diet alone [62.3%] are the preferred strategies for slowing down the effects of the ageing process. Exercise and diet [48.8%], and exercise alone [47.4%] recorded lower percentages of acceptance as strategies for slowing down the effects of the ageing process. Further analysis shows that herbal remedies with chi square value of 305.31 [$P < 0.05$], and Cramer's V coefficient value of [0.49] indicates a significant acceptance strategy for slowing down the effects of the ageing process. Similarly, nutritional supplements [$X^2 = 147.14$, $P < 0.05$; $V = 0.34$] and diet alone [$X^2 = 111.24$, $P < 0.05$; $V = 0.34$] are also significantly accepted as strategies for slowing down the effects of the ageing process among the participants. Exercise and diet [$X^2 = 12.23$, $P > 0.05$; $V = 0.10$], and exercise alone [$X^2 = 7.35$, $P > 0.05$; $V = 0.08$] are not significantly accepted as strategies for slowing down the effects of the ageing process.

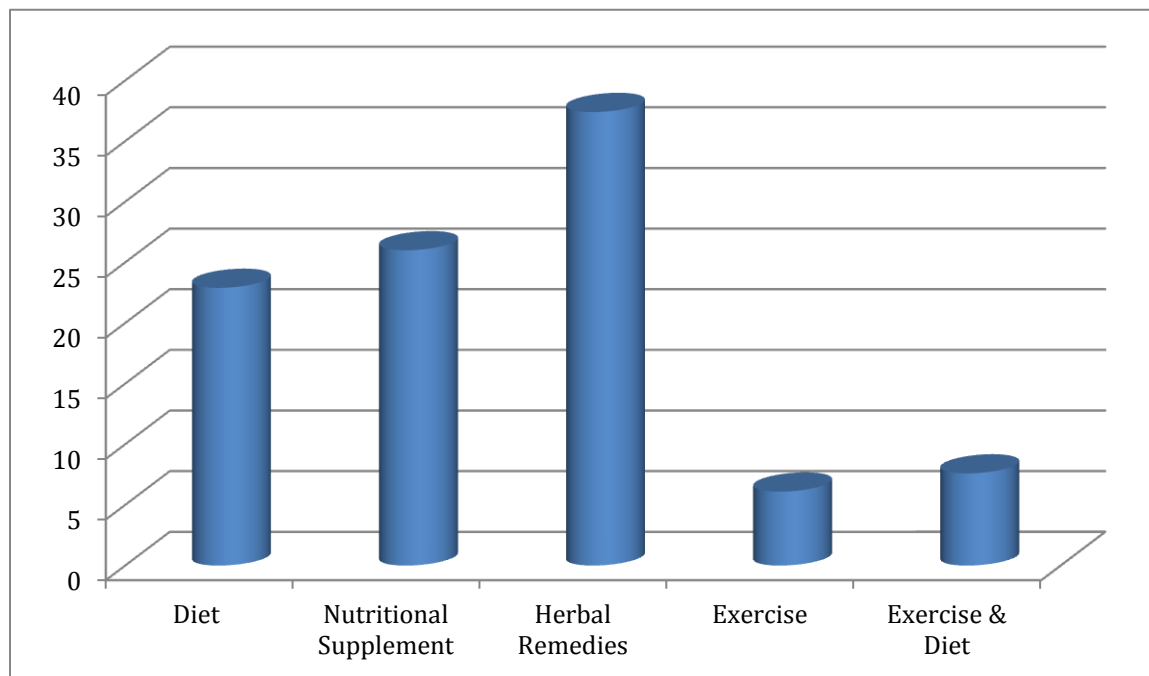


Figure 2: Component bar chart on percentage ranking of variables

Results in figure 2 shows that herbal remedies ranked the highest as strategy for slowing down the effects of ageing process among the participants. This is followed by nutritional supplement and diet alone, while exercise alone, and exercise combined with diet ranked low as strategies for slowing down the effects of ageing process.

Discussion

Findings of this study shows that the most preferred strategy for slowing down the effects of the ageing process among the target population is the use of herbal remedies. This finding is in line with the report of the World Health Organization [WHO, 2011] that in some Asian and African countries, 80% of the population depends on traditional medicines and herbal remedies. Similarly, Tsoa, Meldrum, Kim and Jacob (2006) in a related study on treatment preferences for

complementary alternative medicine in children it was reported that 60% and 80% of patients with a diagnosis of fibromyalgia and arthritis respectively preferred complementary alternative medicine to any form of treatment. Although, high levels of potency are reported for herbal remedies [Native Remedies, 2011], the WHO [2011] identifies some of its challenges. Not many countries have national policies for traditional medicine. Regulating traditional medicine products, practices and practitioners is difficult due to variations in definitions and categorizations of traditional medicine therapies. On safety, quality and effectiveness, WHO [2011] posits that scientific evidence from tests done to evaluate the safety and effectiveness of traditional medicine products and practices is limited. While evidence shows that some herbal medicines and some manual therapies are effective for specific conditions, further study of products and practices is needed.

The findings of this study also showed that nutritional supplements are also preferred as a strategy for slowing down the effects of the ageing process among the studied population [see table 1 and figure 2]. This agrees with the observation of Haastrup and Adeogun (2005) that the use of nutrient supplementation is very high in Nigeria as found in many parts of the world, but The Herbal Resource [2006] notes that nutritional supplements are not controlled by regulatory boards like pharmaceutical medications; since the active ingredients are what cause the effects associated with the herbs, it is important to know how much of the active ingredients are in each supplement. The issue with nutritional supplements is that because there are no regulations on the herbal claims it is hard to determine what is true and what is hype. The Herbal Resource [2006] observes that most companies that produce herbal supplements are reputable and only use what they list, however their label claims may be exaggerated or worded in a deceptive manner.

This study found that the use of diet as a strategy for slowing down the effects of the ageing process is significant. This finding agrees with the position of Haastrup and Adeogun (2005) that because of the dangers associated with taking mega doses of nutrient supplements, taking a balanced diet everyday and eating three times a day will give all the minerals and vitamins the body needs to function effectively without necessarily resorting to the use of nutrient supplements. According to Roberts [2011], food eaten can have a polluting effect on the body, and for this reason there is a need for healthy eating. Individuals must learn how to eat foods that will help them age well and avoid age-related disease as well as which foods are needed to be cut down on or to be avoided completely. Cleary [2010] also identified healthy diet among strategies for living longer and youthful appearance.

The findings of this study show that the use of exercise alone, and its combination with diet as strategies for slowing down the effects of the ageing process is not significant among the participants [see table 1 and figure 2]. This is an indication of poor knowledge and practice of exercise and [probably] good nutritional behavior. Atkins (2002) notes that combining diet with exercise is the best antidote to body cells degeneration. In the same vein, Cleary [2010] identifies some benefits of exercise in relation to slowing down the ageing process, and these include increased energy, improved muscle tone, increased metabolism, lowered blood pressure, reduced risk of heart attack, and reduced stress levels. According to Gothelf (2008), 70% of longevity is related to lifestyle and therefore controllable, anti-ageing strategies designed to retard the ageing process should focus on a comprehensive and proactive strategies of diet and exercise, with other strategies with positive scientific evidences.

Conclusion and Recommendation

Based on the findings of this study, it is concluded that the Ogu and Awori people of suburban area of Lagos State, Nigeria preferred the use of herbal remedies, nutritional supplements and diet to exercise, and combination of exercise with diet as strategies for slowing down the effects of the ageing process. It is therefore recommended that more public health education is needed in the area to further sensitize the people of the importance of good food, balanced diet and regular exercise as means to enhancing optimal health, reduce age related diseases and ensure longevity. Individuals in the communities should be motivated via relevant programs to embrace a combination of diet and exercise as a working combination for leading a good life and slowing down the effects of ageing process.

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Exercise Maximization for Wellness among Civil Servants in Lagos, Nigeria

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Abstract

Civil servants are challenged by a city lifestyle that is subject to precipitating diseases preventable through exercise participation. This study examined barriers to sport participation and the extent to which benefits of exercise are maximized to sustain wellness by civil servants and members of the society. A descriptive survey research method was employed. Study sample comprised of 120 participants selected through stratified sampling technique from over 1000 clients of University of Lagos Sports Centre gymnasium between February and December 2010. Variables investigated were availability of sport facilities and equipment, job schedules, pursuit of health promotion, cost implications of exercise and sport participation. Research instruments were a researcher-developed, validated Exercise Benefit Maximization Questionnaire (EBMQ) and a modified Flanders Interaction Analysis Categories (Flanders, 1970; Hopkins & Moore, 1993) applied for direct observation of exercise situations. Data analysis was with Chi Square statistics. Four hypotheses were tested at 0.05 Alpha level of significance. Results showed that availability of sports equipment and facilities motivated participants to exercise. Cost of exercise and job schedules influenced frequency of sport participation. Awareness of benefits of exercise influenced initiatives to participate in exercise but there was difficulty in compliance as only 110 participants achieved 98 % attendance for the period studied. Conclusion: Civil servants are motivated to exercise to keep fit. Interest and passion to keep healthy remains a drive for choice of physical activity. Awareness of benefits of exercise removes emphasis on cost implications and promotes participation. Recommendation: Health education should be provided to civil servants so they may acquire the desired behavior change.

Introduction

Wellness is an interactive process of becoming aware of and practising, healthy choices to create a more successful, balanced and harmonious lifestyle. It implies taking the responsibility to reduce health risks and maximise healthy choices as related to personal habits and interests of eating, resting, recreating and socialising. Wellness is a measure of health. A healthy worker should be a person capable of performing or carrying out the primary assignment with a minimum loss of hours due to sickness. The healthy worker is productive and must be interested in wellness.

The current lifestyle of most Nigerians and some civil servants seems to include poor nutrition, poor eating habits, physical inactivity through the automation of most physical work, a lack of personal hygiene, and an unhealthy environment with poor waste disposal. A more positive lifestyle in which people choose to eat well and moderately, become more active by exercising regularly, and keep their surrounding clean will no doubt guarantee a better quality of life, resulting in healthier and fitter citizen. This is referred to as maximizing sport and exercise benefits.

The World Health Organization (WHO, 2002) observes that over 60% of morbidity, mortality and disability among members of the society result from non-communicable diseases such as unhealthy diets and physical inactivity. Awalenje (1998) expresses displeasure that civil servants have very high morbidity rate of preventable disorders such as backaches, chronic

diseases such as hypertension, and stress related diseases. He has opined that health promotion for healthy living would include participation in exercises of fitness and leisure programs to promote wellbeing of individuals. Emiola (2008) has defined fitness as a state that characterizes the degree to which the person is able to live most effectively with his potential. Ability to function depends upon the physical, mental, emotional, social and spiritual components of fitness, all of which are related to each other and are mutually interdependent. Hoeger & Hoeger (2002) have confirmed that wellness brings vision and promise with open mindedness for accepting others. Mental wellness shows respect and faithfulness to personal ideas and curiosity without compulsion to conform.

Otinwa (2008) has opined that wellness is a dynamic process of change and growth. The process of achieving optimal wellness involves the balance and maintenance of its dimensions which include: Physical Wellness, Intellectual Wellness, Spiritual Wellness, Social Wellness, Social Wellness, Emotional Wellness and Environmental Wellness. Our lifestyle is one of the major determinants to our health. Lifestyle is responsible for most of the years of premature life lost. According to Otinwa various factors militate against wellness such as lifestyles with negative effects on the health, such as lack of exercise, self medication, alcohol abuse, cigarette smoking, and poor nutritional practices.

Morehouse and Miller (1977) believe that a person is anatomically fit when one has intact all parts and all organs of one's body necessary for doing the job at hand; is physiologically fit when one possesses muscular strength, endurance and motor skills to perform skillfully and to recover from fatigue quickly; and is psychologically fit when one combines effectively intelligence, drive, educability and emotional stability in doing a task. Physical education according to Ikulayo (2007) is all that embraces and caters to people of all ability groups. Its major concern is to promote physical growth, health, and all-round development of the individual. Physical education therefore involves activities designed to keep individuals physically fit and structured for the benefit of all participants. The author asserts that participation in physical activity is a spring board to involvement in sport.

Various theories have demonstrated the need for learning to occur across the three domains: cognitive, affective, and psychomotor. The Theory of Social Learning (Bandura, 1997) posits that transfer of learning occurs between individuals through interaction, observation, initiation and modelling, which serve as guide for human behaviour. Another theory that promotes healthy behaviour is Maslow's (1954) Motivation and Personality, which emphasizes the fact that human beings have in common certain basic needs as the origin of their motivation. He has organised these basic needs as an inter related hierarchy of needs and asserted that these human needs are ranked in order of priority with the highest need at the apex of a triangle. These needs are physiological needs, safety and security needs, belonging, affection and love needs, esteem needs, and self-actualisation. He has opined that for higher level needs to be realised, certain lower needs must be met or satisfied. Still another theory is the Attribution Theory (Bernard, 1935) that attributes behavior to causal dimensions. That is, behavior is observed and perceived, behavior is determined to be intentional, and behavior is attributed to internal and external causes leading to either success or failure.

Emiola (2008) has asserted that the ability to supply the needed oxygen and fuel to the working muscles and the heart and brain effectively depends on the individual's cardio-respiratory health and fitness, or one's cardiorespiratory capacity. Successful endurance athletes have a high cardio-respiratory capacity. The measure of cardio-respiratory capacity is maximal oxygen consumption (VO_2^{Max}), that is, the maximum rate at which oxygen can be taken up and

used by the body during a maximal exercise. Less active individuals are known to have lower cardiorespiratory capacity. The heart, being a muscle, also adapts to exercise and the average heart beats about 70 times in a minute, about 100,000 times in a day or 36.5 to 4 million times in a year, and about 2.5 to 3 billion times over 70 years of life time.

Civil servants working as staff of the University of Lagos demonstrated the inability of effective participation in sports activities despite their awareness on the need to prevent chronic diseases (obesity, diabetes mellitus, hypertension, or other hypo-kinetic diseases). As a result, this study was intended to examine barriers to sport participation and the extent to which exercise benefits are maximized by civil servants (staff of University of Lagos). This study therefore was to provide answers to four research questions listed below:

- (1) Will access to standard sport facilities and equipment significantly influence sport participation of the civil servants?
- (2) Will job schedules significantly influence sport participation of the civil servants?
- (3) Will cost implications of sport activities significantly influence sport participation of the civil servants?
- (4) Will interest in health promotion significantly influence sport participation of the civil servants?

The following four null hypotheses were tested at the 0.05 level of significance,

- (1) Ho 1: Access to standard sport facilities and equipment will not significantly influence sport participation of the civil servants.
- (2) Ho 2: Job schedule will not significantly influence sport participation of the civil servants.
- (3) Ho 3: Cost implications of sport activities will not significantly influence sport participation of the civil servants.
- (4) Ho 4: Interest in health promotion will not significantly influence sport participation of the civil servants.

Methods

Participants

The participants of the study were 120 civil servants who worked at the University of Lagos Sports Centre were selected through stratified random sampling technique. The variables investigated were availability of sport facilities and equipment, job schedules, cost implications of sport activities, and pursuit for health promotion and sports participation.

Instrumentation

Two instruments were used in the study. One was a researcher-developed, validated Exercise Benefit Maximization Questionnaire (EBMQ) ($r = 0.84$) containing a modified 5-point Likert attitudinal scale, which was administered to participants as a pretest and posttest. The second instrument was a modified Flanders Interaction Analysis Categories (Flanders, 1970; Hopkins & Moore 1993) ($r = .88$) that applied for direct observation of exercise situations using a 5 category motivation system with interactive sessions.

Data analysis

Descriptive statistics of frequency counts and percentages were calculated using the SPSS package. In addition, the inferential statistics of Chi-square was used for hypothesis testing, and the significance level was set at .05.

Results

Demographic data of participants revealed that only 110 participants of the 120 participated in the study throughout the period of the study, 44 males and 66 females. Their age range was as follows: 30 participants in 30- 39 years, 43 in 40-49 years, 21 in 50-59 years, and 16 above 59 years. As for education background, 63 participants had post-graduate qualifications, 34 with diploma/ NCE, and 13 with B. Sc. Honors. With respect to the length of service, 22 participants worked for less than 10 years, 45 worked for 10-15 years, and 43 for 15-20 years.

Flanders Interaction Analysis System

The approach provided the researcher (observer) with the followings: (a) the ability to draw conclusions about the application of practical skills in either game situations or exercise participation, and (d) the ability to make inferences about the communication exchange between the game instructor and the participants using practical and competitive strategies. Instructor and athlete behaviors observed are listed in Table 1.

Table 1.
Observed Behavior of Participants

	Tasks	Frequency	Remarks
1. Instructor Indirect Influence	I Simultaneous skill demonstration and observation of response pattern to confirm learning and effects of exercise on participants: Pretest evaluation: (i) Educate participants on steps of exercise regime and rationale: warm up, exercise frequency and time and depletion (warm down). (ii) Sign consent forms and record vital signs of blood pressure, height, weight. (iii) Introduction of warm up exercise for 5-7 minutes to acclimatize. (iv) Introduction of task or exercise skills	Same time instruction for all participants.	Participants complied with instructions
2. Instructor Indirect Influence	Continuous counting 1, 2, 3, etc. and change of exercise style as a sign of approved performance by participants /athletes.	5 sets x 24 days (Weekly)	Session Well attended 110 participants
3. Instructor Indirect Influence	Introduction of new exercises and style as intensity increases while observing degree of difficulty in coping with style and intensity of exercise as counting increases through 11, 12, 13, up to 20.	5 x 24	Minor difficulties experienced
4. Instructor Indirect Influence	Feed back on degree of difficulty experienced by participants as styles vary and intensity increases using body sides of Right and Left.	Complaints noted	110 attended

5. Instructor direct influence	Feed back is expected either by continuing or discontinuing exercise by participants as counting is taken in reverse manner: 20, 19, to 11 and change or alternate side for exercise : 10, 9, down to 1 and stop.	Complaints noted	110 attended
6. Instructor direct influence	Repeated exercises in sets of start 1-10 , reverse 11- 20 and pause as a set or bout of exercise why recording observed responses from participants.	All participated	Exercise well taken
7. Instructor direct influence	Criticism: (i) Obedience to instructor's instructions. (ii) Appropriate skill demonstrations (iii) Differences observed. (iv)Rationale for exercise skill& health benefits was explained.	Degree of obedience noted difficult squats and synchronizing Flexibility exercises	Consistently Consistently Learning occurred later Learning occurred gradually
8. Participants Group Discussion	Responses by participants: (i) degree of difficulty experienced and why. (ii) Suggest possible solutions (iii)Express desires or seek clarifications	Initial difficulty experienced Rationale for flexibility and toning of muscle explained	Learning occurred with adaptation
9. Participants Group Discussion	Role play: (i) Participants assume role of instructor in turns while researcher observes responses from other participants. (ii) Depletive exercises or warm down (iii) Feedback expected on conduct of exercise from participants	Attempt to play instructors role perfectly Depletive was easy. Fear expressed over continuity	Learning became permanent Learning occurred Learning occurred
10 Participants : Silence	Post test evaluation	110 participated	Benefits were comprehended

Summary of categories for Flanders Interaction Analysis as adapted and modified source: Hopkins, W. S., & Moore, K. D. (1993). Clinical supervision: A practical guide to student teacher supervision. Madison, WI: Brown & Benchmark Publishers.

Table 2.
Analysis of Flanders Interaction Category

S/No.	Variables/ factors	Observation Always	N = 110
1	Self Motivation to participate	74 (66%)	
2	Interest as factor of fitness	46 (41.7%)	
3	Regular attendance	64 (57.8%)	
4	Questions/ Feedback	42 (37.5%)	
5	Cost of exercise programme	24 (25 %)	
6	Health Talks on benefits of exercise	55 (50%)	

Table 2 revealed that about 74 (67%) participants were self-motivated to exercise, while 64 (58%) had regular attendance. Only 55 (50%) received health talk. Forty-six participants (41%) took initiatives while 42 (38%) asked various questions related to health benefits of sport and exercise.

(1) Most responses to the questionnaire thought the availability of facilities and equipment would enable them to take exercise at will. Ho1: Access to standard sport facilities and equipment is significantly related to sport participation by civil servants, $X^2 \text{ cal} = 28.93 > X^2 \text{ tab} = 21.03$; $df = 12$; $p < 0.05$.

(2) Questionnaire responses confirmed that it would be somewhat difficult to be a regular exerciser, while 42% (41) participants claimed interest in keeping healthy and 25% (24) participants reported that their busy schedule prevented them from participating in exercise regularly. Ho 2: Job schedule is significantly related to sport participation, $X^2 \text{ cal} = 15.12 > X^2 \text{ tab} = 12.59$, $df = 6$; $p < 0.05$.

(3) Approximately 25% of (24) participants confirmed that sport was expensive while the others viewed exercise an important health promotion strategy. Ho 3: Cost implications of sport activities is significantly related to sport participation by civil servants, $X^2 \text{ cal} = 18.94 > X^2 \text{ tab} = 12.59$; $df = 6$; $p < 0.05$.

(4) Approximately 75 % (78) participants took exercise to reduce and control preventable diseases such as weight control, diabetes, hypertension, and arthritis or joint pain. Ho 4: Pursuit for health promotion significantly influenced sport participation, $X^2 \text{ cal} = 21.54 < X^2 \text{ tab} = 16.92$.

Discussion

The hypothesis testing Ho1: Access to standard sport facilities and equipment is significantly related to sport participation by workers. The results showed that access to sport facilities would enhance participation. This corroborates Arogbonlo and Achugbu (2005) who observed the relevance of instructional materials and favorable learning environment in physical education and sports. Also that facilities and equipment must be of good quality and standard to promote confidence and enhance participation was confirmed by Aibueku and Okunbor (2005).

The results also reveal that one's job schedule was significantly related to sport participation, and irregular attendance to exercise sessions due to the lack of time was observed. Azzarito & Ennis (2003) reported that career progress could be a barrier to effective sport participation. Other silent factors that constituted barriers included preference of sports as determined by cost of physical activity.

Cost implications of sport activities were significantly related to sport participation by civil servants. Morgan et al. (2003) confirmed that individuals can be motivated to participate in lifelong exercise to promote wellness. This study observed reluctance to participate in exercise even when the exercise was free. Bernard (1935) attributes behavior to causal dimensions, namely: behavior is observed and perceived, behavior is determined to be intentional, and behavior is attributed to internal and external causes leading to either success or failure of achievement oriented behavior. Cost implications are the cost of enrolment into the fitness club, and purchase of sports equipment and sports wears, etc.

Result indicated that interest for health promotion significantly influenced sport participation. Health talks were aimed at initiating positive behavior change for people to take their destiny in their own hands and keep healthy. Experts express that what one achieves in a 60-minute walk could be achieved with a 30-minute jog. Ideally, intensity of exercise should correspond with the target heart rate. It is therefore necessary for individuals to adopt healthy life styles.

Lee (2003) and Otinwa (2005) have attributed poor sports participation among members of the academic community to various factors such as a lack of time, insecurity, poor access to sports equipment and facilities, no motivation, and cost of sport activities. Emiola (2008) reports that a duration of 20- to 30-minute workout per day has been indicated as an optimal amount and is indicative of the greatest return for time invested. Ideally, intensity of exercise should make the heart rate within the target heart rate for most people, or should be at least 60% of the maximal heart rate. A frequency of 3 to 5 days per week is an optimal frequency.

Emiola (2008) states that skeletal muscles are very responsive to exercise. He asserts that more than 600 muscles are used by humans to play sports and accomplish daily tasks. The skeletal muscle is the body's most abundant tissue, making up about 23% of an adult female's body weight and 40% of an adult male's body weight. The author explains that regular exercise through work, play, and recreation serves several major health benefits such as lowering risk of premature death, improving mental health, improving body composition, increasing ability to strengthen the body, and relaxing the mind and toughening the spirit.

Otinwa (2005) indicates that exercise is the most inexpensive therapy for the prevention and rehabilitation of most diseases, especially the hypo-kinetic, non-communicable diseases. Participation in exercise and fitness programs has great benefits such as reduction of the risk of developing diabetes, high blood pressure, and colon cancer. It also reduces feelings of depression and anxiety; helps control weight; builds and maintains healthy bones, muscles, and joints. Physical activity promotes psychological well-being, improves digestion and enhances quality of sleep. Exercise and fitness add radiance to complexion, improve body shape, tone and firm muscles, and improve endurance.

Onwuama (2003) and Odebunmi (2004) have confirmed that work schedules are capable of precipitating stress, anxiety and increasing blood pressure which can be managed with regular exercises. Exercise enhances coordination and balance, improves posture, eases and possibly eliminates back problems and pain. It lowers resting heart rate, enriches sexuality and immune system, increases enzymes in the body which burn fat, enhances oxygen transport throughout the

body. Physical activity increases speed of muscle contraction and reaction time, empowers freedom from drug abuse, improves learning ability and the ability to concentrate.

Conclusion

Wellness is the first and foremost choice to assume responsibility for the quality of life. It begins with a conscious decision to lead a healthy lifestyle. Regular physical exercise and play are crucial to life and essential for physical, mental, psychological, social development and the promotion of wellness in individuals. Wellness is a mindset, a predisposition to adopt a series of key principles in various areas of life that lead to high levels of well-being and life satisfaction. Health education would increase knowledge on health related benefits of physical activity and the ability to make appropriate decisions regarding personal health.

Recommendation

It is recommended to provide civil servants with health education, information, and consultation so they can participate in physical activity regularly and make appropriate decisions regarding their health.

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Towards Achieving The Millenium Development Goals In Nigeria Through Sports

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Abstract

The authors examined the expectations of the Millennium Development Goals (MGDs) in terms of the objectives and the set deadline of 2015 for their full actualization and observed that Nigeria was yet to rise up to the challenges of realizing these objectives. The paper identified the roles that physical education and sports can play in the achievement of the MDGs. The authors in the final analysis recommended the observation and implementation of the Olympic ideals in the application of Physical Education and sports towards the realization of the MDGs.

Introduction

Nigeria, a country in West Africa has the largest population amongst the world black race. Her population represents about a quarter of the whole of Africa. This makes the achievement of the millenium development goals in Nigeria a very significant one in the achievement of same in Africa as a whole. It is however disheartning to note that Nigeria is amongst the nations in the world with the least possibility of achieving the MDGs by 2015. Odedeyi (2005) regrets that Nigeria has been footdragging in her efforts towards achieving the MDGs and made a clarion call in the direction of ameliorating the problem.

Since the United Nations millenium summit in 2000, where the millenium declaration was adopted by 189 nations and signed by 147 heads of states and governments, United Nations has done a lot of monitoring and evaluation of the activities on the achievement of the Millenium Development Goals (MDGs) in all countries and Nigeria has been found lacking. While emphasising this, Abass (2008) reported that the United Nations affirmed that activities in Nigeria in co-ordinating and publicising comemorative activities which is the testimony to the success of the international year of sports and physical education was very minimal and indeed very lacklustre. National focal points have been established in some countries. Furthermore, 52 of these countries have been particularly active in providing the objectives of the year with reports on their activities made to the office for the international year. Also, the Economic Commission for Africa (2005) in her report on the assessment of the progress and challenges of MDGs in Africa reported that Nigeria was not having a remote probability of achieving any of the sports related goals of the MDGs by 2015.

Mitigating Factors Against Sport as a Means of Attaining the MDGs in Nigeria

Despite the fact that Nigeria is a sports-loving nation, her attitude to sports is most uncomplimentary with sports development. Up till now, there has been no recorded official effort in Nigeria by the government or its organ in charge of the MDGs to harness the power of sports in achieving any of the objectives of the MDGs; although Nigeria was reported slightly as having participated in roundtables, meetings and workshops in Burundi, Cameroon, Ethiopia, Mozambique, Niger and Nigeria. The recognition given to and state of Physical Education in Nigeria is presently unwholesome. The subject is treated with lukewarmness and never given a

pride of place in the hearts of the government, school proprietors, administrators etc. At the secondary school levels, the subject is treated with levity tending towards disdain, while at the primary school level, the subject has been replaced by other less important subjects in the school curriculum.

There is indeed a need for a concerted effort to put Nigeria on the right track to achieve the MDGs. It is a known fact that sports and physical education can contribute to the specific objectives of Millennium Development Goals. Each of the eight objectives and goals are sports related because eradication of extreme poverty and hunger is achievable through sports. The sports industry has helped to achieve this in Nigeria. Universal Primary Education came to Nigeria in the early seventies with sports and physical education being part of the inalienable culture, gingering the interest of many towards participation in physical education and sports. Gender equality and women empowerment has been promoted more in the sports arena than anywhere else. Child mortality has been reduced through sports participation and maternal health has improved due to regular attendance at fitness clinic or individual participation in sports. Sports has provided good role models from athletes and individuals who live normal lives without recourse to anti-social activities that can cause HIV/AIDS and other disease. Sports is a tool for stimulating people towards promoting the preservation of human natural environment. Also, sports is a very useful and reliable source of providing endless opportunities for innovative partnership for intra and international development.

The United Nations attaches a lot of significance and recognition to sports as a medium to achieving development and peace. The organisation also considers sport as a veritable means for actualizing the MDGs; from the perspective of sports in relation to health, education, sustainable development, peace, communication, partnerships and the control and prevention of HIV/AIDS. The report from the United Nations inter-agency task force on sport for development and peace (2003) noted that sport is far more than a luxury or a form of entertainment. It recommended that access to and participation in sport is a human right; essential for individuals of all ages to lead healthy lives. In Nigeria, true as the position of the United Nations above can be, it is sad to note that the potential of sport as a tool for development and peace is yet to be fully realized. Even in the mainstream thinking of the United Nations agencies, the use of sports to maximise its potential is not yet fully appreciated. Sports which in reality is an engine of development is being erroneously viewed as its bye-product. There must exist a synergy between the government, private organisations, and well meaning individuals towards maximising the potentials of sports in promoting human development, maintaining peace and actualising the MDGs.

The concept of “sports for all” is equally useful to achieve these objectives. This is yet to be properly addressed in Nigeria. This represents a lacuna, preventing the generality of the people from acquiring the life skills that could be earned through participation in sports. This concept is not meant to develop sports champions only, but to promote skills that would help to empower individuals and promote psychosocial well-being, which include, increased resiliency, self esteem and interpersonal relationship that is profitable (UN reports 2003).

The Way Forward

A popular adage of Chinese origin says “problem identified is half solved”. It therefore behoves Nigeria as a nation to workout the modalities for using sports and physical education as veritable tools for achieving the MDGs. To this end, all hands must be on deck. Physical education at all levels would ensure the acquisition of formal knowledge of skill acquisitions in

sports coupled with the positive behavioural changes that the tenets and practice of physical education enshrine. The practice of sports promote holistic development of individuals; when coupled with physical education, better citizenry results. The rise in physical activity would reduce and therefore curtail the existence of hypokinetic diseases which has been recorded as the cause of 1.9 million deaths globally.

In a world that has realized that participation in physical activity as a lifestyle is the most cost-effective and sustainable way to tackle the rise in many deadly diseases, motivating people towards participation in sports would promote more healthy Nigerians with some measure of economic benefits. Nigeria should endeavour to participate in all the World Health Organisation (WHO) programme to benefit from their advantages. In 2002, WHO dedicated the World Health Day to the concept of “Move for Health” and the world “No Tobacco Day 2002”. In 2003, the “Move for Health” initiative was expanded to the idea of sports for all. Despite the near global acceptance of this noble concept, Nigeria’s participation has been regrettably minimal. The nation needs to do more in this regard.

For Nigeria to maximally enjoy the potential of physical education and sports as tools for realizing the MDGs she must appreciate the position taken by Koffi Annan (2003), that the “Right to Play Belongs to Everyone”. However, this right can only be properly enjoyed if the factors to promote it are made available. Some time ago, the United Nations declared the year 2005 as the international year of Sport and Physical Education, expecting all nations to embrace the concept, but at that time, the appreciation and significance attached to Physical education was at a low ebb.

The Olympic movement as an unswerving instrument of peace and human dignity is also an instrument established to assist man in redirecting his thoughts away from war, domination and all negative directions. Nigeria as part of the movement has her own National Olympic Committee (NOC) but the relegation of Physical Education in her school curricula as well as the lacklustre manner of running her sports and sporting programme do not reflect a genuine support for the virtues and ideologies of the movement. Physical Education which should have been given a pride of place has been thoroughly relegated in Nigeria. How then can the Chinese proverb hold sway that says “If you are planning for one year, plant rice; if you are planning for five years, plant trees; if you are planning for the future, educate your children” (Naik, 1993). Now, Nigeria must arise from her slumber and start to recognise the original concept of the Olympic movement as primarily an educational movement through which the minds of men can be revitalized towards better citizenry which is the precursor for making every individual an essential and invaluable factor in realising the MDGs

While condemning the damaging and downgrading of the support for school-based physical education and sport around the world. Yang (2010) paid a glowing tribute to President Samaranich who established education as a treasure trove and a force to counteract the pervasive negative effect of the vices. The MDGs and the principle of Olympism are one because they both share the same ideology, and that is “To lead the highest creation of God – men and women – toward perfection” therefore, Nigeria must rise up to the challenge of meeting the objectives of the MDGs, through the media of sports and physical education within the ideals of olympism.

Conclusion

Nigeria has indeed come of age at 50, but there are still many loopholes to be filled in order to meet the expected deadline of 2015 year of full actualisation of the MDGs. Physical education

and sports with the principle of olympism should be carefully embraced and utilized to achieve this

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Influence of Managerial Policy on Enhanced Performance of Oyo State Athletes at the Nigeria National Sports Festival (1998-2008)

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Abstract

An efficient and effective management of sport requires the establishment of sound policies, if it is to achieve its goals. Policies serve as a standing plan or guide in general terms of how sports organization should be run and how its activities are to be conducted. Policies shape the procedures, rules and regulations of an organization. Without stated policies, there would be little to guide the activities and conduct of the organization in the pursuit of its achievable goals. The purpose of this study was to investigate the influence of managerial policies on enhanced performance of Oyo State athletes at the Nigeria national sports festival for a period from 1998 to 2008. The participants of the study consisted of a sample of 500 respondents who were purposively selected from Oyo State at the 16th National Sports Festival in Kaduna State, Nigeria. The main instrument used for the study was a self-developed and structured questionnaire. The questionnaire was content and construct validated and the non-parametric statistics of Chi-square (X^2) was used to test the hypotheses at 0.05 alpha level. Conclusions were made and recommendations were proffered on how management staff's achieved goals, professional skills, positive attitude, and strategic plan and managerial policies would enhance the performance of Oyo State athletes at subsequent national sports festival in Nigeria.

Introduction

Sports have continually occupied the prime time and space in the electronics and print media and also occupied the subconscious and conscious of many to such an extent that man has become fanatically committed to the cause of sports, either as athletes or as spectators (Morakinyo, 2002). Onifade (2002) indicates that sport in Nigeria has been a veritable avenue for national cohesion and unity, and it is also a facet of life. The incredible popularity and growth of international sports have an appreciable impact on the sporting interest and awareness of Nigerians and have become a worldwide social phenomenon with implication for our youth. Governments of different countries use sports for both personal and partisan ends. International participation in sports is universally accepted, thus making sports unequal as a social phenomenon of modern times.

Fasan (2004) has stated that sports administration can be defined as activities which are intended for the development of sports, in general, and carried out by specific people trained in the administration of sports. He further said that sports administration could mean the art of managing programs, which makes effective use of human and material resources in sports organizations so as to achieve the best result and satisfy the demand and expectation of the management and interest of the general public.

Sports administration is the bedrock of sports development in virtually all nations. This is the aspect that is responsible for the smooth running of various sports in terms of planning, organizing, structuring and controlling all essential inputs (Oloruntoba & Achugbu, 2002). Bucher and Krotee (2005) referred to management as the attainment of organizational goals in an effective and efficient manner through planning, organizing, leading and controlling organizational resources in accordance to policies.

According to Audu (2008), one of the objectives of the sports development policy is to provide the nation with the opportunity of measuring its sports against those of other nations with the views of

establishing a respectable position for Nigeria in the sporting community of the world. However, Abubakar (2002) summarize that the level of sports development in Nigeria has been very disappointing for its inability to improve sports management since independence. Nigeria has never implemented an integrated national sports program that incorporates progressive sports management strategies to enhance and promote the steady growth and development of sports in the country.

Parkhouse (2005) defined policy as a definitive course of action selected from various alternatives in light of given conditions to guide and determine present and future decisions. Policies are developed from mission statements that should be the basis for establishing aspects of operational procedures. Bucher and Krotee (2005) have stated that efficient management of sports requires the establishment of sound policies if it is to achieve its goals. Policies serve as standing plans or guidance in general terms of how sports organizations should be run and how its activities are to be conducted. Policies shape the procedures, rules and regulations of an organization. Without stated policies, there would be little to guide the activities and conduct of the organization in the pursuit of its achievable goals. With well-stated policies the organization and its members will better understand what is expected of them and as such may serve to solve potential problems of behavioral and organizational management.

Oyo State is one of thirty six (36) states in Nigeria, located in the South-West Nigeria. It has thirty three (33) local government areas. They are predominantly Yoruba speaking with Ibadan being the largest city in Nigeria as the capital.

The managerial policy in Oyo State in the past did not improve sports performance of the state athletes at the previous national sports festivals. This is due to the fact that sports policies were pursued by so many past sports administrators who were not professionals. Oyo State has not gotten any sports policy that will enhance sports performance at the national sport festival, and this led to poor performance in the past festivals. Bucher and Krotee (2005) have asserted that the lack of set goals and objectives stated in terms of authentic behavior and performance outcome could be a serious hindrance to effective sports development. In view of the fact and coupled with the need to further develop managerial policy towards enhanced performance of Oyo State athletes at national sports festivals, it is therefore imperative that a study of this nature be conducted.

This study was intended to investigate the influence of managerial policy on enhanced performance of Oyo State athletes at the Nigeria National Sports Festivals that took place between 1998 to 2008. It was hypothesized that management staff's achievable goals, professional skills, and attitude, plus strategic planning of management policy, would have significant influence on level of enhancement of performance of Oyo State athletes at the Nigeria National Sports Festival (1998-2008).

Methods

A descriptive research design was used for this study and it allowed the researcher to carefully describe and explain responses of the respondents on influence of managerial policy towards enhanced performance of the athletes. The subjects of the study consisted of five hundred (500) respondents who were purposively selected using the purposive sampling technique at the 16th National Sports Festival (Kada 2008) Kaduna State, Nigeria. The sample comprised staff members of ministry of youth and sports development, sports associations, and corporate. The sample also contained private sponsors, sports journalists, coaches, athletes, house of assembly committee members on sports, honorary coaches who were lecturers in tertiary institutions, and past and present directors of sports from Oyo State, Nigeria.

The main instrument for the study was a self-developed and structured questionnaire. The questionnaire was divided into two sections, Section A and Section B. Section A elicited

information on the demographic data of the respondents, and Section B was used to seek information on the variables to be used for the study. The questionnaire was content and construct validated, and the test-retest was used and Pearson's Product Moment Correlation Coefficient was adopted to examine its reliability with $r = 0.79$ obtained.

The distribution and collection of the questionnaire to the respondents at the different venues at Kada 2008 in Kaduna, Kaduna State, Nigeria, was done with the assistance of three research assistants. The results from Section A (demographic information) were coded and analyzed using descriptive statistics of frequency counts and percentages, and the responses obtained from Section B of the questionnaire were analyzed using Chi-square (X^2) method to test the hypotheses of the study at 0.05 alpha level.

Results and Discussions

Table 1.

Chi-square Analysis on Achievable Goals and level of Enhancement of Performance of Oyo State Athletes at the Nigeria National Sports Festival (1998-2008)

Response	Yes	No	Df	X2 value	P	Remark
Strongly Agree	132	62	3	18.423	0.000	Sig
Agree	85	71				
Disagree	37	37				
Strongly Disagree	32	44				
Total	286	214				
Sum Total	500					

The results from Table 1 showed the calculated Chi-square (X^2) value of 18.423, degree of freedom (df) = 3 and P = 0.000. The results imply that achievable goals could significantly enhance performance of Oyo State athletes at national sports festival (1998-2008).

Table 2.

Chi-square Analysis on Professional Skills and Attitudes of Management Staff on Enhancement of Performance of Oyo State Athletes at the Nigeria National Sports Festival (1998-2008)

Response	Yes	No	Df	X2 value	P	Remark
Strongly Agree	104	90	3	12.248	0.007	Sig
Agree	56	100				
Disagree	38	36				
Strongly Disagree	32	44				
Total	230	270				
Sum Total	500					

The results from table 2 indicate the calculated Chi-square (X^2) value of 12.248, degree of freedom (df) = 3 and P = 0.007. The results imply that professional skills and attitude of management staff could significantly enhance performance of Oyo State athletes at National Sports Festival (1998-

2008).

Table 3.

Chi-square Analysis on Strategic Planning of Managerial Policy on Enhancement of Performance of Oyo-State Athletes at the Nigeria National Sports Festival (1998-2008)

Response	Yes	No	Df	X ² value	P	Remark
Strongly Agree	119	94	3	15.489	0.001	Sig
Agree	77	71				
Disagree	38	46				
Strongly Disagree	27	28				
Total	261	239				
Sum Total	500					

The results from table 3 reveal that the calculated Chi-square (X^2) value of 15.489, degree of freedom (df) = 3, and P = 0.001. The results imply that strategic planning of managerial policy could significantly enhance performance of Oyo State athletes at National Sports Festival (1998-2008).

Discussion

A good achievable goal could significantly enhance the performance of Oyo State athletes at the Nigeria national sports festival. The findings corroborate Bucher and Krotee's (2005) statement that organizational goals can function in an effective and efficient manner through planning, organizing, leading and controlling all aspects of organizational resources. The findings are also in agreement with Emeruwa (2008) who asserts that goals are created, stated and reached through programs that are implemented, and goals can be achieved through proper planning and cooperative action. Therefore, good achievable goals will enhance the performance of Oyo State athletes at the Nigeria national sports festivals.

The findings in table 2 are in agreement with Ojeme (2007) who states that the qualification and abilities of managers vary, so in order for managers to do the tasks and responsibilities professionally and successfully, certain skills and attitudes are required. Bucher and Krotee (2005) also agree that the primary skills are deemed crucial for effective and efficient management practice, and that the acquisition of professional skills and positive attitudes are vital ingredients in management process.

Therefore, strategic planning of managerial policy could significantly enhance performance of Oyo State athletes at the Nigeria national sports festivals. The findings agree with Doherty and Chelladurai (2009) that policies become important management tools for implementing plans, and once the plans have been accepted, they must be carried out. Wikipedia the free encyclopedia (2007) corroborates the above statement that a well-reasoned policy can make the organization function well and that the organization members will better understand what is expected of them. It further states that strategic policy is a definitive course of action needed to guide and determine present and future decisions in any establishment.

Conclusion

Based on the findings it is concluded that a well stated and management staff's achievable goals, professional skills, and positive attitude, plus a well reasoned strategic plan and good managerial policy,

will consequently enhance performance of Oyo State athletes in subsequent national sports festivals in Nigeria.

Recommendations

It is therefore recommended from the findings of this study

- (1) That the government of Oyo-State should state clear, more realistic and achievable goals for sports managers and administrators to be accomplished before each national sports festivals in Nigeria.
- (2) The professional skills and attitude of the management staff of the Oyo-State sports council should be geared towards harnessing the human, physical, and financial and information technology resources for optimal performances of the state athletes at the national sports festivals in Nigeria.
- (3) The sports managers and administrator in the state need to adopt good and error proof strategic plans in terms of adopting technical, psychological and motivational plans as incentive to enhance optimal and high performance among athletes. Also a well stated policy should be laid out with specialists and professionals made to manage and administer the sports industry.

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A Practical Study of the Relationship Between Exercise on School Yard Equipment and Physical Ability of Elementary School Children

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Abstract

This study investigated the effects of exercise on physical ability in 53 elementary school children. The third-graders were divided into a training group (male: $n = 16$, female: $n = 9$) and a control group (male: $n = 16$, female: $n = 12$). During the course of a regular school day, the children in the training group were allowed to play in a school yard for about 15 minutes per day, five days per week, for 10 months. Using training equipment, they participated in six activities: crossing 18 bars on a hanging ladder, climbing to the top of a climbing bar, leapfrogging over 10 fixed tires, climbing to the top of a scrambling net ladder, hanging from a horizontal bar, and walking along a 10-m log. Individual times for each activity were recorded once a month. The control group did not perform any such activities in the course of their school days.

By the end of the ten-month experimental period, the children in the training group improved their physical ability with increased grip strength, and their times were significantly shorter (or longer in the case of the horizontal bar) than those of the control group. As there is significant correlation between grip strength and other muscles, this study finds that playing with a variety of equipment at an early age can improve neuromuscular adaptation, as well as increase physical ability. While further studies must be conducted to address the correlation between increased physical ability and increased safety, the implications at this stage are promising.

Key words: grip strength

Introduction

It has been reported recently that the number of injuries and accidents involving young adults and children during exercising has increased. Uchiyama *et al.* (2004) have shown that such instances increased by 30% in elementary school children and by 40% in junior and senior high school children from 2004. Uenobe *et al.* (1982) reported that these injuries and accidents were shown to be higher in lower elementary school children than in junior and senior high school children. It is likely that there has been a decrease in instances of children playing outdoors due to significant changes in their lifestyles (Komata, 2003). Abe *et al.* (2006) suggests that “strong safety education” with respect to exercise and/or improving the basic physical ability in children is highly essential.

There are many types of playing equipment in the schoolyard. We examined the effects that playing on a hanging ladder and a horizontal bar in school yards had on the grip strength in elementary school children and found an increase in the “passive grip strength (PGS)” as compared to “active grip strength (AGS)” in case of hanging ladder, and an increase in AGS as compared to PGS in case of horizontal bar (Komata *et al.* 1999, Komata 2002).

AGS is a voluntary force generated by a person, whereas PGS is the grip strength generated against external force (Ono *et al.* 1964). There was significant correlation between

grip strength and the other muscles of arms, back, and legs (Ishiko 1985). Playing with equipments can improve grip strength as well as muscular strength. Thus, these abilities are useful determinants of the basic physical ability.

Basic physical ability not only includes muscular strength but also other types of physical ability such as speed, balance, flexibility, endurance muscular strength, and agility. No study has investigated the effects of playing with various equipments in the schoolyard on changes in the physical ability.

The purpose of this study was to investigate the effects of regular exposure to training equipment on grip strength and general muscular strength, which are useful determinants of basic physical ability, in third grade elementary school children.

Methods

Subjects

Fifty-three grade 3 (mean age: 8.3 yrs) children from an elementary school in the semi-urban area of Tokyo participated in the study. Agreement was obtained from their parents and legal guardians prior to the study. Children were randomly placed into training (male: $n = 16$, female: $n = 9$) and control (male: $n = 16$, female: $n = 12$) groups with no significant difference between the two groups. The physical characteristics of the subjects before and after the experimental period are shown in Table 1.

Playing with Equipment

Children in the training group were allowed to play in the school yard with six playing equipments that included (1) playing on a horizontal hanging ladder, (2) climbing a climbing bar, (3) leapfrogging fixed tires on the ground, (4) climbing a scrambling net ladder, (5) hanging from a horizontal bar, and (6) walking along a log, for around 15 minutes, 5 days per week for 10 months.

Children in the training group practiced playing with this equipment at least once every day except on the occasion of rain, school holidays, and school events. The experiment was conducted from May to February, except for the 40-day summer and 14-day winter vacations (2005-2006). The control group did not perform from any such activity in the course of their school days.

Table1. *Physical characteristics of subjects in training and control groups*

Gender	Group		Body height (cm)	Body weight (kg)	Sitting height (cm)
Boy	Training	before	\bar{x}	128.6	28.2
			SD	4.6	5.4
		after	\bar{x}	135.1	31.9
			SD	4.6	6.2
	Control	before	\bar{x}	128.7	26.3
			SD	4.8	2.8
		after	\bar{x}	133.6	28.8
			SD	4.7	3.5

Girl	Training	before	\bar{x}	128.5	27.4	70.6
			SD	6.4	5.9	3.1
		after	\bar{x}	134.2	30.6	73.2
			SD	6.6	7.3	3.4
	Control	before	\bar{x}	126.8	26.9	69.8
			SD	5.5	5.1	2.9
		after	\bar{x}	133.6	30.0	72.3
			SD	6.3	5.9	3.4

Equipment play test (Performance test)

The time required by children in the training group to play with the following equipments was recorded every month for the entire experimental period.

- 1) Crossing 18 bars on a hanging ladder
- 2) Climbing to the top of a climbing bar
- 3) Leapfrogging over 10 fixed tires
- 4) Climbing to the top of a scrambling net ladder

Also, the following performance tests were conducted during the first, middle, and end months of the experimental period.

- 5) Hanging from a horizontal bar
- 6) Walking along a 10-m log

The control group conducted the performance test only on the first and end months of the experimental period.

Grip strength

Active grip strength was measured by a digital handgrip dynamometer (TTEM No. 1857; Takei scientific instruments Co., LTD. JAPAN) in the first, middle, and end months of the experimental period for the training and control groups. The present study was measured AGS only. AGS was measured twice for both hands, and the average of higher records of both arms was used for analysis. The control group measured the grip strength only on the first and end months of the experimental period.

Statistical analysis

All data are presented as means \pm SD. Changes in AGS and play time of each equipment during the experimental period were analyzed by two way analysis variance. A multiple comparison was performed by Scheffe's post hoc test. Statistical significance was chosen as $P < 0.05$.

Results

Figures 1-6 show changes in the performance test on “hanging ladder,” “climbing bar,” “fixed tires,” “net ladder,” “hanging from horizontal bar,” and “walk along a log” for the training and control groups in the experimental period. By the end of the 10-month experimental period, most of the boys and girls in the training group improved their physical ability, and most of the time taken was significantly shorter (or longer in the case of the horizontal bar) in comparison with the control group ($P < 0.05$ or $P < 0.01$).

Figure 7 shows the changes in AGS during the experimental period for boys and girls in the training and control groups. At the end of the experimental period, significantly increase in AGS was observed for boys and girls in the training group in comparison with the control group ($P < 0.01$ or $P < 0.05$).

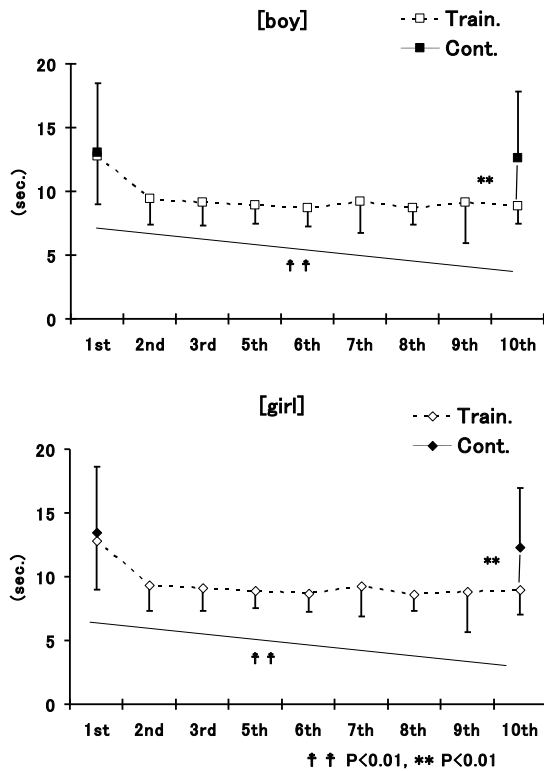


Figure 1. Changes in crossing 18 bars on a hanging ladder for the training and control groups during the experimental period for the boys and girls

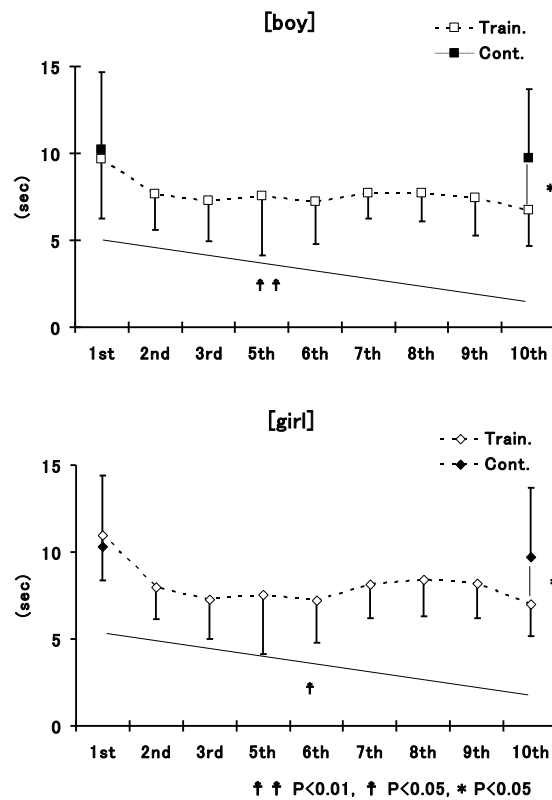


Figure 2. Changes in climbing the top of the climbing bar for the training and control groups during the experimental period for boys and girls

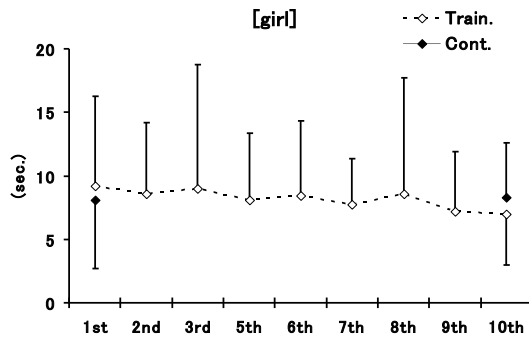
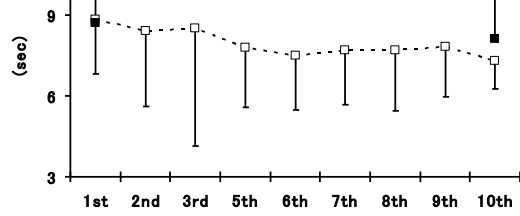


Figure 3. Changes in leapfrogging over 10 fixed tires for the training and control groups during the experimental period for boys and girls

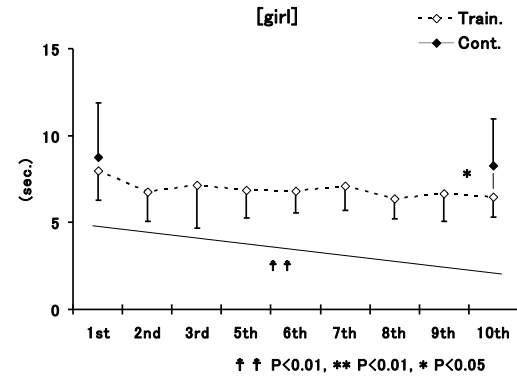
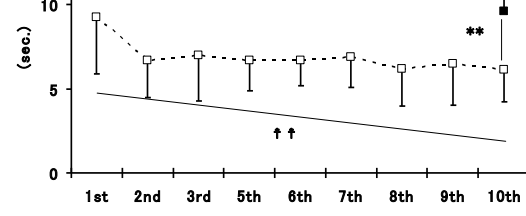


Figure 4. Changes in climbing the top of the scrambling net ladder for the training and control groups during the experimental period for boys and girls

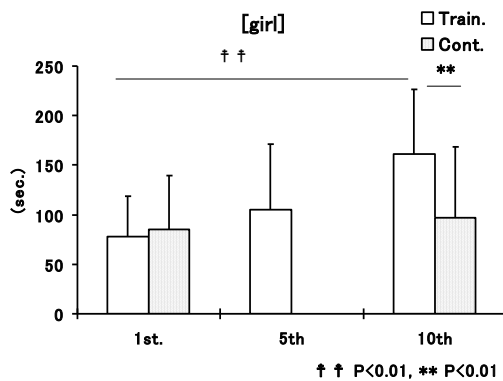
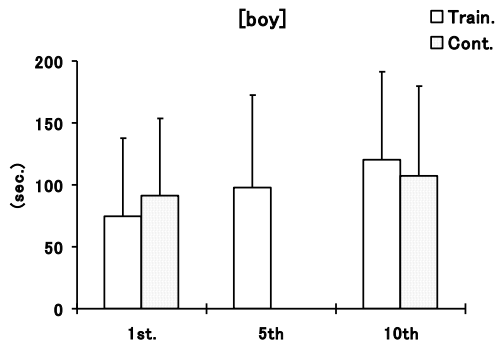


Figure 5. Changes in hanging from a horizontal bar for the training and control groups during experimental period for the boys and girls

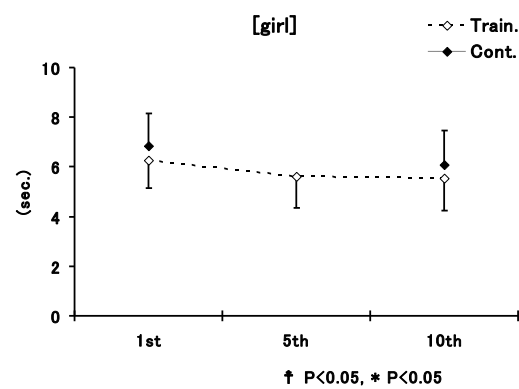
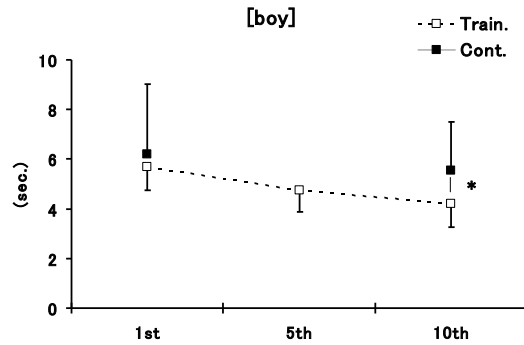


Figure 6. Changes in walking along a 10m log for the training and control groups during experimental period for the boys and girls

Discussion

The equipment used in this study are highly popular equipment used in Japanese elemen-

tary schools, most often used by lower grade children. They require various forms of movement abilities. Thus, the acquired physical ability is expected to decrease the number of injuries and accidents during exercising.

The purpose of this study was to investigate the effects of regular exposure to training equipment on grip strength and general muscular strength, which are useful determinants of basic physical ability in elementary school children.

In this study, “hanging ladders”, “climbing bars,” and “horizontal bars” can be estimated to improve two types of grip strength (AGS, PGS) for controlled muscular strength by oneself and against gravity force (Komata *et al* 1998, 1999, Komata 2002).

Further, “net ladders,” “walking a log,” and “fixed tires” can be estimated to improve balance ability, speed, or agility. All these abilities are as important as the basic physical ability.

By the end of the experimental period, most performance tests revealed that the time taken by the training group was significantly shorter (or longer in the case of the horizontal bar) in comparison with that of the control group (Figure 1-6). Consequently, most of the boys and girls in the training group noted improvement in their physical ability with increased grip strength (Figure 7). In this study, PGS was not measured. However, since Kuchiki (1988) reported that PGS was shown to be higher than AGS in all school children, it is speculated that PGS was likely to improve along with AGS. Thus, these results indicate that improvement in physical abilities is correlated with grip strength.

Also, the performance tests conducted in this study were considered to be relevant in times of disaster and/or emergency. It is likely that these abilities contribute towards “emergency evacuation ability” (Komata 2006).

On the other hand, a previous study shows that hanging on ladders and playing on horizontal bars significantly increase AGS and PGS in lower elementary school children more than other school children (Komata 1999, 2002, 2004). Fukunaga (1978) demonstrated that muscle strength training included neuromuscular adaptation, followed by muscle hypertrophy.

With respect to the training group in this present study, no significant differences were evident before or after in terms of body height and/or body weight in either boys or girls (Table 1). However, physical ability significantly improved. It seems reasonable to assume that

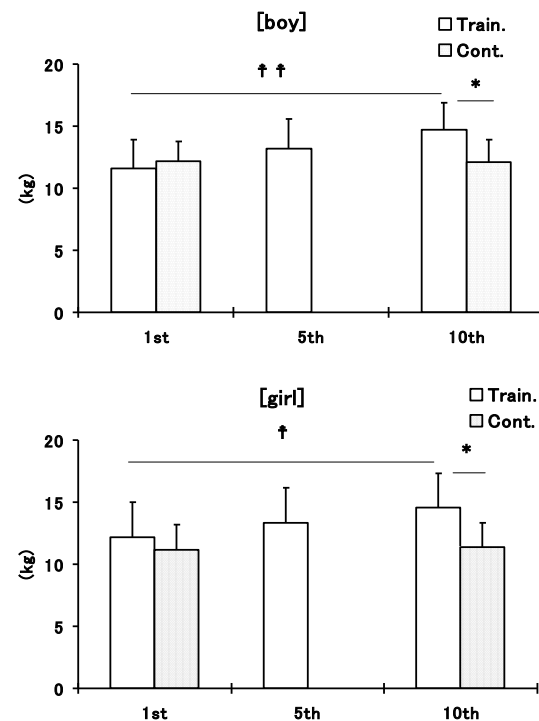


Figure 7. Changes in grip strength (AGS) for training and control groups during the experimental period for boys and girls

improvement in physical abilities was caused by neuromuscular adaptation and not by muscle hypertrophy.

In conclusion, this data suggests that improvement in physical ability is closely correlated with the ability to exercise safely and that playing with various equipment is important for acquiring such skills in elementary school children for neuromuscular adaptation on Scammon's growth curve (1900). While further studies must be conducted to address the correlation between increased physical ability and increased safety, the implications at this stage are promising. It also indicates that traditional Japanese playing equipment are highly important and useful items for their future.

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Age and Gender as Determinants of Participation in Physical Recreation Activities among Members of Selected Recreation Clubs in Ibadan Metropolis, Nigeria

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Abstract

The influence of age and gender on physical recreation activities participation cannot be over-emphasized due to the fact that every nature of physical recreation activities involves physical and mental exertion. Therefore, this study investigated age and gender as determinants of participation in physical recreation activities among members of selected recreation clubs in Ibadan metropolis, Nigeria. A total number of two hundred (200) respondents were purposively selected from four (4) functional recreation clubs, while simple random sampling technique of “fish-bowl” with replacement was adopted to select fifty percent (50%) of the regular participants. Self-developed structured and validated questionnaire with reliability of 0.98 was used to generate data for this study. The questionnaire was analyzed using inferential statistics of chi-square (X^2) to test for significance at 0.05 level of probability. Consequently, the results of this study revealed that the two hypotheses tested were rejected. Thus, age and gender were significant determinants of participation in physical recreation activities. The study concluded with some recommendations in anticipation that if implemented would help to enhance more participation in physical recreation activities among women, young and old.

Introduction

Recreation is about activities, pastimes and experiences that produce feelings of well-being, fulfillment, enjoyment, relaxation and satisfaction. It is usually undertaken during the free-time at one's disposal, which in turn provides an opportunity to express creativity, and master new things and feel good doing so. Recreation also provides an opportunity to meet and mix with people while enjoying a range of social, cultural and physical activities (www.recrend.freesevers.com).

According to Morakinyo (2002), recreation has been defined as an activity performed in opposition to work, which refreshes or invigorates the individual and it is an activity performed after work. The nature of work, hours of work, location of work, availability of recreational equipment and facilities, innovative work, inventions and exposure to modern technological system among others, determine the attitude of an individual towards participation in physical recreation activities and sports as stated by Farkash (2002).

Babatunde (2005) postulated that tremendous influence of age on sport and recreation cannot be over-emphasized; this is due to the fact that the very nature of sports and recreational activities involve physical and mental exertion. He went on to point out that optimum performance is usually more associated with youth and younger adults; also, that nearly all human activities are affected by age whether physical or intellectual. Omoruan (1996) also believed that age is one of the determinants of participation in sports or recreational activities as age can be a barrier to the learning of skills which were not learned at a younger age.

There are broad ranges of recreational activities; some are physical or active while some are passive in nature. For the purpose of this study, the researcher focused on the physical or active recreational activities such as Tennis, Swimming, Walking, Polo, Hunting, Squash, Table-tennis, Badminton, Billiard/Snookers and Golf.

Morakinyo (2002) stated that there are distinct areas of interest among different age groups as young people are more interested in activities of high intensity such as vehicle riding, tennis, basketball, swimming and others, while people over the age of 60 years are more interested in activities of low intensity such as camping, hunting, fishing, hiking, walking for pleasure, attending cultural events and others.

Oworu (2003) and Ademuyiwa (2004) both found that gender discrimination is another common practice in recreation and sports because it is generally believed that women are not as strong as men. According to Asagba (2005), gender inequality had started even from the creation of sport. He stated that ancient Olympics as observed by early Greeks, to whom the whole world owes its sports heritage, witnessed the event as belonging only to males.

For Nigerian women, choosing to participate in a sport or recreational activities has been mostly by chance. Some have deliberately gone into particular sport or activity because these are sports or activities done in the family or by the parents or friends (Omokhodion, 2001). He also stated further that women are now coming alive through sports and recreational activities which made them realized that the biggest impediments on the paths of women achievements in sports and recreation were their own image and the effect of their socialization influenced the way their bodies looked was more important than how they felt. Therefore, it became imperative to investigate the determinants of participation in physical recreation activities among members of selected recreation clubs in Ibadan metropolis.

Ibadan city is located in Oyo State, Nigeria. It is urbanized with a population of over 1,338,659 inhabitants, with both private and public establishments, institutions, federal, state and local government parastatals (www.world66.com/africa/nigeria/ibadan/sights). Hence, the need for physical recreation by the general public in Ibadan metropolis becomes inevitable. Therefore, the researchers set out to investigate age and gender as determinants of participation in physical recreation activities among members of selected recreation clubs in Ibadan Metropolis of Nigeria.

Statement of the Problem

Many human activities require physical ability, training and strength, whereas, individual's ability diminishes with age. Consequently, women tend to shy away from sports and recreational activities simply because of the belief among people in Nigeria that women that participate in sports do not have attractive feminine features, and that women are not as strong as men.

It has also been observed by the researchers that most individuals do not utilize leisure opportunities maximally due to constraints that include age and gender among other reasons. Therefore, the researchers set out to investigate age and gender as determinants of participation in physical recreation activities among members of selected recreation clubs in Ibadan metropolis of Nigeria.

The following hypotheses were tested in this study: The first hypothesis is that age will not significantly determine participation in physical recreation activities among members of selected recreation clubs in Ibadan metropolis of Nigeria. The second hypothesis is that gender will not significantly determine participation in physical recreation activities among members of selected recreation clubs in Ibadan metropolis of Nigeria.

Research Design

The descriptive survey research design was used for this study. According to Rea and Parker (1997), this design is advantageous as it has a wide range of scopes, a great deal of formation as well as representative sample which allow inferences and generalization to the entire population. The population for this study comprised all the registered members of recreation clubs in Ibadan metropolis, Nigeria.

Purposive sampling technique was used to select four (4) functional recreation clubs out of the six (6) most patronized recreation clubs in Ibadan metropolis namely Ibadan Recreation Club; Ibadan Tennis Club; Ibadan Golf Club; Army Officers' Mess and Police Officers' Mess. While simple random sampling technique of "fish-bowl" with replacement was used to select fifty percent (50%) of the regular participants from each of the selected recreation clubs, making two hundred (200) respondents altogether as sample for this study. The research instrument used for this study was self-developed and structured questionnaire which was subjected to validity in order to enhance clarity of the questionnaire. The questionnaire was on four point Likert type of summated rating of Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD) with a reliability of 0.98, through test-retest method, using Pearson Correlation Coefficient (PCC). The questionnaire was administered by the researchers, assisted by four (4) trained research assistants. The respondents were encouraged to fill the questionnaire on the spot for immediate collection.

The completed questionnaire were collated, coded and analyzed using descriptive statistics of frequency counts and simple percentages for demographic data of the respondents, while inferential statistics of chi-square (X^2) of contingency table was used to test the hypotheses at 0.05 alpha level.

Results

Out of the total number of two hundred (200) questionnaires administered, one hundred and ninety-five (97.5%) were returned and analyzed as follow:

Table 1

Distribution of Respondents by Age

Age	Frequency	Percentage (%)
25 – 40	82	42.1
41 – 50	69	35.4
51 – 60	26	13.3
61 and above	17	8.7
Non response	1	0.5
Total	195	100.0

Table 1 showed that 82 (42.1%) respondents were in the age group of 25 – 40 yrs, 69 (35.4%) respondents were in the age group of 41-50 yrs; 26 (13.3%) were in the age group of 51-60 yrs; 17 (8.7%) were in the age group of 61 years and above, while 1 (0.5%) respondent did not respond.

Table 2

Distribution of Respondents by Gender

Gender	Frequency	Percentage (%)
Male	152	77.9
Female	43	22.1
Total	195	100.0

Table 2 revealed that 152 (77.9%) respondents were male while 43 (22.1%) were female. Therefore, the majority of the respondents for this study were male.

The first hypothesis was that age will not significantly determine participation in physical recreation activities.

Table 3

Age

S/N	Statement	Responses					Cal X ²	df	Tab. X ²	Remarks
		SA	A	D	SD	Total				
1.	Age often determines the choice of recreational activities	21 (19.1)	90 (91.9)	29 (34.68)	55 (13.4)	195	140.23	6	12.6	Sig.
2.	Age can be a barrier against learning skills which were not learnt at younger age	15 (19.0)	106 (91.4)	37 (34.51)	36 (48.9)	194				
3.	Human activities and performance in recreational activities are affected by age	21 (18.7)	77 (89.58)	37 (33.79)	55 (47.91)	190				

X² Cal. Value = 140.23; df. 6; X² tab.Val. = 12.6; Level of Sig. 0.05
(Hypothesis → rejected → significant)

As shown in table 3, the calculated chi-square (X^2) value of 140.23 is greater than the table chi-square (X^2) value of 12.6 with 6 degree of freedom, all set at the 0.05 level of significance. Therefore, hypothesis 1 was rejected; hence, age significantly determined participation in physical recreation activities among members of selected recreation clubs in Ibadan metropolis, Nigeria.

This result corroborates the view of Morakinyo (2002) that many activities require physical ability, training, and strength, whereas, individuals ability diminishes with age. Also, distribution of respondents by age for this study revealed that the majority of the respondents fall within the age group of 25-40 (42.1%) of the total respondents, as shown in table I.

The second hypothesis was that gender will not significantly determine participation in physical recreation activities.

Table 4

Gender

S/N	Statement	Responses					Cal X^2	df	Tab. X^2	Remarks
		SA	A	D	SD	Total				
1.	Vigorous recreational activities are meant for both male and female	13 (26.1)	34 (64.4)	99 (73.5)	49 (30.8)	195	126.13	6	12.6	Sig.
2.	Women are not intimidated recreating with opposite sex	10 (25.9)	63 (63.7)	80 (72.7)	40 (30.5)	193				
3.	Gender often determines the complexity of recreational activities participation	55 (25.9)	95 (63.77)	40 (72.74)	3 (30.56)	193				

X^2 Cal. Value = 126.13; df.6; X^2 tab.Val. = 12.6; Level of Sig. 0.05
(Hypothesis → rejected → significant)

Discussion

Table 4 revealed that calculated chi-square (X^2) value of 126.13 is greater than the table chi-square (X^2) value of 12.6 with 6 degree of freedom, at 0.05 level of significance. Since it is significant at 0.05 alpha level, therefore, gender was a determinant of participation in physical recreation activities among members of selected recreation clubs in Ibadan metropolis of Nigeria.

This result is in line with the assertions of Oworu (2003) and Ademuyiwa (2004) that gender discrimination is another common practice in recreation and sports because it is generally believed that women are not as strong as men.

Distribution of respondents by gender also revealed in this study that the majority of the respondents were male, which represents 77.9%, as against women respondents with only 22.1% of the total respondents as shown in Table 2.

Conclusion

The findings and observations made as a result of the data collected from the respondents with regard to age and gender as determinants of participation in physical recreation activities among members of selected recreation clubs in Ibadan metropolis are as follows.

The two hypotheses tested were rejected, which implied that the two variables tested were significant at 0.05 level of probability. After carefully deducing the various responses of the respondents, the following conclusions were therefore made;

Age is a significant determinant of participation in physical recreation activities among members of selected recreation clubs in Ibadan metropolis. Gender is also a significant determinant of participation in physical recreation activities among members of selected recreation clubs in Ibadan metropolis.

Recommendations

Based on the findings of this study, and the conclusion drawn thereof, it has been confirmed by the researchers that age and gender often affect participation in physical recreation activities among members of selected recreation clubs in Ibadan metropolis. Therefore, the researchers offer the following recommendations in anticipation that if implemented, would help to enhance more participation among women, young and old in physical recreation activities.

Prospective participants should not allow age which is natural and universal in nature to hinder their participation in physical recreation activities, as there are various activities suitable for young and old. Participants should choose their physical recreation activities on the basis of interest, enjoyment, fulfillment and low or high intensity. Women participants should see physical recreation activities as something good for the body and mind, instead of shying away because of gender discrimination, but develop more interest in physical recreation activities.

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The Relationship between Internet Related Behaviors and Academic Achievement among HKHE Undergraduates of the University of Lagos

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Abstract

This study examined the relationship between internet-related behaviors and academic achievement among Human Kinetics and Health Education (HKHE) undergraduates of University of Lagos, Nigeria. It also examined the influence of gender and level of study on academic achievement of students as well as determining if academic achievement of undergraduates is related to both skill level and purpose of using the internet. Participants totaled 164, from four levels of study, and were mainly male (54.6%). Data were collected with the 49-item Internet Related Behavior Questionnaire (IRBQ), developed from the frameworks of the Cognitive Information Processing Model and Neurological Orientation Theory (Abdulnasir, 2006). Pearson's product moment correlation, t-test and one-way ANOVA were used to test five hypotheses at 0.05. Results showed a non-significant negative relationship between internet use and academic behavior. Gender and level of study were found to have insignificant influence on academic achievement. Academic achievement was also found to be unrelated to skill level and purpose of using the internet. Results suggest that university undergraduates use the internet for many purposes unrelated to academic activities. Students should be exposed to more internet-based academic programs, while HKHE academic course delivery for students should be anchored in internet-based activities.

Keywords: Information Technology

Introduction

The medium of the internet has rapidly gained popularity and acceptance around the globe due to its nature, availability, cost and its potential to deliver information across boundaries and geographical locations (Abdulnasir, 2006). The public is most familiar with the computer network of the internet and the World-Wide-Web is what most people think about when we say "the internet". Thus the internet may be conceptualized as the network of networks that links people and information through computers and other digital devices allowing person-to-person communication and information retrieval. Through its various sources, the internet serves to remove both natural and artificial barriers of time and space as well as national borders and ideology. Wide Area Networks (WANs) can link together educational institutional, faculty and the generality of students regardless of their geographical location.

Studies on human information that specifically focused on adolescents and students learning behavior provided a quality theoretical framework for understanding cognition and cognitive developments in students (Garcia, Bearer & Lerner 2004; Robinson, 2004; Siegler & Alibali, 2004). Vygotsky (1978) theorized that all higher mental processes originate in social processes and that such processes can only be understood in terms of the culture. Neurological orientation theory (Garcia, et al., 2004; Robinson, 2004) assumes that cognitive development and brain development are intricately related. Mental processes are thus influenced by neurological maturation and environmental experience. Literature also supports the notion that academic learning behavior and achievement are a function of cognitive development (Solso, Maclin & Maclin, 2005). The socio-cultural perspective on cognitive development maintains that social and cultural activities mediate human interactions, and identifies the internet as a cultural tool through which individuals develop cognitive structures.

From an educational perspective, the internet helps students exploit enormous information possibilities for schooling purposes and increase learning through communication (Fuchs & WoBmann, 2005). The most common internet activities for students includes downloading video and audio materials, accessing websites and e-journals, social networking sites, e-mail, gathering information from data bases and directories and instant messaging (Roberts, Foehr & Rideout, 2004). Students use the internet to complete academic assignments and augment instructional content. From a cognitive perspective, accessing websites enhances visual processing of information, increases language and literacy skills, builds a broad knowledge base and promotes meta-cognitive abilities such as planning and evaluation.

Following the link between students' internet-related behaviors and academic achievement studies have attempted to examine students' behavior from different perspectives of internet use (Chen & Peng, 2008; Kubey, Lavin & Barrows, 2001, Kuh & Hu, 2001; Suhail & Bargee, 2006). Various degrees of relationship have been established with these studies which suggest that the physical, social and psychological environment peculiar to a student's use of the internet could determine how the usage is related to academic achievement of the student (Anderson, 1999; Hunley et al., 2005).

Trends indicate continued increase in the number of students accessing the internet, the amount of time they spend online and the complexity of their online behavior (Livingstone & Helpsper, 2007). Despite the popularity of the internet amongst the different research fields, there remains a large area to be examined systematically in terms of how students use the internet, the purpose and skill efficiency of use. These issues represent an area of great interest for further research to understanding the complex processes and interactions with information systems and sources.

In Nigerian universities, the internet is fast becoming a new medium of communication and information dissemination in the 21st century, and has brought unprecedented opportunities to students at all levels. Universities as citadels of learning and centers of academic excellence seek to provide qualitative learning experiences for the attainment of their objectives of which access to the internet forms a part. However, the internet has also become a major source of concern for both parents and educators as some online activities may seriously distract students from their academic pursuits. Therefore, it is important to determine the relationship between internet use and academic achievement which remains a key expected outcome of university education. These are the issues that aroused the interest of the researchers and prompted the conduct of this study.

The primary purpose of this study was to establish if there is any relationship between internet use and academic achievement of undergraduate Human Kinetics and Health Education (HKHE) students. It is hoped that the study would stimulate more research on this topic so that internet use among HKHE students can be further enhanced. Also it was considered important to determine the relationship between these two variables, as academic achievement is a key expected outcome of university education (Faculty of Education, 2008). The researchers hypothesized that there would be no significant relationship between internet use and academic achievement as measured by the cumulative grade point average (CGPA) of the participants.

The secondary objective of the study was to investigate the depth of students' internet use by gender and level of study in order to provide baseline data for further research on this topic. In addition, the authors hypothesized that students' internet use increased as their level of study in the Department of HKHE increased. This was because were required to take more courses as they progressed in their degree program and by extension more usage of the internet for coursework and assignment.

It was hypothesized that no gender differences in internet use will exist. This was because of the fact that University of Lagos as well as the larger Nigerian society provides relatively equal opportunity to both gender to study HKHE. For the purpose of this study, academic achievement is defined as the academic standing of the student determined by the CGPA as at the end of the First Semester of the 2010/2011 academic session.

Finally, it was hypothesized that skill level of students in internet use and the purpose for using internet would not be significantly related to academic achievement of the students. The skill level in internet use might not be considered as important for other areas of academic activities and the purpose for using the internet by the students could be different from academic activities.

Methodology

Participants

The population for this study included all full-time HKHE students who registered for the first degree academic program of the University of Lagos located in Lagos, South West Nigeria as at the end of the First Semester, 2010/2011 academic session. For reasons of sample homogeneity, students in the same department and running the same course of study were intentionally selected. Using a relatively homogenous group minimizes random error that might occur by using a heterogeneous sample involving as many other courses of study. Among level of study, 36.0% of the participants were in the 100 level (n=59), 20.7% in the 200 level (n=34), 20.1% in the 300 level (n=33) and 22.6% in the 400 level (n=37). The majority of the participants were males (n=88; 53.7%).

Table I: Sample Descriptive Statistics

<u>Gender</u>			<u>Level of Study</u>			<u>Age Range</u>		
Option	Freq	(%)	Level	Freq.	(%)	Range (Yrs)	Freq.	%
Female	75	45.7	100	59	36.0	Below 21	38	23.2
Male	88	53.7	200	34	20.7	21 - 23	64	39.0
Total	163	99.4	300	33	20.1	24 – 26	44	26.8
Unusable	1	.6	400	37	22.6	27 – 29	10	6.1
Total	164	100.0	Total	163	99.4	30 & above	5	3.0
			Unusable	1	.6	Total	161	98.2
			Total	164	100.0	Unusable	3	1.8
						Total	164	100.0

Instrumentation

The Internet Related Behavior Questionnaire (IRBQ) was developed, validated and pilot tested by the authors. The instrument is a 49-item descriptive survey to assess the behavior of students in internet usage, skill level, level and purpose of usage, internet devices, accessories and hindrances in applying information technology to academic activities. In developing this study and in constructing the IRBQ for data collection, the Cognitive Information Processing Model and Neurological Orientation Theory (Abdulnasir, 2006) were used as a guiding framework. The survey was reviewed for readability and a 10-item validity rating form was developed by the authors to establish content validity (Thomas, Nelson, & Silverman, 2005) through a five-member panel of experts and practitioners. The panel confirmed the content validity with an average criterion of between 3.0-3.5. The instrument was then piloted on a group of 20 undergraduates of the Department of Science and Technology. The instrument demonstrated good construct validity (Cronbach's $\alpha=0.82$). A 6-item demographic was also completed by the participants to provide data relating to the characteristics of age, gender, level of study, specialization, matriculation number, CGPA and semester/session.

Data Collection

Data collection followed appropriate steps of informed consent and confidentiality of participants. All undergraduates in the Department of Human Kinetics and Health Education were informed of the purpose and focus of the survey during the general sports fitness program of the Department. Those who volunteered to participate were issued with the Informed Consent Form (ICF) to complete. The ICF formally assured participants of confidentiality of their responses especially as it affects information on their CGPA. It also informed participants of their right to withdraw from the survey at anytime and encouraged participants to ask questions about the survey, if necessary, through the mobile phone numbers of the authors which were printed on the form for that purpose. Participants were also informed of the fact that their academic standing will be verified; hence participants were requested to sign the ICF with their matriculation numbers.

Thereafter, the survey was administered through four research assistants (one for each level of study) who were given specific instructions on how to administer the survey on the participants. The administration was done within one week at four different lecture venues. Where lecture periods were affected, permission was sought and obtained from the lecturers

concerned so that participants were free and focused to complete the survey. To ensure correctness of the information supplied concerning participant's CGPA, permission was formally obtained from the Head, Department of HKHE where the participants enrolled for the degree program.

Data Analysis

Data screening was carried out before the statistical analysis. Data analysis was completed using SPSS 17.0. Descriptive statistics were used to report the results. Mean, standard deviation, frequencies and percentages were calculated for each of the demographic variables of interest – gender, level of study, skill level and purpose of usage. Pearson's product moment correlation and coefficient of determination was used to determine the statistical relationship between internet use and academic achievement, between skill level and academic achievement, and between purpose of use and academic achievement. The general cutoffs established for correlation coefficient was set as: above .76 is high, .51 to .75 is fair, .26 to .50 is moderate and .25 and below is weak (Berg & Latin, 1994). Influence of gender in internet use was determined with the t-test. One-way ANOVA was used to analyze level of study influence in internet use.

Results

Based on the Pearson's product moment correlation result as indicated in Table 2: ($r = -.01$; $p > .05$ $df = 139$), there was no statistically significant relationship between internet use and academic achievement of HKHE students. A two-tailed t-test determined that male and female students showed significant difference in internet use (see Table 3). The influence of level of study in internet use was found to be non-significant ($F(3, 137) = 2.18$; $p > .05$) as indicated in Table 4. Pearson's product moment correlation results between skill level and academic achievement ($r = -.02$; $p > .05$ $df = 139$) and between purpose of use and academic achievement ($r = .04$; $p > .05$) showed a non-significant low relationship (see Table 5).

Table 2: Correlation Coefficient of Internet Use and Academic Achievement

Variable	N	Mean	Std. Deviation	r	Sig.
Internet Use	141	2.49	0.69	-.01	.941
Academic Achievement	141	3.01	0.64		

$df(139) = -0.01$; $p > .05$

Table 3: T-test Comparison between Mean and Gender Differences in Internet Use

	Subgroup	N	Mean	Std. Deviation	t
	Sig.				
Internet Use	Male	77	3.13	0.65	-2.66
	Female	64	2.86	0.59	

$t(139) = -2.66$; $p > .05$

Table 4: ANOVA Comparison Between Level of Study Differences in Internet Use

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.51	3	0.84	2.18	.092
Within Groups	52.47	137	0.38		

$F(3,137) = 2.18; p > .05$

Table 5: Descriptive Statistics and Correlation of Skill Level and Purpose of Use with Academic Achievement (N=141)

		Academic Achievement	Skill Level	Purpose of Use
Academic Achievement	Pearson Correlation	1	-.023	.039
	Mean	2.47	3.62	2.69
	Std. Deviation	0.69	1.02	
	Sig. (2-tailed)		.795	0.55
				.656

P value for significance is 0.05

Discussion

A non-significant low relationship between undergraduates' internet use and academic achievement found in this study supports previous studies (Chen & Peng, 2008; Hunley, et.al ,2005; Kubey, Lavin, & Barrows, 2001) which concluded that academic achievement have no noticeable association with internet-related activities. Some online activities may seriously distract the students from their academic work. Trends indicate that the pervasive and extensive use of internet have changed the balance of cognitive skills from the verbal to the visual, (Livingstone & Helpsper, 2007); hence no association should be expected with academic achievement in HKHE which has many practical oriented courses.

This finding contradicts Johnson and Johnson's (2008) conclusion linking higher academic achievement to internet activities. Internet use was considered to be associated with learning, reading and information-processing skills (Suhail & Bargie, 2006). Gender was found to have no influence on internet use among undergraduates. This result is supported by Johnson and Buck (2009) who noted that no significant influence should be expected between males and females who are exposed to relatively similar academic activities. This result is not surprising as there is no gender discrimination in the learning environment of the Nigerian Universities. Also level of study was not associated with internet use suggesting that irrespective of the length of time spent as an undergraduate, there is no difference in the usage of internet. This suggests that internet use among the undergraduates is not determined by the length of time spent on the program. The finding that the skill level in internet use is not related to academic achievement is in line with earlier studies (Chen & Peng, 2008; Kubey, Lavin, & Barrows, 2001) which found

no correlation between internet use and academic achievement. It has been argued that no correlation should be expected between skill level and academic achievement if internet use is not associated with academic achievement. Effective use of the internet is dependent on the proficiency of related skills (Siegler & Alibali, 2004).

Purpose of internet use was also found not related to academic achievement. This finding is not surprising as undergraduates could make use of the internet for various purposes other than academics (Roberts, Foehr & Rideout, 2004). The diverse purpose of internet use could thus distract the undergraduates from using it for academic purpose.

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Regular Aerobic Activity as a Panacea for Promotion of Optimum Health

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Abstract

Regular aerobic activities not only increase fitness levels and capacity for exercise and work/ it also plays a very vital role in the prevention of cardiovascular diseases. The American Heart Association results of pooled studies showed that people who start regular physical activities after heart attacks have better rates of survival and better quality of life. The physical feelings of depression and anxiety can be mediated, and improved moods and the promotion of a sense of well being can occur. Some forms of aerobic activities like brisk walking, jumping rope, jogging, cycling, dancing, skiing and cross-country are known to promote good health. This paper attempts to list the importance and benefit of regular physical activity - including the physical, physiological, and psychological areas of development. It serves as a catalyst to encourage participation in fitness programs, especially for people who are at risk of developing cardiovascular diseases. This paper concluded that participation in regular physical activity enhances the functional capacity of individuals and recommended that a minimum of 3 times per week of exercise be adhered to by individuals.

Introduction

The word aerobics literally means with 'with oxygen' or 'in the presence of oxygen'. Aerobic exercise is any activity that uses large muscle group, can be maintained continuously for a long period of time and is rhythmic in nature. Aerobic exercise utilizes oxygen as the major fuel for sustaining activity for relatively long periods. In general, aerobic exercises are those activities that require large muscle work, elevate the heart rate to about 60 percent of maximal heart rate and are continuous in nature and last for about 15 to 60 minutes in duration. (ACSM, 1998). In this paper the word AEROBICS will be used interchangeably with the term PHYSICAL ACTIVITY and EXERCISE. There is compelling evidence that an active and fit way of life has many important health benefits and that sedentary habits are associated with an increased risk of numerous chronic diseases and decreased longevity (NIH,1996.; Pale, Pratt & Blair 1995; U.S Dept of Health and Human Services, 1996). Although a consensus is growing on the importance of the relation between aerobic activities and health and wellness, the specific dose of physical activity necessary for good health remains unclear (Kesaniem, et al, 2001).

Physical Activity and Health

Morris et al (1980) documented higher rates of CVD in men who were sedentary on the job or during leisure-time than in men who had higher levels of job or leisure-time physical activity. These observations have been confirmed and extended by others, notably Paffenbarger et al (1998). At present there are dozens, if not hundreds, of published reports in the peer-reviewed literature documenting the health hazards of an inactive way of life and the benefits of being physically active (U.S Department of Health and Human Services, 1996).

The ACSM was an early leader in providing specific exercise recommendations. The publication in 1975 of Guidelines for Graded Exercise Testing and Exercise Prescription, and its subsequent revised editions, had a major influence on fields of exercise science and clinical and rehabilitation medicine (ACSM, 1990; ACSM, 2000). This book served as the foundation for development of the ACSM certification program that was designed for clinicians primarily working in cardiac rehabilitation settings. The recommendations for the frequency, intensity, and duration of exercise were specified in the guidelines. The exercise recommendations of the

ACSM briefly reviewed above were quite specific and led to somewhat regimented thinking about how much exercise should be recommended. These highly structured exercise recommendations caused most persons to think that exercise not meeting these specific criteria would be of limited or no value. The 1990 ACSM position stand, however, may be seen as the beginning of a shift away from an exclusively "performance-related fitness" paradigm to one that includes activity recommendations for both performance and health-related outcomes." ACSM recognizes the potential health benefits of regular exercise performed more frequently and for longer duration, but at lower intensities than prescribed in this position statement" (ACSM, 1990). The compelling evidence for the benefit of regular exercise in preventing several health problems (notably CHD) that had accumulated by the beginning of the last decade of the 20th century led the American Heart Association to release a report in 1992 that identified physical inactivity as the fourth major modifiable CHD risk factor, joining smoking, hypertension, and, dyslipidemia (Fletcher, Blair, & Blumenthal 1992).

The IOM Committee on Dietary Reference Intakes released a report in 2002 that included a chapter on physical activity (Institute of Medicine, 2002). The specific recommendation is given in the first section of this report, and the fundamental issue is that it calls for 60 min activity/d and tends to dismiss as inadequate the consensus public health recommendation of 30 min activity/d. Four features of the IOM recommendation are troubling. First, the statement that "some benefits" accrue in response to 30 min of moderate-intensity physical activity understates the substantially lower morbidity and mortality seen in moderately active adults than in those who are sedentary. For example, our own work on cardio respiratory fitness and mortality has shown repeatedly that moderately fit women and men have mortality rates that are 50% lower than those of their unfit peers (Blair, Kohl & Barlow, 1991). Second, the statement that 30 min of activity is insufficient to affect weight control is speculation and is counter to some existing data (Schmitz, Jacob, Leon, Schriener & Stenfeld, 2000). Third, the description of activities such as walking or jogging 4-5 miles/h (6.4-9.0 km/h) as moderate-intensity activities indicates a poor understanding of several issues. Physical activity at this specified level requires 4-8 multiples of resting energy metabolism (METs). This range of energy expenditure extends beyond that typically considered to be of moderate intensity on an absolute basis (eg, 3-6 METs) and far exceeds moderate intensity on a relative basis (e.g. 40-75% maximal functional capacity), especially for older or unhealthy persons (Howley, 2001). Fourth, the major flaw in the logic of the IOM report is in the panel's interpretation of the doubly labeled water data presented. Whereas the panel performed a useful task in assembling data on doubly labeled water studies from several laboratories, they used this information inappropriately to draw inferences about how much activity is required to prevent unhealthy weight gain.

How Much Physical Activity is Required to Prevent Unhealthy Weight Gain?

It is extremely important to recognize that the CDC/ACSM report focused on recommending a dose of physical activity that would likely reduce the morbidity and mortality risk of several chronic diseases, rather than solely addressing the issue of weight management. The amount of activity required to prevent unhealthy weight gain appears to be a major rationale of the IOM recommendation for physical activity. Because of the cross-sectional design and the similarities in PAL between normal-weight and overweight or obese persons, we do not believe that the total energy expenditure data presented in the report justify the conclusion that 60 min activity/d is required to prevent unhealthy weight gain. In population-based observational studies with long-term follow-up, more modest levels of activity have been found to prevent substantial weight gain (DePietro, Kohl, Barlow & Blair 1998).

Factors to Consider Before Engaging in Aerobic Activity

There are three key components of an aerobic program: The warm up, the workout and the cool down. It is important the warm-up exercise precedes the work-out, while the cool-down exercise comes after. (Ikulayo & Adewunmi, 2011).

Warm Up

Before engaging in any exercise routine, it is always advisable to consult a medical doctor to enable you know the areas you have to work on. These following precautions must be adhered to: Always start the exercise routine gradually within your comfort levels initially. The exercise should be done in an area that is hygienic and free from clutter. There should be an ample circulation of air, A healthy diet can be maintained as a supplement for a weight loss exercise program. While exercising maintain regular breathing. Never try to force a stretch or continue any stretch that begins to cause pain (ACSM, 1995; Robcrgs & Ketcyian, 2003). With 10 minutes of initial aerobic work another 5-10 minutes of stretching and 10 minutes of cooling down after a workout, it means there will be 20 - 30 minutes added to any workout. Please note that the better you are warmed up the more you will get from the workout. Also remember that injury prevention is better than injury recovery!

Cool Down

A cool down after the workout is important to promote an effective recovery from physical activity. A cool down allows for gradual recovery immediately after a workout. The American College of Sports Medicine (ACSM) indicates that the cool down is "a critical ingredient for a comprehensive, safe program for healthy participation as well as patients with disease" similar to warm up, a two phase cool down is recommended. The first phase of the cool down includes low-intensity activity (e.g. walking, slow jogging or cycling) for approximately 5 minutes. This cool down phase allows a gradual slowing of the metabolic and cardiovascular systems. The second phase of the cool down involves stretching exercises. Stretching after exercises may be more important than stretching before exercise because it may help relieve spasms in fatigued muscles. The cool-down stretch should last 5 minutes or more. (Amechi, 2009).

Guidelines for Aerobics Exercise Prescription

To develop the cardiorespiratory system, the heart muscle has to be overloaded. The heart has to be exercised to increase in size, strength and efficiency. To better understand how the cardiorespiratory system can be developed, we have to be familiar with four variables of exercise intensity mode frequency and duration (ACSM, 2002).

Intensity of Exercise

Cardio respiratory or aerobic development occurs when the heart is working between 40 – 85 percent of heart rate reserve (ACSM, 1998). To determine the intensity of exercise or cardio respiratory training zone according to heart rate reserve, the following steps have to be followed:

1. Estimate your Maximal Heart Rate (MHR) according to the following formula:
 $MHR = 220 \text{ minus age } (220 - \text{age})$
2. Check your Resting Heart Rate (RHR). After sitting quietly for 15 - 20 minutes take your pulse for 30 seconds and multiply by 2 or take it for a full minute.
3. Determine the Heart Rate Reserve (HRR) by subtracting the resting heart rate from the maximal heart rate ($HRR = MHR - RHR$).
4. Calculate the training intensities (TI) at 40, 50, 60 and 85 percent. Multiply the Heart Rate Reserve by the respective .40 .50 .60 and .85 and then add the Resting Heart Rate to all four of these figures.

Example: The 40, 50, 60 and 85 percent training intensities for a 20 year-old with a

resting heart rate of 68 beats per minute (bpm) would be as follows -

MHR: $220 - 20 = 200\text{bpm}$

RHR: 68 bpm

HRR: $200 - 68 = 132$ beats

40% TI = $(132 \times .40) + 68 = 121$ bpm

50% TI = $(132 \times .50) + 68 = 134$ bpm

60% TI = $(132 \times .60) + 68 = 147$ bpm

85% TI = $(132 \times .85) + 68 = 180$ bpm

Low-intensity cardiorespiratory training zone: 121 to 134 bpm.

Moderate-intensity cardiorespiratory training zone: 134 to 146 bpm

Optimal cardiorespiratory training zone: 147 to 180 bpm.

To improve the cardiorespiratory system, maintain your heart rate between the 60 and 85 percent training intensities to obtain adequate development. Inactive people should train around 40 - 60 percent training intensity during the first 6 to 8 weeks (Hoeger & Hoeger, 2002).

Health Benefits of Regular Physical Activity

There is irrefutable evidence of the effectiveness of regular physical activity in the primary and secondary prevention of several chronic diseases (e.g., cardiovascular disease, diabetes, cancer, hypertension, obesity, depression and osteoporosis) and premature death. There appears to be a linear relation between physical activity and health status, such that a further increase in physical activity and fitness will lead to additional improvements in health status yet have other risk factors for cardiovascular disease may be at lower risk of premature death than people who are sedentary with no risk factors for cardiovascular disease. (Katzmarzyk, Church & Blair, 2004) Oguma, Shinoda-Tagawa (2004) revealed that there was a graded inverse relation between physical activity and the risk of cardiovascular-related death, with the most active women having a relative risk of 0.67 (95% CI 0.52 to 0.85) compared with the least active group. These protective effects were seen with as little as 1 hour of walking per week.

Hypertension, COPD, Diabetes, Smoking, BMI, and Total Cholesterol

Relative risks of death from any cause among participants with various risk factors (e.g, history of hypertension, chronic obstructive pulmonary disease [COPD], diabetes, smoking, elevated body mass index [BMI 30] and high total cholesterol level [TC 5.70 mmol/L) who achieved an exercise capacity of less than 5 METs (metabolic equivalents) or 5-8 METs, as compared with participants whose exercise capacity was more than 8 METs have also been shown to be protective against the development of type 2 diabetes in middle-aged men, (Lynch , Helmrigh , Lakka , et al.1996). Williamson , Vinicor and Bowman. (2004) concluded that modest weight loss through diet and exercise reduced the incidence of the disease among high-risk people by about 40%-60% over 3-4 years. In one of the RCTs, (Knowler , Barrett-Connor, Fowler, et al.2002) a lifestyle intervention that included moderate physical activity for at least 150 minutes per week was found to be more effective than metformin alone in reducing the incidence of diabetes. It showed that only 7 people would need to be "treated" with the lifestyle intervention to prevent a single case of diabetes over a 3- year period, compared with 14 people given metformin. (Knowler. Barrett-Connor, Fowler , et al. 2002)

How Much Physical Activity is Enough?

It is apparent that physical activity is essential in the prevention of chronic disease and premature death. However, doubt remains over the optimal "volume" (frequency, duration and intensity of exercise) and the minimum volume for health benefits, in particular the effects of intensity (e.g., moderate v. vigorous) on health status. There is evidence that intensity of physical activity is

inversely and linearly associated with mortality (Lee & Skerrett, 2001) Early work by Paffenbarger and associates revealed that regular physical activity (expending > 2000 kcal [8400 kJ] per week) was associated with an average increase in life expectancy of 1 to 2 years by the age of 80 and that the benefits were linear even at lower levels of energy expenditure. Subsequent studies have shown that an average energy expenditure of about 1000 kcal (4200 kJ) per week is associated with a 20%-30% reduction in all-cause mortality. (Lee, Skerrett, 2001)

Musculoskeletal Fitness

As a person ages, his or her musculoskeletal fitness (i.e., muscular strength, muscular endurance, muscular power and flexibility) declines to the extent that a small impairment may result in disability. Many elderly people currently live near or below the functional threshold for dependence. High levels of (or improvements in) musculoskeletal fitness will enhance the capacity to meet the demands of everyday life and allow a person to maintain functional independence for a greater period (Lee & Skerrett, 2001) offers health benefits. If so, then previously sedentary people may be more likely to engage in physical activity and maintain an active lifestyle.

Conclusion

In summary, increasing research supports the importance of regular aerobic activity for the primary prevention of type-2 diabetes. Further research is warranted to uncover the ideal methods (e.g., resistance vs. aerobic training) and intensity levels of exercise. Regular aerobic activity is clearly effective in the secondary prevention of cardiovascular disease and is effective in attenuating the risk of premature death among men and women. In summary, observational studies provide compelling evidence that regular aerobic activity and a high fitness level are associated with a reduced risk of premature death from any cause and from cardiovascular disease in particular among asymptomatic men and women. Furthermore, a dose-response relation appears to exist, such that people who have the highest levels of physical activity and fitness are at lowest risk of premature death.

The key to effective weight loss is through the use of a healthy exercise program which is performed on a regular basis while following a healthy dieting and nutritional plan. The US Department of Health and Human Services (2008) guidelines recommend 150 minutes of moderate-intensity activity per week, or 75 minutes of vigorous-intensity activity per week or an equivalent combination of moderate-and vigorous-intensity physical activity. Aerobic activity is good for weight loss because it uses more calories than any other activity and helps to raise metabolic rate, which helps the body burn calories faster.

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Perception of Persons with Disability on Physical Activities as an Antidote to Attaining Optimal Health and Well Being-The Nigeria Experience

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Abstract

The study examined the perception of persons with disability on physical activities as an antidote to attaining optimal health and well-being. The study employed descriptive design of a survey type. The population of the study consisted of all persons engaged in disability sports in South West, Nigeria. The sample was made up of 110 persons with disabilities (90 males and 20 females), purposefully and randomly selected from physical activity participants in stadia and recreation centres in South Western Nigeria. The research instrument was a questionnaire validated by experts in Human Kinetics and Health Education. Using Test retest method and Pearson Product Moment Correlation a reliability coefficient of 0.82 was obtained. The data were analysed with the use of frequency counts, percentage and chi-square statistics. The finding showed that persons with disability are aware of the importance of physical activities. It was also discovered that participation in physical activities is an antidote to attaining optimal health and wellness by persons with disability. It was therefore, suggested that persons with disability should be encouraged to participate in physical activities for enhanced physical fitness and prolonged life. Governments should provide more facilities and equipment to enable more persons with disability the opportunity to participate in sports. Moreover, the present facilities should be upgraded and renovated, to enable more persons with disability to have access to them.

Introduction

Health is a state of well being, while well-being or optimal health is a state of total wellness that is, a state of complete health. The World Health Organisation (1948) defined health as a state of physical mental and social well-being and not merely the absence of disease or any infirmity. That is, to be optimally healthy implies that an individual must be physically, mentally and socially well. This means that one should be able to strike a balance, among the three triads of health as postulated by the W. H. O. There is no halfway but rather one needs to maintain a balance physically, mentally and socially. At times many people outside the field of Human Kinetics and Health Education associate physical well being with being healthy, however, being healthy goes beyond physical health, because one could be physically well and at the same time not healthy in terms of social and mental health.

Physical activity is a form of bodily movement produced by skeletal bones and muscles that expend caloric energy (WHO, 2010). If one is healthy the individual will definitely be able to participate in physical activities. Physical activities that can be done on regular basis, that are beneficial to both normal individual and which could be modified for persons with disability include running, jogging, swimming, walking, dancing and others to list a few. Torabi and Luegers (2010) in a study carried out discovered that physical activity is a vital component of maintaining a healthy and active life style regardless of age or ability. On the other hand, WHO (2010) posited that physical inactivity is considered a risk factor resulting in various communicable diseases that can be linked to 1.9million deaths worldwide.

Moreover, physical activity is a means of achieving physical fitness, a means of prolonging life and an important means of promoting healthy living. Contributing to the importance of physical activity to an individual, Vuori (1995) and; Jones, Ainsworth and Croft (1998) pointed out that physical activity remains an important behaviour for promoting health,

postponing or preventing neuromuscular disorders such as mechanical, low back pains, neck and shoulder pains and decreasing the risk of developing coronary heart diseases, hypertension, diabetes, osteoporosis, obesity and colon cancer. Also, Torabi and Luegers (2010) emphasised that physical activity can help to produce endorphins in the brain which can promote feeling of well being. They stated further that individuals who regularly take part in exercise can experience reduced symptoms of anxiety and depression.

However, it is important to note that physical activities should be done regularly and adequately to promote physical fitness level of participants, either by person with disability or the able-bodied. An individual with disability is a person who is handicapped or disabled. The handicapped or the disabled is an individual that has lost any part of the body which makes that part of the body useless to such individual. At times these individual may need the help of another person or the use of equipment to function appropriately. This condition should not be an excuse to disallow persons with disability from participating in physical activities; rather physical activities should be used to improve their living conditions.

Adegun (2005) stated that physical activities occur naturally in both male and female and this is done to the demands of everyday living in terms of occupation as well as keep the soul and body together. He opined further that the biological and social nature of human being make it mandatory for mankind to engage in one form of physical activity or the other from birth to death. In fact participation in physical activities by an individual goes beyond birth but actually started at conception when one cannot even determine whether the zygote formed after fertilization is handicapped or disabled (Oyeniya, 2002). Ajisafe (1991) posited that:

Sports participation started at cellular level at the moment of conception when about 200 million spermatozoa had to run the greatest Olympic race ever organised by nature in order to fertilize an egg, whose shape resembles the gold medal awarded to outstanding athletes today. We are here today because each of us won the race of birth, the race of life which was divinely supervised by the Almighty (p 6).

In Nigeria, observations have shown that many persons with disability are fond of living sedentary living due to the nature of their disability. On the other, hand, few of them are seen at recreation centres, stadia and other sports centres where they participate in physical activities. Many who do not participate failed to do so either as a result of poor knowledge of the importance of physical activities or the fear of injury during participation. Hence this study examines the perception of persons with disability on physical activities as antidote to attaining optimal health and well being.

Research Hypotheses

The following research hypotheses were tested:

1. Persons with disability are not significantly aware of the importance of physical activities
2. Persons with disability will not significantly participate in physical activities to attain optimal health.
3. Persons with disability will not significantly participate in physical activities to prolong their lives.

Methodology

The study is a descriptive research design of a survey type. The sample consisted of 110 persons with disabilities, with 90 males and 20 females who were purposively and randomly selected. The instrument used for data collection was a questionnaire validated by experts in Human Kinetics and Health Education. The reliability of the instrument was determined through test - retest method and a reliability coefficient of 0.82 was obtained. The collection of data was

done on the spot by the researcher and research assistants. The data collected were analyzed through frequency count, simple percentages and chi square.

Results

Table 1: Physical Activities for Optimal Health and Well Being

		A	%	Not Sure	%	D	%	χ^2
1	I am aware of the importance of physical activities.	110	100%	0	0.0	0	0.0	91
2	My participation in physical activities is because of the importance attached to it.	110	100%	0	0.0	0	0.0	
3	Participation in physical activities enables me to establish relationship.	110	100%	0	0.0	0	0.0	
4	My participation relieves me of staying alone.	92	83.64	10	9.09	8	7.27	
5	I participate in physical activities to improve my health.	106	96.36	4	3.64			76.94
6	I always feel better after participating in physical activities.	98	89.10	6	5.45	6	5.45	
7	I always have sound sleep after participating in physical activities.	102	92.72	5	4.55	3	2.73	
8	My body becomes lighter after participating in physical activities.	99	90	5	4.55	6	5.45	
9	Participation in physical activities can prolong my life.	110	100%	0	0.0	0	0.0	106.02
10	Participation in physical activities make me to be fit.	108	98.18	1	0.91	1	0.91	

df = 2 critical value = 5.99 p = 0.05

The table showed that all the respondents (100%) are aware of the importance of physical activities. They also believe that their participation in physical activities is as a result of the importance attached to it, which makes them establish relationship easily. The result showed that majority of the respondents 92 (83.64%) agreed that their participation relieved them of staying alone; 10 (9.09%) were not sure, while 8 (7.27%) disagreed. The chi square value of 91 was obtained which is greater than the table value of 5.99 at 0.05 alpha level. Therefore, persons with disability are not significantly aware of the importance of physical activities was rejected. That is persons with disability are significantly aware of the importance of physical activities.

The result shows that 106 (96.36%) respondents participate in physical activities to improve their health condition, 10(9.09%) were not sure while 8(7.27) disagreed. 98(89.10%)

respondents' always feel better after participating in physical activities, 6(5.45%) were not sure, while 6(5.45%) disagreed. On whether participants always have sound sleep after participation in physical activities 102 (92.72%) agreed, 5(4.55%) were not sure, while 3(2.73%) disagreed. Furthermore, 99(90%) respondents believed that their bodies become lighter after participating in physical activities, 5(4.55%) were not sure, while 5(4.55%) disagreed. The chi square value of 76.94 obtained is greater than the table value of 5.99 at 0.05 alpha level. The null hypothesis that persons with disability will not significantly participate in physical activities to attain optimal health is rejected. Therefore, persons with disability will significantly participate in physical activities to attain optimal health.

All the respondents are of the opinion that physical activities can prolong life. However, 108(98.18%) respondents are of the opinion that participation in physical activities make them fit, 1(0.92%) was not sure, while 1(0.92%) disagreed. The chi square value of 106.02 obtained is greater than the table value of 5.99 at 0.05 alpha level. With the result the null hypothesis that persons with disability will not significantly participate in physical activities to prolong their lives was rejected. This shows that persons with disability significantly participate in physical activities to prolong their lives.

Discussion

The findings showed that persons with disability are aware of the importance of participating in physical activities hence their involvement in various forms of physical exercises. The result is in consonant with the findings of Torabi and Luegers (2010) who observed that physical activity is a vital component of maintaining a healthy and active life. In the same vein, it is in line with the stance of WHO (2010) that physical inactivity is considered a risk factor resulting in various communicable diseases that can be linked to 1.9 million deaths worldwide.

The results also revealed that persons with disability participate in physical activities to improve their health conditions and prolong their lives. The result also corroborates the findings of previous study that discovered that physical activity remains an important behaviour for promoting health, postponing or preventing prevalent neuromuscular disorders such as mechanical disorders such as mechanical low back pains, neck and shoulder pains and decreasing hypertension, diabetes, osteoporosis, obesity and colon cancer (Vuori, 1995; Jones, Ainsworth & Croft 1998). This result is also consistent with Torabi and Luegers (2010) who discovered that physical activities can help to produce endorphins in the brain which can promote feeling of well being. They stated further that individuals who regularly take part in exercise can experience reduced symptoms of anxiety and depression.

Conclusion

Judging from the findings of the study it was therefore concluded that persons with disability are aware of the importance of physical activities. It revealed that participation in physical activity is an antidote to attaining optimal health and wellness by persons with disability. Moreover, it was also discovered that physical activity is a means of promoting physical fitness among persons with disability.

Recommendations

It was therefore recommended that persons with disability should always find means of engaging in physical activities in order to be physically fit. They should also participate in physical activities to prolong their life and prevent them from thinking about their disabilities.

Government should provide more facilities and equipment to encourage participation in physical activities by persons with disabilities. They should also renovate the present facilities to accommodate more persons with disability who are interested in participating in physical activities.

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Motives for Participation in Competitive Sport by Nigerian College Athletes

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Abstract

Most of the work done on motives for participation in sport has focused on recreational activities and the participants were mostly non-college athletes. Participation in sports is high among Nigerian college athletes. The purpose of the current study was to find out why Nigeria college athletes participate in competitive sports. Two hundred and fifty (250) college athletes volunteered to take part in the study after the purpose of the study was discussed with them. One hundred and eighty seven (187) comprising 109 males and 78 females returned the questionnaires thus forming the sample for the study.

A questionnaire 'Motives for participation in competitive sports' was used for data collection. This contained two sections. Section A sought information on demographic data while section B focused on items dealing with purposes of participation in competitive sports. The modified Likert scale with five response options from very important to not important was adopted. The Cronbach alpha coefficient was $r = 0.724$.

Descriptive statistics of simple percentages, mean and standard deviation and inferential statistics of Chi Square and Pearson's Product Moment Correlation coefficient were used in analyzing the data at alpha level of 0.05. Skill development, psychological well being, physical fitness and social relationships (respectively) were reported as important purposes of participation in competitive sport by Nigerian college athletes. It was recommended, among others, that college coaches should bear in mind the reasons why athletes participate in competitive sports so that they can help them maximize their results.

Considerable attention has been placed on involvement in physical activities, especially the health benefits derived from participation. Humberstone (2002) cited by Hoe & Selangor (2007), opined that physical activity has become one of the most important parts of an individual, particularly as it helps in the development of personality and social domain. People tend to participate in physical activities for various reasons. It has been well documented that people participate in physical activities because of the enjoyment they derive from participation. Other reasons such as need for affiliation, fun, fitness, competence, skill development, psychological wellness, health and competition have been documented (Gould, Brodtkin & Weiss, 1990; Laker, 2002; Wang & Wese –Bjornstal, 1996).

Research into adults' motives for participation in physical activities has also identified several reasons. While most studies confirm that fitness benefits are among the main reasons, other motives for participation in physical activity include weight control, competition, sheer enjoyment, physical appearance, self-presentation, coping with stress and/or anxiety, relaxation, social contact, and fun (Cash, Novy, & Grant, 1994; Dwyer, 1992; Flood & Hellstedt, 1991; Frederick & Ryan, 1993; Gill & Overdorf, 1994; Leary, 1992). In a study on perception of college students on various benefits of sports participation, Kelinske, Mayer and Chen (2001)

reported that college students mentioned moral reasoning, socialization, competition, health and fitness and leadership traits as potential benefits of sports participation.

Biddle & Goudas (1993), in a study to determine why people participate in sport and exercise in community sport centres, that most commonly reported motives were to maintain health, develop physical fitness and aid relaxation. They further reported that males were more motivated to participate for sport mastery and performance and assertive achievement than females. According to the researchers, older subjects were more motivated by socio – psychological well –being than younger subjects. Kelinske, Mayer and Chen (2001) found out that there was a significant difference between males and females with regards to competition as a motivating factor to participate in sports. There was, however, no difference between males and females on perceived benefits of participation in sports with regards to moral reasoning, socialization, health and fitness. Most of the work done on motives for participation in sport focused on recreational activities and the participants were mostly non – college athletes. Participation in sports is high among Nigerian college athletes. An average college athlete in Nigeria desires to win medals in the bi – annual collegiate competitions. Many of them dream of playing professional sports after their college years as well. The purpose of the current study was to find out why Nigeria college athletes participate in competitive sports.

Methods and Procedure

Participants

The participants were College athletes who competed in the 15th Nigeria Colleges of Education Games (NICEGA). Two hundred and fifty (250) athletes volunteered to take part in the study after the purpose of the study was discussed with them. Thereafter, they were given the questionnaires. One hundred and eighty seven (187) comprising 109 males and 78 females returned the questionnaires. This represented 72.8% of the volunteers.

Instruments

A questionnaire ‘Motives for participation in competitive sports’ was used for data collection. This contained two sections. Section A sought information on demographic data while section B focused on items dealing with motive for participation in competitive sports. The modified Likert scale with five response options from very important to not important was adopted. . The Cronbach alpha was $r = 0.724$.

Data Analysis

The data obtained were analyzed using descriptive statistics of simple percentages, mean and standard deviation and inferential statistics of Chi Square and Pearson’s Product Moment Correlation coefficient. The Alpha level was set at 0.05.

Results and Discussion

The results of the study are presented below.

Table 1

Mean and Standard Deviation of the Athlete on Motives for Participation in Competitive Sports

Motives	N	Mean	s.d	Rank
Social relationship	187	15.00	2.696	4
Skill development	187	16.29	12.072	1
Psychological well being	187	16.07	2.826	2
Physical fitness	187	15.79	2.828	3

Table 2

Chi Square Values of Responses of the Athlete on Motives for Participation in Competitive Sports

Motives	N	Df	X	Sig.
Social relationship	187	13	102.807	.000
Skill development	187	13	92.027	.000
Psychological well being	187	13	106.102	.000
Physical fitness	187	13	96.219	.000

Table 3

Relationship between Type of Sport and Motives for Participation in Competitive Sports

Motives	Type of sport	Social relationship	Skill development	Psychological well being	Physical fitness
Type of sport	1	.092	.018	.076	.108
Social relationship		1	.505	.417	.307
Skill development			1	.583	.433
Psychological well being				1	.567
Physical fitness					1

Discussion

Skill development was reported as the most important motive for participation in competitive sport by Nigerian college athletes. This was followed by psychological well- being, physical fitness and social relationships in that order (table 1). These purposes were statistically significant as revealed in table 2. This result should be expected since these were young athletes who obviously were looking forward to playing professional sports after their college years. Skill development would rank high in their motives for participation in competitive sports. The academic workload could be much to many college students; participation in sport sports as a means of improving their psychological well being would be expected. The findings of the current study are in agreement with those of other researchers who had earlier reported similar motives for people's participation in sports (Brodin & Weiss, 1990; Laker, 2002; Wang &

Wese –Bjornstal, 1996). Although most of these researchers used people who participated in recreational activities, the result of the current study show similarity in the purposes of people for participating either in competitive sports or recreational sports. Table 3 shows that there was no significant correlation between type of sport and purpose of participating in competitive sport by Nigeria college athletes.

The results of this study have implications for both college coaches and sport administrators. Understanding people's motives for involvement in physical activity sheds light on individuals' decision process for taking part in sport and physical activities (Morgantown, 2001). Therefore, determining these motives could assist in planning, promoting, and maintaining people's participation in physical activities (Ashford, Biddle, & Goudas, 1993). Indeed, the optimal motivation for participation in (and adherence to) physical activity is most likely to occur when the providers are able to identify and address the needs of the participants (Ashford et al., 1993). College coaches should bear in mind the reasons why athletes participate in competitive sports so that they can help them in achieving such. Since these athletes are young, their well - being should be the concern of the coach and he/she should be able to balance his/her need for achievement with the need of the athletes' psychological well being. The environment (physical and social) where the athletes operate should be conducive for the achievement of their overall development. This will not only enhance their performance but will also impinge on their psychological well being. The services of certified sport psychologists should be explored by college sport administrators to enhance the development of these young athletes, and help them to get the best from their sport participation.

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Personal and Environmental Factors as Correlates of Team Cohesion among Players of Selected Amateur Soccer Clubs in Oyo State, Nigeria

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Abstract

Many people take part in competitive sports, believing they have what it takes to become professionals and to make a full time living from their chosen sport. This sport could be an individual or group/team type that requires teamwork. Teamwork in sport competition implies that the task must be accomplished by a group of athletes working together in order to combine individual effort to win. In team sports, members have to contend with so many personal and environmental forces that are germane to team cohesion. Cohesion enables individuals to sacrifice personal desires and conform to team needs. Members therefore, need to acquire skills in problem solving and decision making for interpersonal interaction for the overall success of the team. This study was done to investigate if some personal and environmental factors would be correlates of team cohesion among players of selected amateur soccer clubs in Oyo state, Nigeria. A descriptive survey research design was adopted for this study. The sample for the study was 2720, drawn from 75 out of the 121 registered amateur soccer clubs in Oyo state FA league representing 62.4% of the study population. The simple random sampling technique of fish bowl with replacement was adopted to select the soccer clubs used for the study while systematic sampling technique was used to select the respondents chosen from each of the registered amateur soccer clubs in Oyo state, Nigeria. A standardised Group Environment Questionnaire (GEQ) with ' r ' = 0.86 was the instrument used for data collection. Two hypotheses were tested in the study with the aid of multiple regressions at the 0.05 level of significance. The results revealed that two independent variables - personal and environmental statistically proved to be significant correlates of team cohesion among players of amateur soccer clubs in Oyo state. It was recommended among others that soccer teams should be encouraged to employ the services of sports psychologists to help build a desirable atmosphere for wholesome interaction among players for team cohesion.

Key words: Competitive sports, teamwork

Introduction

Team cohesion is considered to be a complex phenomenon, a very strong component of group dynamics, which contributes to the winning formula implementation in sports. Carron, Colman, Wheeler, and Stevens (2002) defined cohesion as the dynamic process which is reflected in the tendency for a group to stick together in pursuit of its goals and objectives. Group performance therefore, depends in part, on members' dedication to group goals. Cohesion enables individuals to sacrifice personal desires and conform to team needs (Smith, 1996). Great teamwork happens when those on the team have a philosophy of being the best person for the team rather than the best person in the team.

A group provides its members with social support, a cultural framework to guide performances and rewards of all kinds. Without groups, an individual would be isolated, unloved, less productive, out of touch and even disorientated (Hogg & Vaughan 2001). Most

sport activities take place in group settings. Even athletes who participate in individual sports, and who are solely responsible for the performances in competitions, are usually members of a team (Carron, Hausablas & Eys, 2005). A sports team is characterized by factors such as: significant performance need or opportunity, joint commitment to a common goal, real interdependency and mutual accountability, mutual success and progressive professional concern (Surgarman, 2007). Team members also need such skills as problem solving and decision making in order to withstand the challenges they face within the framework of interpersonal interaction.

A cohesive team has well-defined roles and group norms, common goals, a positive energy, trust, a willingness to cooperate, unity, good communication, pride in membership, and synergy. Another indicator of the amount of cohesiveness in a team is the frequency of statements of “we” and “our”, in contrast to statements of I, me and mine. The “we” is just as important as the “me” (www.essay-911.com/samples/ind). Cohesiveness has two dimensions: emotional (or personal) and task- related (Eisenberg, 2007). The emotional aspect of cohesiveness, which has been studied more often, is derived from the connection that members feel for other group members and to their group as a whole. That is, how much members like to spend time with other group members, how they look forward to the next group members, share group goals and work together to meet these goals. The more cohesive a team is, the more it encourages peak performance in members. If cohesion is lacking, it can often prevent the team from reaching its` potential.

Developing cohesion is something that takes time and effort, but it is worth the investment. To establish cohesion, personal factors have to come into focus when considering team goals. Making sure the members know what the individual goals are, for themselves and their teammates, is very important. If you know what your teammates are striving for, many times you can aid them in their endeavour, which will lead to a more cohesive relationship. There can be no hidden agendas by any of the members; their goals must coincide with team goals. What`s good for the team has to be good for the individual and vice versa. It is believed that, if a group has a shared belief about its competence, then, its attraction to the group (cohesion) would also increase (Hogg & Vaughan, 2001).

There are so many factors contributing to cohesion; some of which are personal, environmental, team characteristics and leadership factors and some of these have been found by Mello, (2004) to fall into categories such as; perception of the social group, attractiveness to it, perception of group task and attraction to it. It was also reported that success in competition is most likely attainable, if each team member, regardless of personal aspirations, totally concentrates on common tasks and shares a team`s belief and prospects, being ready to contribute to them actively at any time (Mello, 2004).

The success of a sports team depends on being able to find strength in cooperation, build on mutual helpfulness, and responsibility for fellow teammates (Sugarman (2007) & Mello, 2004). Moreover, team members` personal characteristics can influence the type of cohesion developed. It had been found that social background, gender, and personality differentially contribute to cohesion (<http://www.essay-911.com/samples/ind>). Common participation motives can contribute to team cohesion. Participation motives can be identified as task, affiliation, and self-motivations. Athletes with high task motivation would contribute to team task cohesion. Thus athletes with self-motivation attempt to obtain personal satisfaction by performing up to one level of ability, seemingly to contribute to social and task cohesion.

Many people who take part in sports thinking that they have what it takes to become a professional and to make a full time living from their chosen sport and this is particularly true of teenagers and younger amateurs who believe that their talent is what marks them out from the rest. Amateur sports, as opposed to professional sports, are sports in which participants engage largely or entirely without remuneration. An amateur receives little or irregular income from their activities and thus differ from a professional who makes a living from the pursuit and typically has formal training and certifications in the domain. The term “amateur” reflects a voluntary motivation as a result of personal interest in the sport.

Environment factors of cohesion refer to the normative forces holding a group together. These may be signed contracts, scholarships, family expectations and peer influence. These factors can hold a group together. Although other factors, such as age, proximity, or eligibility requirement can also play an important role in that physical and functional proximities influence team members’ interaction. Individuals in close contact, and having opportunities for interactions and communication hasten group cohesion. Aspects of the social environment can also play a role. Social pressures from within or outside the group (e.g. family, workplace) can influence decisions with respect to staying with or leaving a team.

Team goals should be clear and definite; they may concern either the nearest competition or some event gaining status in the prospect of several years. In this case, goals may be short term and long term. It is considered in practical terms that short term goals are by far the most important but on the other hand sportsmen should not neglect setting long term goals as while short term goals are basically process oriented; they may be compared to concessive steps resulting in achievement of a long-term goal. Other factors like team size, homogeneity, norm and roles also play an invaluable role in the dynamics of interactive teams.

Nigeria is a renowned footballing nation that has produced so many soccer stars and has won major soccer tournaments, though at the age group levels. Oyo state has been seen as the cradle of modern sport development in Nigeria being the host of the first and one the biggest stadiums in the country. There are over 120 registered amateur soccer clubs in the state that jostle for positions in the state Football Association league.

This study was carried out, to find out if personal and environmental factors would be correlates of team cohesion among players of selected amateur soccer teams in Oyo State, Nigeria.

Statement of the Problem

Teamwork in sport competition requires that the task must be accomplished by a group of athletes working together in order to combine individual effort to win. The common goal that binds a team together is winning. In many cases, this is what holds teams together. For this reason, winning becomes vital to teams, coaches, players, team managers, families and other supporters. In recent times, the researcher have discovered soccer players of many amateur soccer clubs in Oyo state were exhibiting individual skills rather than team work during competitions. This is often seen in the breakdown of communication among team members on the field of play and ultimately results in lack of cohesion and poor performance. The researcher therefore decided to find out if personal and environmental factors would be correlates of team cohesion among players of selected amateur soccer teams in Oyo State.

Research Question

Will the length of stay in the club be a significant correlate of team cohesion among amateur soccer players of selected clubs in Ibadan?

Hypotheses

The following hypotheses were tested

- (1) Personal factors (Socio economic background, Team role perception, Personality, and Common participation motives) will not be significant correlates of team cohesion of selected amateur soccer players in Ibadan, Oyo State.
- (2) Environmental factors (Contracts, Scholarship, Family expectations and Peer influence) will not be significant correlates of team cohesion of selected amateur soccer players in Ibadan, Oyo State.

Methodology

Research Design

A descriptive survey research design was used for this study. This design helped the researcher to analyze, interpret and report the information gathered accordingly.

Population and Sample

The population for this study include all amateur soccer players registered in the Oyo state Football Association (FA) league for the 2010 football season. There were 4356 players from the 121 amateur soccer clubs. Each team registered 36 players for the season. The sample for the study was 2720, drawn from 75 out of the 121 registered amateur soccer clubs in FA league representing 62.4% of the study population. The sample was based on those that fulfilled the inclusion criteria of willingness and availability. The simple random sampling technique of fish bowl with replacement was adopted to select the soccer clubs used for the study while systematic sampling technique was used to select the respondents chosen from each of the clubs.

Research Instrument

The standardized group Environment Questionnaire (GEQ) developed by Carron, Widmeyer & Bradley (1985) was used for data collection. The GEQ has demonstrated internal consistency, reliability and content validity in two different sport team samples during its initial development (Carron, Widmeyer & Brawley, 1985). The four subscales produced a cronbach's alpha of 0.74, 0.58, 0.78 and 0.61 respectively. Brawley, Carron & Widmeyer (1987) used three studies to further test the GEQ'S concurrent, predictive and construct validity. Li & Hammer (1996) subsequently tested the validity of the GEQ with an intercollegiate sample using confirmatory factor analysis and the result was valid. To establish the reliability of the GEQ for this study, the instrument was administered on 30 soccer players in the University of Ibadan prior to the actual study. The data was subjected to Cronbach alpha for local reliability; it produced an alpha reliability co-efficient of 0.86, which means the instrument was highly.

Data Analysis and Discussion of Findings

Demographic information of Respondents

Table 1

Age Distribution of Respondents

Age in years	Frequency	Percentage
16-20	841	30.9%
21-25	1585	58.3%
26-30	206	07.6%
31 and above	88	03.2%
Total	2720	100%

The respondent's age is presented in Table 1, 841 (30.9%) are between 16 and 20years, 1585 (58.3%) are between 21 and 25 years, 206 (07.6%) are between 26 and 30 years. The remaining 88(03.2%) are above 31years. The information revealed that most of the respondents fall within the age range of 21 and 25 years while very few of them are above 31 years.

Table 2

Educational Attainment Of Respondents

Qualification	Frequency	Percentage
FIRST SCHOOL LEAVING CERT.	793	29.1%
SENIOR SCHOOL. CERT	954	35.1%
OND/NCE	753	27.7%
UNIVER. DEGREE	220	8.1%
Total	2720	100%

Table 2 presents information on respondent's academic qualifications. 793 (29.1%) had first school leaving certificate, 954 (35.1%) possess Secondary school certificate, while 753 (27.7%) possess Ordinary National Diploma/Nigeria Certificate of Education. Only 8.1% of them had a university degree.

Research Question

Will length of stay in the club be a significant correlate of team cohesion among amateur soccer players in selected clubs in Ibadan?

Table 3

Respondents' Length of Stay in their Clubs

Length of stay	Yes	No	Total
1-2 years	473(52.1%)	436 (47.9%)	909(100%)
3-4 years	430(57.6%)	328 (43.4%)	758(100%)
5-6 years	335(58.6%)	236(41.4%)	571(100%)
7-8years	121(59.4%)	83(40.6%)	204(100%)
9years and above	96 (34.5%)	182(65.5%)	278(100%)
Total	1455(53.4%)	1265(46.5%)	2720(100%)

The respondents length of stay in their various clubs was presented in Tables 3. On the whole, 53.4 % of the respondents agreed that their length of stay in their clubs had helped them in building team cohesion with their mates while 47.6% disagreed. Based on the percentage a higher number posited that length of stay is a significant correlate of team cohesion in their clubs.

Hypotheses Testing

Hypothesis 1: Personal factors (social background, personality team role perception and participation motives) will not be significant correlates of team cohesion among selected amateur soccer players in Ibadan, Oyo State.

Table 4

Multiple Correlations between Personal Factors and Team Cohesion

R = 0.550 R Square = 0.303 Adjusted R square = 0.302					
Model	Sum of squares	df	Mean square	F	Sig.
1. Regression Residual	4357.619 10030.126	4 2394	1089.405 4.190	260.020	.000 ^a
Total	14387.745	2398			

Table 4 shows that the multiple correlation coefficient (R) between personal factors (socio economic background, personality, team role perception and participation motives) and team cohesion of players in selected clubs in Oyo state is 0.550. Estimated R square equals 0.303 while Adjusted R square equals 0.302. This meant that personal factors when taken together accounted for 30.2 percent variation in team cohesion of players in selected clubs in Oyo state. Further investigation on correlative relationship between personal factors and team cohesion using Regression ANOVA produced $F(4,2394) = 260.020$; $P < 0.05$. Since P value is less than 0.05, then the null hypothesis is therefore rejected. This translates to mean that personal factors, i.e. socio economic background, personality, team role perception and participation motives correlate with team cohesion significantly at $\alpha = 0.05$.

Table 4.1

Degree of Contribution of Personal Factors to Team cohesion

Model	Unstandardized Coefficients		Standardized Coefficient	t	Sig.
1. (constant)	7.289	.145			
Socio economic background	.242	.021	.279	50.419	.000
Personality	.100	.015	.135		
Team role perception	.053	.022	.056	11.734	.000
Participation motives	.152	.017	.203		
				6.660	.000
				2.431	.015
				8.956	0.00

It was further discovered as shown in Table 4.1 that socio economic background contributed most ($\beta = 0.279$; $t = 11.7734$; $P < 0.05$) to team cohesion of players in selected amateur clubs. Next to socio economic background is participation motives with ($\beta = 0.203$; $t = 8.956$; $P < 0.05$); followed by personality with ($\beta = 0.135$; $t = 6.660$; $P < 0.05$); and lastly team role perception contributed the least among others with $\beta = 0.056$; $t = 2.431$; $P < 0.05$). All the four factors however, contributed significantly to team cohesion of players in selected clubs in Oyo state. This is supported by the works of Sugarman & Mello (2004) who submitted that the finest way for athletes to survive and succeed is to be able to find strength in cooperation, build upon mutual helpfulness and responsibility for teammates. It has also been established in research that team member's personal characteristics are crucial to the overall success of any team (www.essay-aii.com/samples/ind.2010).

Hypothesis 2: Environmental factors (contracts, scholarship, family expectation and peer influence) will not be significant correlates of team cohesion among selected amateur soccer players in Ibadan, Oyo State.

Table 5

Multiple Correlation between Environmental Factors and Team Cohesion

R = 0.461 R square = 0.213 Adjusted R square = 0.211					
Model	Sum of Squares	df	Mean Square	F	Sig.
1. Regression	2999.661	4	749.915	157.492	.000 ^a
Residual	11108.812	2333			
Total	14108.473	2337			

Table 5 reveals that the multiple correlation coefficients (R) between environment factors (contracts, scholarship, family expectation and peer influence) and team cohesion among players of selected amateur soccer clubs is 0.461. Estimated R square equals 0.213 while Adjusted R square equals 0.211, meaning that environment factors when taken together accounted for 21.2 percent variation in team cohesion among players of selected amateur soccer clubs.

Further investigation on correlative relationship between environmental factors and team cohesion using Regression ANOVA produced $F(4,2333) = 157.492$; $P < 0.05$. Since P value is less than 0.05, then the null hypothesis two is therefore rejected. This interprets that environmental factors which are contracts, scholarship, family expectation and peer influence correlate with team cohesion at $\alpha = 0.05$.

Table 5.1

Degree of Contribution of Social Factors to Team Cohesion

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
1. (Constant)	9.756	.283		34.455	.000
Contracts,	.234	.018	.281	12.680	.000
Scholarship	.173	.018	.216	9.876	.000
Family expectation	.151	.057	-.049	-2.658	.008
Peer influence	.062	.018	-.066	-3.477	.001

It was further discovered, as indicated in Table 5.1 that contracts contributed most ($\beta = 0.281$; $t = 12.680$; $P < 0.05$) to team cohesion among players of selected amateur soccer clubs. Next to contracts is scholarship with $\beta = 0.216$; $t = 9.876$; $P < 0.05$. This was followed by peer influence with $\beta = -0.066$; $t = -3.477$; $P < 0.05$. Family expectation contributed the least among other factors with $\beta = 0.049$; $t = -2.658$; $P < 0.05$. This translates to mean that all the four factors contributed significantly to team cohesion among players of selected amateur soccer clubs. Individuals being in close contact and having opportunities for interactions and communication hasten group cohesion. Other aspects of the social environment according to Barron &

Greenberg, (1990) also exert social pressures from within or out side the group (e.g. family, school) This is capable of influencing decisions with respect to joining, staying or leaving a group/team.

Conclusion

Team or group cohesion in sports constitutes important factors for improving team communication and performance. This study affirmed that personal and environmental factors are significant correlates of team cohesion among amateur soccer players in, Oyo State, Nigeria. It is therefore necessary for sports managers, coaches and other professional who form part of the team handlers to develop effective leadership and communication skills that would ensure cohesion among team members in order to improve sport team performance. It was established that forces within and outside individuals in the team are capable of derailing the team from achieving its goal.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Soccer teams should be encouraged to employ the services of sports psychologists to help build desirable atmosphere for wholesome interaction among players for team cohesion.
2. The role of the athlete within the group (team) should be spelt out in order to avoid a situation where individual interest would override team interact as this may adversely affect team performance.
3. Where an athlete finds it difficult to operate effectively within the group, such an athlete should be referred for counselling by qualified sport psychologist.
4. Team officials should develop effective communication skills that would assist in building the gap that may exist between the athletes and the management of the team.

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Sport Participation Motives as Predictors of Motivation Outcomes among University Athletes

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Abstract

The extent to which motives for sport participation predict motivation outcomes was investigated in a study embracing self-determination theory using Vallerand's hierarchical model of motivation at the contextual level. Data were collected from 120 university athletes in track and field. Motives for sport participation were assessed using the Sport Motivation Scale. Cognitive, affective, and behavioral measures were used to assess contextual motivation outcomes. Linear regression analyses examined the extent to which sport motives predicted motivation outcomes (satisfaction, concentration, and persistence). Amotivation emerged as a strong negative predictor of the outcome measures. External and introjected regulations and three intrinsic motives did not predict any of the motivation outcomes. The results do not support previous findings and offer limited support of Vallerand's model. Therefore, coaches should be trained in the principles underlying emotional intelligence, given that the present findings suggest that sensitivity to athletes' affective states is likely to buffer the potentially negative consequences of amotivation.

Keywords: Intrinsic and extrinsic motivation, affective outcome, cognitive outcome,

Introduction

Individuals have both conscious and unconscious reasons for their behaviors. These reasons can be considered as motives. Motives have two functions. First, they direct behavior toward or away from some goals and activate people to be more aroused when they have strong motives (Gleitman, 1991). Secondly, motives work to help individuals reach their goals. Thus, in order to initiate or modify behavior it is necessary to understand the underlying motives behind behavior. Understanding individual motives in sport and exercise help coaches, teachers and individuals to improve coaching, maintain motivation, prevent burn out and lower drop out rates (US Swimming, 1996). These benefits, among others, have prompted a need for understanding motivation in sport and exercise, especially an understanding of why individuals initiate, continue, and withdrawal from participation. Research directed towards understanding sport and exercise motivation has focused primarily on motives for participation and withdrawal.

Sport psychologists have defined participation motivation as the reasons that individuals adopt for initiating, continuing and then sustaining involvement in physical activity, as well as the reasons that individuals choose to discontinue involvement (Roberts, 1992, cited in Busby, 1997). Differences in motives according to level of experience were suggested by Gould, Feltze, & Weiss (1985). However, many studies have found differences in motives for different ages (Ashford, Biddle, & Goudas, 1993; Asford & Rickhuss, 1992, cited in Biddle, 1995; North, McCullagh, & Tran, 1990). The common finding is that people's interest in sport changes when they grow. For example, young kids are orientated toward physical development at 6-9 years of age, and become interested in the social aspects of sport at around 10-14 years of age. Study of participation motivation has resulted in the identification of many motives for individuals

involved in sports. However, it is unclear to what extent these motives can be applied to sports in general motivation outcomes among athletes.

According to Mageau and Vallerand (2003) few activities are more beneficial in inducing interest, enjoyment, and excitement in its participants than sports. Two types of motivation that include intrinsic and extrinsic have been of particular interest to researchers in the field of sport psychology (Deci & Ryan, 2008; Vallerand, 2001). According to researchers intrinsic motivation involves participation in an activity for the feelings of fun, pleasure, excitement, and satisfaction associated with it, while extrinsic motivation entails participation for the attainment of such rewards as money, trophies, and social approval/recognition or to avoid punishment. In view of this, self-determination theory (SDT, Deci & Ryan, 2000) has widely been applied as theoretical approaches to these types of motivation. The SDT involves the concept of amotivation or having no sense of purpose and lacking intent to engage in a particular behavior. Deci & Ryan (2000) posits that the different types of motivation through SDT range on a continuum from high to low self-determination of intrinsic motivation–extrinsic motivation–amotivation.

According to Vallerand (2001) the model asserts that social factors, mediators (autonomy, competence, and relatedness), motivations, and consequences (affect, cognition, and behavior) exist at three levels - global, contextual, and situational (See Appendix A). Studies (Ratelle, Vallerand, Chantal, & Provencher, 2004; Standage & Vallerand, 2008; Taylor, Ntoumanis, & Standage, 2008; Wilson, Rodgers, Fraser, & Murray, 2004) have indicated that behavioral regulations spanning the SDT continuum would lead to a corresponding pattern of consequences. Hence, autonomous regulations and intrinsic motivation are expected to correspond with more positive outcomes, and less self-determined forms of regulation (external and introjected regulations) correspond with more negative outcomes, such as poor focus, burnout, and dropout.

Ntoumanis (2005) and Spray, Wang, Biddle, and Chatzisarantis (2006) stated that these proposals (Vallerand, 2001) found broader support in a range of sport and physical activity contexts, of which no study has examined these proposals in the context of a single sport. Therefore, this study examined the extent to which motives for sport participation predicted motivation outcomes at the contextual level of motivation affording a direct test of the model. Based on previous studies (Ntoumanis, 2001; Ntoumani & Ntoumanis, 2006; Pelletier et al., 1995), it was hypothesized that dimensions of intrinsic motivation and identified regulation would be significantly positive predictors of motivation outcomes, and that amotivation would be a significant negative predictor.

Methods

Participants

The respondents include 120 institution athletes (55 female and 65 male) in amateur track and field involved during the institution competitions with mean age of 19.7 years. Forty-five (37.5%) athletes participated in sprint events, 30 (25.9%) in middle distance events, 33 (27.5%) in throwing events, 7 (5.83%) in long-distance events, and 5 (4.17%) in multi-events (sprint, throws & middle distance events). Their years of experience in track and field ranged from 1 to 18 ($M = 5.8$ years, $SD = 3.5$).

Measures

Motivation measures. The 28-item Sport Motivation Scale (SMS) based on SDT and designed to assess contextual intrinsic motivation, extrinsic motivation, and amotivation (Pelletier et al., 1995) was used to collect data. Athletes responded to the item “Why do you

practice your sport?” with responses from a Likert-type scale ranging from 1 (does not correspond at all) to 7 (corresponds exactly). The SMS consisted of seven subscales with four items attached to each. The participation motives operationalized in the SMS are as follows (ranging from the most to the least self-determined): intrinsic motivation to know (for the pleasure of discovering new training techniques); intrinsic motivation toward accomplishment (for the satisfaction I experience while I am perfecting my abilities); intrinsic motivation to experience stimulation (for the excitement I feel when I am really involved in the activity); identified regulation (because in my opinion, it is one of the best ways to meet people); introjected regulation (because I must do sports regularly); external regulation (to show others how good I am at my sport); and amotivation (it is not clear to me anymore; I really don't think my place is in sport). The internal consistency estimates for all subscales was $\alpha = .76$ to $.85$ with the exception of identified regulation ($.68$). This corroborates Pelletier et al. (1999) and Vallerand and Losier (1999) that the SMS has strong psychometric properties using confirmatory factor analysis to support the factor structure, while correlations between subscales and criterion measures were consistent with theoretical predictions.

Affective outcome measure. Satisfaction was used as an affective outcome and assessed using a single item: “I am satisfied with my participation in the sport I currently practice” (Vlachopoulos et al., 2000). Participants responded on a Likert-type scale ranging from 1 (I do not at all feel satisfied) to 7 (I feel extremely satisfied).

Cognitive outcome measure. Concentration was used as a cognitive outcome and was assessed using the dimension of concentration on task at hand from the Dispositional Flow Scale-2 (Jackson & Eklund, 2002). This dimension consists of four items (e.g., “I have total concentration”) and participants provided responses on a Likert-type scale ranging from 1 (never) to 5 (always).

Behavioral outcome measure. The behavioral outcome of persistence was assessed using the mean of three items: “I intend/I will try/I am determined to continue participation in the sport I currently practice during this year” (Vlachopoulos, Karageorghis & Terry, 2000). Responses were provided on a semantic differential scale ranging from 1 (extremely unlikely) to 7 (extremely likely).

Data Analysis

In order to have values within expected ranges the z scores was used at $p < 0.01$ and those reduced modifying to mean score. A linear regression analysis was used to predict the outcome measures of the three from the seven Sport motivation scale (SMS) subscales.

Results

The result revealed that data screening on three cases with multiple univariate and one case with a multivariate were identified and deleted. Based on that 11 univariate were identified and transferred the z scores (Tabachnick & Fidell, 2007). The SMS mean scores were highest for the self-determined motives, showing that the respondents participated in sport majorly for intrinsic and identified reasons rather than external and introjected reasons.

Table 1.*Descriptive Statistics for the Sport Motivation Scale and Outcome Measures*

Variable	Mean	SD	Range	Skewness	Kurtosis
Sport Motivation Scale					
Amotivation	7.60	4.64	5.00-3.00	1.26	0.97
External regulation	16.40	4.72	4.00-27.00	0.15	-0.45
Introjected regulation	15.92	5.55	4.00-28.00	0.25	-0.67
Identified regulation	16.02	4.78	4.00-28.00	0.10	-0.42
Intrinsic motivation to know	19.93	4.37	8.00-29.00	-0.17	-0.55
Intrinsic motivation toward accomplishments	21.55	3.72	10.00-28.00	-0.53	-0.38
Outcome measures					
Satisfaction	6.40	1.55	1.00-6.00	-1.28	1.52
Concentration	16.26	2.20	8.00-20.00	0.21	-0.13
Persistence	7.89	0.57	6.00-7.00	-3.46	5.02

The result from Table 1 shows that skewness and kurtosis values indicated that the persistence variable was the only problematic variable examined. Respondents generally indicated strong intentions to persist in their event. Therefore logarithmic transformation was not applied. Based on this, a linear regression analysis was conducted to predict each outcome measure from the SMS subscales.

Table 2.*Regression analysis to predict Motivation Outcomes from Motives for Sport Participation*

Dependent variable	Predictor variable	Standardized beta (β)
Satisfaction	Amotivation	-0.50*
	External regulation	0.20
	Introjected regulation	-0.09
	Identified regulation	-0.06
	Intrinsic motivation to know	0.08
	Intrinsic motivation toward accomplishment	0.05
	Intrinsic motivation to experience stimulation	0.09
R = 0.40		
R ² = 0.20		
Concentration	Amotivation	-0.34*
	External regulation	0.19
	Introjected regulation	-0.02
	Identified regulation	-0.06
	Intrinsic motivation to know	-0.16

* $p < .01$.

The joint effect of independent variables revealed a significant ($p < .01$) overall prediction within each regression equation. Amotivation emerged as a strong negative predictor of each of the three motivation outcomes. Against expectations, the intrinsic motives did not predict the outcome measures in any of the equations. The predictor variables accounted for the highest degree of percentage variance in the outcome of satisfaction (20%), followed by concentration and persistence.

Discussion

This study examined the extent to which motives for sport participation predicted motivation outcomes at the contextual level of motivation in a single sport. The study specifically examined the proposition that more self-determined forms of motivation are positively associated with motivation outcomes than their other controlling counterparts or amotivation. The results indicated that amotivation negatively predicted the contextual motivation outcomes, which corroborates recent findings pertaining to this dimension (Deci & Ryan, 2000; Wilson et al., 2004). However, neither intrinsic motives nor external or introjected regulations predicted any of the outcome measures. The present results collectively appear to offer very limited support for the research hypothesis because it was found that autonomous

regulations and intrinsic motivation were not positive predictors of the motivation outcomes. The findings of this study do not support previous findings that identified regulation and intrinsic motivation were positively associated with motivation outcomes at the contextual level of motivation (Ntoumanis, 2001; Ntoumani & Ntoumanis, 2006; Wilson et al., 2004).

It is agreeable that the predictive efficacy of intrinsic motivation to know may be lower in track and field than in some other sports because the sport (structures or functions) involves relatively few tactics, with athletes following their coaches' instructions closely without exhibiting a particularly deep desire to explore new performance strategies. However, anecdotal evidence suggests this may not generalize to elite performers (Johnson, 1996; Lewis & Jeffrey, 1990).

The regression analysis predicted a relatively small percentage of the variance in the cognitive and behavioral outcomes but a considerable percentage of the affective outcome (20%). This indicates that behavioral regulations are strong predictors of how people feel about their participation in sport. Notably, amotivation was found to be a strong contrasting marker of satisfaction, a finding that is consistent with theoretical predictions (Ntoumanis, 2001; Wilson et al., 2004). This implies that if coaches are to address the potentially unwholesome effects of amotivation, an effective strategy would be to apply mood and emotion-regulation strategies and to demonstrate some sensitivity toward athletes' affective states. The multidisciplinary nature of track and field event based on the findings shows that not only are psychological needs underlying intrinsic motivation frustrated by the sport's coactive nature and emphasis on social comparison, but there is addition for a further level of competition between event groups, such as sprints versus throws or jumps versus distance running. This fusion of conflicting forces makes track and field a very distinct sport which may account for the lack of support for the propositions of SDT, thus corroborating an earlier study suggesting that SDT has limited predictive efficacy in terms of motivation outcomes (Bhatnagar & Costal, 2008).

Conclusion

Participant development in sporting activity is dynamic and non-linear, and there are multiple pathways that individuals may take as they progress. This non-linearity, coupled with the importance of events and transitions in the developmental pathway makes it essential for support systems to offer flexibility, individual optimization, and return routes as features of any formal pathway to excellence. Traditionally, excellence in sport has been conceptualized in terms of outcome measures in the form of medals, records and victories. The growing interest in lifelong participation in activity includes excellence in terms of personal participation and improvement. The findings of this study provided limited support for Vallerand's (2001) hierarchical model of intrinsic and extrinsic motivation and posits of SDT (Deci & Ryan, 2000).

Recommendations

The findings indicate that amotivation was the only predictor of the contextual motivational outcomes. This lies in the promoting factors that underpin intrinsic motivation in track and field. Hence, perceptions of autonomy and individual mastery will nurture intrinsic motivation and ultimately improve sport performance (Edmunds, Ntoumanis, & Duda, 2006; Wilson & Rodgers, 2004). The following recommendations are made:

1. Coaches should emphasize positive sensations (fun and excitement) that result from participation, while placing their emphasis on peer comparison.

2. Coaches should be trained in the principles underlying emotional intelligence, given that the present findings suggest that sensitivity to athletes' affective states is likely to buffer the potentially negative consequences of amotivation.
3. Coaches may benefit from understanding that athletes are more responsive and successful when they are intrinsically motivated, and amotivation can likely be avoided with proper mentoring. When properly motivated, athletes will experience successful and sustained sports endeavors.
4. Future research should explore additional motivation outcomes in the area of cognitive outcomes such as attention span and level of learning in related sport.

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APPENDIX A

The Motivational Casual Sequence

