

A Profile of the  
Masters Track & Field Athlete

by

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**CHAPTER 1**

**INTRODUCTION**

Aging has been associated with deteriorations in physiological measurements. A decrease in aerobic capacity, a decrease in lean body weight, and an increase in body fat are three of the most prominent. Are these declining physiological factors an inevitable reality for people approaching middle-age or can they be delayed or completely restrained? With the population of middle and older age individuals who exercise and participate in athletic competition on the increase, sport scientists are trying harder to define the relationship between physical activity and aging. There is a growing realization that the benefits from exercise outweigh the risk factors associated with exercise in older people. How much can exercise help in retarding the decline in physiological factors associated with the loss of good health? Is running and/or competition good for the aging person? Kavanagh, Lindley, Shephard and Campbell (1988), concluded that large scale Masters competition was both desirable and safe, even for the non-elite competitor.

Exercise among older individuals has increased in recent years

and more individuals are becoming involved in what is known as Masters athletic competitions. In track & field, Masters competitions are for individuals 30 years of age and older. The number of competitors participating in Masters athletic competitions has risen dramatically in the last decade. In National and International competition, the popularity is growing not just for the elite athlete but for the non-elite athlete as well. During July 4-7, 1991, more than 800 entrants age 30 through 85 competed in the TAC/USA national masters track & field championships in Naperville Illinois (Wojcik, August 1991). More than 5,000 athletes aged 55 and older, competed in the biennial United States National Senior sports classic III, in Syracuse New York during June 28 - July 3, 1991, where track & field drew 755 competitors (Sheahen, August, 1991). More than 5,000 Masters track & field athletes, age 40 through 95 competed in the 9th biennial WAVA world veteran track & field championships in Turku Finland July 18 - 28, 1991. The marathon drew nearly 1000 runners! (Sheahen, September, 1991). Competition in track & field has moved beyond the boundaries of elitism and now allows a broader population of non-elite athletes to compete. Thus a new question arises to physicians and family members, "Is competition something that we should encourage aging exercisers to participate in?" To find out the answers to some of these questions, 94 masters track & field athletes were asked to volunteer for a study that included completing out a questionnaire and having their body

fat percentage estimated.

#### PURPOSE OF THE STUDY

The purpose of this study was to construct a profile of the Masters track & field athlete.

#### VARIABLES

The independent variables of the study were:

- 1) competition and exercise,
- 2) no competition but regular exercise habits,
- 3) no competition and no regular exercise habits.

The dependent variables of the study were:

- 1) skinfold measurements,
- 2) percent body fat,
- 3) demographic statistics of the Masters track & field athlete.

The control variables of the study were:

- 1) To gather information from a variety of track & field subjects in all categories: sprint, distance, field events and multi-events.

### HYPOTHESIS

It was hypothesized that competitive track & field athletes will not differ from exercising and non-exercising age matched peers.

### OPERATIONAL DEFINITIONS

**Masters track & field competitor** - A male or female age 30 or older who participates in at least one track & field or running competition each year.

**Exerciser** - A male or female age 30 or older who does not compete in track & field but exercises on a regular basis at least once each week.

**Non-Exerciser** - A male or female age 30 or older who does not compete in track & field and does not exercise on a regular basis.

### ASSUMPTIONS

Assumptions were made so as to treat the study as objectively as possible. They were:

- 1) The athletes who volunteered to participate in this study were representative of all the athletes participating in Masters track & field in the United States.
- 2) The data collected was representative of the data of all athletes who participate in Masters track & field as a whole.
- 3) The information obtained on the questionnaires was accurate.

DELIMITATIONS

The study was delimited to:

- 1) Individuals 30 years of age and older who were competitive in track & field and competed in at least one meet per year.
- 2) Individuals 30 years of age and older who did some form of exercising on a regular basis.
- 3) Individuals 30 years of age and older who did not exercise at all or did not exercise on a regular basis.

LIMITATIONS:

Limitations in the study were:

- 1) The inability to control possible influences on skinfold measurements.
- 2) The accuracy in answering the questions on the questionnaire.

SIGNIFICANCE OF THE STUDY

Since more individuals age 30 and older are taking part in Masters athletic competition, this study will contribute to research done in the area of exercise and competition with older athletes in track & field.

**CHAPTER 2**  
**REVIEW OF LITERATURE.**

With aging, there is a general decline in physiological measurements. Aerobic capacity, muscular strength, movement speed, and lean body weight all decrease, while percent body fat increases. The decline in physiological measurements begins somewhere in the mid 20's and has been called the aging curve. This is in agreement with researchers who tested individuals from 20-80 years of age (Bemben, Massey, Bemben, Misner, & Boileau, 1991; Howard, Cunningham, & Rechnitzer, 1987; Howley & Franks, 1986; Kavanagh & Shephard, 1990; Kuta, Parizkova & Dycka, 1970; Meredith, Zackin, Frontera & Evans, 1987; Parizkova, Eiselt, Sprynarova & Wachtlova, 1971; Schwartz et al. 1990; Stamford, 1988). However, a growing number of researchers believe that a portion of the deterioration seen in aging curves is caused by less activity in older individuals and not by aging itself. People who maintain active lifestyles slow down the fitness

decline seen in typical aging curves (Heath, Hagberg, Ehsani & Holloszy, 1981; Meredith et al. 1987; Pollock, Miller & Wilmore, 1974; Pollock, Foster, Knapp, Rod & Schmidt, 1987; Pollock et al. 1991; Skrobak & Anderson, 1975; Wilmore & Costill, 1988).

The majority of these studies by the sport scientist have been cross sectional studies. Various age groups consisting of different people have been compared with each other. What is not known with certainty is to what extent these aging factors can be slowed by those who constantly exercise throughout their lives. More longitudinal studies need to be done by sport scientists before this issue is clarified.

#### Changes in Body Composition with aging.

As most people age, the amount of body fat becomes easier to accumulate in the body (Meredith et al. 1987; Schwartz et al. 1990; Howard et al. 1987; Wilmore 1990; Pollock et al. 1987). Excess body fat can lead to overweight problems and increased health risks. How important is the control of excess body fat percentage in delaying the aging process and maintaining a superior level of fitness? Researchers have shown that exercise is a well documented factor in controlling body fat (Hammer, Barrier, Roundy, Bradford & Fisher, 1989; Heath et al. 1981; Kavanagh & Shephard, 1990; Meredith et al. 1987; Pavlou, Steffee, Lerman & Burrows, 1985; Pollock et al. 1977; Sidney, Shephard & Harrison, 1977; Skrobak et al. 1975; Stamford 1988; Tanaka,



Nakadomo & Maeda, 1988; Yokoyama, 1984).

Heath et al. (1981), compared 16 highly trained Masters athletes aged 50-72, with 16 young athletes aged 18-27. The two groups were matched based on training regimens which were very similar. Eighteen untrained middle-aged men were also compared as a control group in which nine were identified as overweight, average age 50, and the other nine were identified as lean, average age 52. Significant differences were found between the Masters athletes and the untrained middle-aged men in percent body fat.

	<u>n</u>	<u>age</u>	<u>height</u> (cm)	<u>weight</u> (kg)	<u>body fat</u> (%)
Young athletes	16	22	175.8	65.2	9.3 ± 1.8
Masters athletes	16	59	173.0	63.3	9.8 ± 1.2
Untrained	9	50	175.3	85.0	20.4 ± 2.6
Lean untrained	9	52	174.8	69.1	14.2 ± 2.2

The lean untrained men in Heath's study were said to appear to be as thin as the athletes and were below average weight for their age and height. Nevertheless, the lean untrained men's body fat content was significantly higher than that of the runners due to less muscle mass.

Many researchers have determined that trained men have a lower body fat content than untrained individuals of the same body weight and age. Yokoyama (1984), studied ten athletes and seven non-athletes in order to investigate differences in body composition between young Japanese men with similar somatotypes. There were no significant differences found between the two groups when 20 somatometric parameters such as weight, height and body

girths were compared. Significant differences were found when skinfold thickness was analyzed in four of the six sites measure.

A significant difference was also found in estimated percent body fat between the two groups. The mean body fat percent for the athletes was 10.92% while the non-athletes averaged 17.35%. Yokoyama (1984), also found the metabolic rates of the athletes to be higher than the non-athletes when muscles from seven different areas were measured for maximum local energy metabolic rates (Kcal/hr). Lower metabolic rates measured in the non-athletes meant that they were burning calories at a slower rate than the athletes thus allowing them to store more body fat. The slowing down of the basal metabolic rate as one gets older is another hypothesis for the reason of the additional weight gain associated with aging. However, the decrease in the basal metabolic rate with advancing age may be because of muscle tissue loss (Howley 1986).

In a cross sectional study by Kavanagh and Shephard (1990), on 756 Masters competitors in various sports, five age groups were compared with each other, (30-39, 40-49, 50-59, 60-69, and 70-79).

Lean body mass remained relatively constant for both men and women until ages 70-79, when it decreased 4.3kg and 4.5kg respectively, a significant decline. Contrary to research by other sport scientists who have found decreases in lean body mass with aging, Kavanagh and Shephard (1990) found that from the 30 year decade to the 60 year decade, lean body mass increased an average of .3kg per decade. Women had an increase of .4kg per

decade. Percent body fat surprisingly remained relatively constant in women. Kavanagh and Shephard (1990), found an increase in body fat of .13 percent per decade with the women in the study while with the men there was an increase in body fat of .7 percent per decade.

Pollock, (1987), studied 24 Masters track athletes during a ten year follow-up to determine the aerobic capacity and body composition changes over the ten-year period. All 24 athletes continued their aerobic training, but only eleven of the athletes were still highly competitive and continued to train at the same intensity. Pollock (1987), found slight increases in body fat with both groups although total weight remained relatively the same. Pollock hypothesized that the competitive group, who maintained their training levels, would maintain their body composition at follow-up. The slight increase in body fat led Pollock to conclude that there had been slight losses in lean body mass while body fat increased and that the addition of strength training to the endurance exercise regimen may be necessary to maintain lean weight with age.

A decrease in muscle mass corresponds with a decline in muscle function (Bemben et al. 1991, Kuta et al. 1970). The loss of muscle mass may not be the only factor to fully account for the loss in strength with aging. There may be decreases in muscle fiber size, particularly in fast-twitch fibers, and there may be a reduction in the number of fibers as well (Stamford 1988).

Contrary to Stamford's findings, were results found in a study by Parizkova (1971). Parizkova (1971), compared a group of seven younger men, average age 20, with a group of 18 older men in their 70's. Muscle biopsies taken from the quadriceps revealed that the number of muscle fibers per square millimeter was significantly higher in the older men. Muscle fiber number was high but muscle fiber size was significantly smaller due to atrophy of muscle tissue. Bemben (1991), tested 150 men aged 20-74 on the isometric contraction force time of five muscle groups. Maximal force production for each muscle group tested declined as age increased.

Suprisingly, Bemben (1991), did not observe any large differences in lean body mass until age 70. Bemben (1991), concluded that while muscle mass appeared to remain constant with increasing age while simultaneously declining in function, the decline may be related to neural aspects of muscle function. Future investigations may be needed regarding the influence of weight training on neural-muscular activation with aging.

In a study by Kavanagh et al.(1988), where questionnaires were answered by 1,688 athletes of various sports, weight training was not as popular with the Masters athletes as was endurance training. Weight training was done by 30% of the men and 31% of the women while endurance type training was incorporated into the workouts by 72% of the men and 81% of the women. It may be possible that the elderly are not performing weight training exercises as much as they should be in order to maintain current

muscle mass. Weight training is a relatively recent phenomenon and perhaps we have neglected to give the opportunity to the elderly population in learning how to properly use weight training as a practical component of their training regimen.

It is apparent from sport science research that sedentary patterns in the life of the aging individual can lead to undesirable changes in body composition. Body fat percentages increase while lean body mass, mainly muscle mass and bone density, decrease. Active lifestyles by aging individuals seem to have some influence in slowing down some of these undesirable changes in body composition.

#### Changes in aerobic capacity with aging

Many researchers have tried to answer the question of how much exercise is needed in order to produce positive physiological results. Sport scientists report that in healthy, non-competing men, Vo<sub>2</sub> max declines approximately 9% per decade after the age of 25 years.

Pollock, et al.(1987), discovered that aerobic capacity remained unchanged with eleven middle-aged men over a ten year period who had maintained their training regimens and competitive habits in track & field. During the initial testing, the average Vo<sub>2</sub> max of the eleven men measured 54.3 ml/kg/min. At the follow-up study ten years later, the average had declined to 53.3 ml/kg/min, a minimal decline. With a predicted decline of 9% in Vo<sub>2</sub> max per

decade, the expected result would have been approximately 49.4 ml/kg/min.

In a cross sectional study by Kavanagh and Shephard (1990), 756 Masters athletes of various sports were tested for Vo<sub>2</sub> max levels.

Kavanagh & Shephard (1990), compared the 30-39 age group with the 60-69 age group. The majority of the Masters athletes were runners, swimmers and cyclists. Kavanagh and Shephard (1990), found an average decline in Vo<sub>2</sub> max of 13.0 ml/kg/min over the 30 year period. The 30 and 60 year age groups averaged 49.1 and 36.1 ml/kg/min, respectively. This drop of 13.0 ml/kg/min would amount to a decline of 4.3 ml/kg/min per decade, or 8.8%, a figure close to the expected 9% decline rate. This finding is in contradiction with researchers who found that Vo<sub>2</sub> max declined at a lesser rate with Masters athletes. Kavanagh & Shephard (1990), did not differentiate runners with other athletes in each of the two age groups. Despite the decline in Vo<sub>2</sub> max, Kavanagh and Shephard (1990), from their data, reported that max Vo<sub>2</sub> uptake levels of the athletes were above the norm in comparison to non-athletes of the same age. The athletes resembled the values of sedentary 25 year olds. Pollock et al. (1974), also found a significant drop in maximum aerobic capacity with the 70 year age group in a cross sectional study of elite Masters track athletes. From the 40-49 age group to the 50-59 age group, an average decline of 3.1 ml/kg/min was calculated. From the 50-59 age group to the 60-69 age group an average decline of 3.0 ml/kg/min was calculated. But

from the 60-69 age group to the 70-75 age group, a decline of 11.4 ml/kg/min was calculated, a significant decline.

In a study by Meredith et al. (1987), Six young physically active men (average age 26.8), were compared with six older active men (average age 52.0). The older men had more body fat (13.6% - vs- 7.8%), but Meredith concluded that this was probably due to the younger men spending more time exercising per week. The younger men averaged 12.3 hours/week of exercise, as compared to an average of 7.5 hours/week with the older men. The average maximum aerobic capacity between the six middle aged men in Meredith's study was measured at 55.3 ml/kg/min. This was a higher figure than that which would be the predicted rate of Vo<sub>2</sub> max for this age group. Meredith ultimately concluded that : 1) the amount of time spent exercising every week was significantly related to aerobic capacity, body fat and energy intake; and 2) the declining physical capacity and increasing body fat often described with the 50 and over age range is likely due to decreased amounts of physical activity, with age being of secondary importance.

Pollock et al. (1987), determined from his longitudinal study that maintaining training and competitiveness in track & field avoided the expected decline in aerobic capacity with aging. Kavanagh & Shepherd (1990), however, established a different conclusion from their cross sectional study which showed a decline in aerobic capacity close to the expected decline rate with aging

in the general population. Since Kavanagh & Shepherd did not segregate athletes by sport and event, it is not possible to find out if there were similar declines in aerobic capacity with track athletes resembling the entire Masters athlete population. The information supplied by sport scientist indicates that a decrease in physical activity, weight gain, and deteriorating changes in the cardiovascular system all are factors that result in a decline in Vo2 max with aging. Nevertheless, it seems apparent from the majority of studies done on Masters track & field athletes that continual training in the sport assists in curtailing the expected decline in aerobic capacity with aging.

#### Data on Masters Athletes

In a study of 1,688 Masters athletes at the World Masters Games in Toronto, 1985, Kavanagh et al. (1988), found that most of the Masters athletes began to exercise regularly in middle age and were attracted to Masters competition mainly for recreational and social reasons. Less than half of the subjects (42.1% of the men, 36.6% of the women), had participated in their chosen sport regularly since leaving school. The remainder had started training seriously for Masters competitions at an average age of 39 years for the men and 38 years for the women. The types of training incorporated into the workouts of the Masters athletes varied. Endurance type training was popular and was incorporated into the workouts by 71.6% of the men and 80.5% of the women.



Stretching exercises were performed by 70.1% of the men but by only 18.9% of the women. Weight training was performed by 30.2% of the men and 31.0% of the women. Calisthenics was performed by 37.2% of the men and 71.7% of the women. Circuit training was only performed by men (37.2%). The women did not use circuit training as a training technique (Kavanagh 1988).

The main medical problem for the group of Masters athletes was athletic injury. Thirty seven percent of the men and 29.7% of the women had sustained an injury over the course of their involvement in Masters competition. Leg injuries occurred with 45.3% of the men and with 38.2% of women athletes. The arms were the next major area of injury with 25.7% of the men and 31.6% of women suffering injuries. The weekly training period for the men was an average of 7.5 hours and 6.8 hours for the women. Meredith (1987), also found the average weekly training time with the six middle-aged men in his study to be 7.5 hours. Kavanagh (1988), found the athletes to be very health conscious. The majority of the athletes were concerned about the nature of the food they ate and attempted to follow a low-fat/low cholesterol diet. A small number of the competitors (9.8% of the women, 5.2% of the men) followed a vegetarian diet. A high percentage (30.9% of the men and 40.4% of the women) were taking multivitamin supplements. Only 3.2% of the men, and 5.1% of the women were currently smoking cigarettes. A total of 42.5% of the men and 38.0% were ex-smokers. The majority of the competitors (85.8% of the men and

82.6% of the women), consumed alcohol. The majority (83.7% of the men and 60% of the women) were currently married. The average age of the male athletes was 49.1 years. The average age of the female athletes was 44.9 years.

Relatively little information exist regarding demographics and profiles of the Masters track & field athlete. Since competitions are becoming more popular for Masters aged athletes to attend, it seems important for more research to be done in this area to better understand the Masters athlete. Longitudinal studies with the same athletes will give us some of the answers to questions in regards to the relationship of the aging curve and exercise.

### CHAPTER 3

#### METHOD AND MATERIALS

SELECTION OF SUBJECTS

Data on Masters track & field athletes was gathered during the summer track season of 1991 at six Masters track & field meets or meets where Masters level runners competed. The track meets were:

- 1) TAC National Masters Decathlon/Heptathlon championships in Lincoln, Nebraska June 22-23,
- 2) The Northwest Summer Sports Festival in Seattle Washington, July 5-8,
- 3) The Big Sky State Games in Billings Montana, July 20-21.
- 4) The Northwest Senior Sports Festival in Billings Montana, July 27-28.
- 5) The Montana Masters track & field meet in Bozeman Montana, August 9-10.
- 6) The Rocky Mountain Masters Classic in Boulder Colorado, August 31-September 1.

Subjects

Athletes

Each prospective athlete was verbally informed of the nature of compliance: a skinfold measurement and completion of a 28 part questionnaire (see appendix A), prior to volunteering. Data was collected within 24 hours of competition.

Non-athletes

Similar information was gathered from non-Masters competitors (see appendix B), following informed consent. The only difference between the two questionnaires were sport specific questions related to competition. Non-athlete volunteers ("exercisers") were persons who exercise at least once per week but did not compete in track & field. "Non-exercisers" were those who did not maintain regular exercise habits. Exercisers and non-exercisers were identified at the same six track & field meets listed above and also at the following two locations:

- The Breaux Bridge, Louisiana Senior citizens recreation center, September, 1991.
- Montana State University Wellness program health screen, October, 1991.

### **Body Composition**

In addition to filling out the questionnaire, all subjects were measured for skinfold thickness with a Lafayette caliper, (Lafayette, Illinois), at three skinfold sites using the landmarks described by Jackson and Pollock (1985). Males were measured at the chest, abdomen and thigh and females were measured at the tricep, suprailium and thigh. Sites were measured to the nearest one half millimeter. Methods of measurement conformed to the procedures of Jackson and Pollock (1985). Conversion to an estimated percentage was from the used tables by Jackson and Pollock (1985), based on a generalized body density equations for men and women, (Jackson and Pollock 1978, 1980, 1985; Sinning 1984).

### **Analysis of Data**

The data was analyzed for means  $\pm$  standard deviation (SD) for the competitor, exercise and non-exercise groups. A descriptive profile of the Masters track & field athlete was developed from the data. Finally, a descriptive analysis of comparisons between the Masters track & field athlete and respective control groups was completed.

## Chapter 4

### RESULTS

#### Demographic Variables

Survey information from 74 male and 20 female Masters track & field athletes was obtained through questionnaires and skinfold measurements at six separate Masters track & field meets, or meets where Masters track & field athletes competed. Corresponding information was obtained from 36 male non-competitors and 30 female non-competitors at the same competition sites in addition to other locations.

The average age of the male Masters track & field athletes was  $48.4 \pm 14.7$  years ( $n=74$ ) and ranged from 30 to 95 years. The average age of the female Masters track & field athletes was  $52.6 \pm 15.8$  years ( $n=20$ ) and ranged from 31 to 76 years.

Ninety one (96.8%), of the competitors were from the United States and represented 23 different states. Those from outside the United States ( $n=3$ , 3.2%) were from Vancouver B.C., Canada. Forty (54.1%), of the male competitors participated in track meets within their home state, while 34 (45.9%), of the male competitors traveled out of state to compete. The women showed a higher tendency to stay in state for competitions as 15 (75%), competed

within their home state and 5 (25%), traveled out of their home state to compete. The majority of the men were currently married (74.3%), while 50% of the females were currently married.

The average income of the male athletes was reported to be \$44,910  $\pm$  \$28,440 (n=64). The female athletes reported an average income of \$29,500  $\pm$  \$14,160 (n=14).

Among male athletes, three occupations were dominant: seventeen (23.0%), of the men were teachers and/or coaches; nine (12.2%), were engineers and eight (10.8%), were in health related fields. These three occupations accounted for 46.0% of the men. Six (8.1%) of the remaining men were retired. The women showed no distinct occupational tendency. There were two each in the science, health and teaching professions. Two were housewives and four were retired.

#### **Anthropometric Variables**

The average height of the 74 male athletes was 178.96  $\pm$  7.1cm (5'10½") with an average weight of 75.87  $\pm$  12.38kg (167.3lb). The average skinfold measurement of the 74 males for each of the three skinfold sites was: 8.04  $\pm$  4.94mm for the chest, 17.88  $\pm$  9.51mm for the abdominal, and 12.58  $\pm$  5.68mm for the thigh. The average sum of the three skinfold sites was 38.5mm. The average percent body fat for the 74 males was 13.44  $\pm$  5.37%. Using the average sum of 38.5mm for the three skinfold sites and the average percent body fat of 13.44% for the 74 males, the two figures matched with

the 43-44 year age group of males on the Jackson & Pollock (1978) tables for estimated percent body fat. Noticeable differences between athletes were discernible when classified by event (Table 1).

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**Table 1.** Average anthropometric variables of  
74 male Masters competitors by event.

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event	n	age	wt (kg)	ht (cm)	chest (mm)	abdominal (mm)	thigh (mm)	body fat (%)
middle/long distance	23	44.4	70.2	177.8	6.1	14.1	10.3	10.5
sprinter/jumper	22	49.1	72.7	177.9	7.0	16.5	12.8	13.1
pentathlon/decathlon	18	49.0	77.5	180.3	9.6	18.4	11.7	13.9
throwers	11	50.5	90.4	181.5	11.4	27.0	18.3	18.8

The average height of the 20 female athletes was  $163.56 \pm 6.85$ cm ( $5'4\frac{1}{2}"$ ) with an average weight of  $57.56 \pm 8.75$ kg (126.9lbs). The average skinfold measurement of the 20 females for each of the three sites was:  $15.5 \pm 5.6$ mm for the tricep,  $12.6 \pm 5.7$ mm for the suprailium and  $24.0 \pm 8.1$ mm for the thigh. The average sum of the three skinfold sites was 52.1mm. The average percent body fat for the 20 females was  $22.1 \pm 6.4\%$ . Using the average sum of 52.1mm for the three skinfold sites and the average percent body fat of 22.1% for the 20 females, the two figures matched with the 48 to 52 year age group of females on the Jackson, Pollock & Ward (1980) tables for estimated percent body fat. When athletes were classified by their predominant event, middle/long distance runners were lowest in body fat percentage. Two of the four groups: race walkers and throwers, had similar skinfold measurements and body fat percentage (Table 2).

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**Table 2.** Average anthropometric variables of  
20 female Masters competitors by event.

event	n	age	wt (kg)	ht (cm)	tricep (mm)	supra (mm)	thigh (mm)	body fat (%)
middle/long distance	7	54.0	50.6	160.7	13.6	10.7	18.3	18.5
sprinter/jumper	6	42.0	58.8	164.7	14.0	12.8	25.5	22.2
thrower	3	56.0	69.0	168.5	18.7	15.0	26.0	25.2
race walker	4	63.5	59.3	163.2	18.8	13.8	30.3	26.1

### Health and Dietary Habits

Resting heart rate and blood pressure values were reported by a majority of athletes . The average heart rate for men was  $54.5 \pm 8.3$  beats per minute (n=53, 71.6%). This compared to  $59.4 \pm 8.4$  bpm for women (n=9, 45%). Systolic blood pressure averaged  $120.2 \pm 11.3$ mm Hg and diastolic blood pressure averaged  $74.7 \pm 9.0$ mm Hg (n=36, 48.6%) for men. Systolic blood pressure averaged  $114.8 \pm 23.4$ mm Hg and diastolic blood pressure averaged  $70.3 \pm 11.0$ mm Hg (n=9, 45%) for women.

Only ten (13.5%) of the men and five (25%) of the women answered yes to the question "Do you have a special diet?" The majority (53.3%) of the fifteen stated that they were on low fat, low sugar and/or low calorie diets. A very small number of the athletes (4.1% of the men, 5.0% of the women) followed a consistent vegetarian diet, while a few others (15.1% of the men, 10.5% of the women) reported that they were sometimes vegetarian but not always. A high percentage of athletes reported taking various forms of vitamins but a far smaller percentage were taking mineral supplements (Table 3).

**Table 3.** Athletes reporting regular use of nutritional supplements.

Supplement	men	women
	(%) n=74	(%) n=20
multi-vitamins	33.8	30.0
multi-minerals	8.1	5.0
vitamin B	5.4	10.0
vitamin C	13.5	15.0
vitamin E	4.1	15.0
beta carotene	0.0	10.0
calcium	6.8	25.0
iron	1.4	10.0
protein products	5.4	5.0
ginseng	2.7	0.0
bee pollen	2.7	0.0
misc.	8.1	5.0

Only 7.4% (6.8% of the men, and 10.0% of the women) smoked cigarettes. Two of the five men and one of the two women who smoked were every day smokers. The majority of the athletes drank alcohol to various degrees (68.9% of the men, 85.0% of the women). The remaining athletes reported that they never drank alcohol.

#### **Track & Field Background**

The majority of the men (63.5%) competed in track & field while in high school and about one-third (37.8%) competed in both high school and college. Five (6.8%), of the male athletes were

considered elite athletes having presently or formerly held American or world records. Only 16 of the 74 men (21.6%), had never competed in high school or college; these 16 men had taken up track & field for the first time when they reached the Masters age level. The women participated in track & field in high school and college far less frequently than the men. Eight (40.0%) of the women ran track in high school and only one (5%) of the 20 women ran track in college.

Virtually none of the competitors said they were competing in track & field in order to win races or medals. Of the 70 male athletes who gave answers as to the reason for competing, the top three answers were socialization (57.1%), good health (47.1%), and enjoyment of competition (24.3%). Of the 15 women athletes who responded to the same question, the same top three reasons for competing were given. Seven of the women (46.7%) said they competed for socialization, 46.7% said they competed for good health, and 33.3% said they competed because they enjoy the competition.

When asked about personal goals from competition, the majority (70.6% of the men, 56.3% of the women), said that being healthy was their main goal. The next most popular personal goal from competition by the Masters athletes was being able to set personal records (23.5% of the men, 25.0% of the women). Only 7.4% of the men and 12.5% of the women reported that one of their goals was to win. Only three of the men reported that a goal was to loose

weight. None of the women reported losing weight as a personal goal.

Athletic quality was estimated from a personal best time in the mile run. Fifty four of the men had performed the mile run at sometime in their life. Forty-four of the men (81.5%) had run the mile in less than six minutes and twenty (37.0%) in less than five minutes. Only eight of the women had ever run a mile at sometime in their life and of these, four had run the mile in less than six minutes.

### **Training Habits**

The average number of days spent training each week by the male athletes was  $4.4 \pm 1.5$  days/week with 87.7% of the male athletes training three or more days each week. Seven (9.6%) male athletes reported that they train seven days per week. The average number of days spent training each week by the female athletes was  $4.7 \pm 1.7$  days/week. Three of the female athletes (15.8%) reported that they train seven days per week. The men spent an average time training of  $7.3 \pm 4.2$  hours per week with 86.5% of the males spending four or more hours each week with training. The women spent an average of  $6.4 \pm 5.1$  hours per week with 60.0% of the females spending four or more hours each week training. While the women athletes in the study trained slightly more days than the male athletes, the women spent fewer hours with their training. This may have been due to the 18 male multi-event athletes in the

study who averaged  $7.28 \pm 3.79$  hours/week with training. There were no female multi-event athletes in the study. Each athlete listed the training systems they used. Weight training, distance running and sprinting were the most widely used training systems (Table 4).

**Table 4.** Types of training systems used by Masters track & field athletes.

training system	men (n=74)		women (n=20)	
	number of athletes reporting	%	number of athletes reporting	%
weights	50	67.6	12	60.0
sprint	47	63.5	7	35.0
jog	35	47.3	11	55.0
distance running	33	44.6	7	35.0
hill work	29	39.2	7	35.0
cycle	27	36.5	6	30.0
throw	26	35.1	5	25.0
jump	24	32.4	3	15.0
Fartlick	20	27.0	3	15.0
swim	15	20.3	7	35.0
aerobics	3	4.1	3	15.0
walking	0	0.0	2	10.0

### Injuries

Fifty-eight (78.4%) of the men and six (30%) of the women reported sustaining injuries due to training in the last decade. The most common affliction for men was with hamstrings. Nineteen

of the men (25.7%) had hamstring injuries. No pattern of injury emerged from female athletes (Table 5).

**Table 5.** Location of injuries with Masters athletes due to training in last decade.

<u>Injury site</u>	number of male athletes reporting (n=74)		number of female athletes reporting (n=20)	
		%		%
hamstrings	19	25.7	1	5.0
foot (non-specific)	10	13.5	0	0.0
knee	9	12.2	3	15.0
calf	8	10.8	0	0.0
ankle	7	9.5	0	0.0
achilles	7	9.5	1	5.0
heel	7	9.5	0	0.0
back	6	8.1	0	0.0
quadriceps	4	5.4	0	0.0
ilio-tibial band	4	5.4	0	0.0
hip	4	5.4	2	10.0
shins	3	4.1	1	5.0
groin	3	4.1	0	0.0
elbow	3	4.1	0	0.0
shoulder	3	4.1	1	5.0
abdominal	2	2.7	0	0.0
pelvis	2	2.7	0	0.0

**Data Comparisons of Competitors with Non-competitors**

Of the 36 male non-competitors who volunteered to be in this study, 23 were regular exercisers. Ages ranged from 30 to 75 years for the male exercise group. The remaining 13 non-competitors were non-exercisers and ranged in age from 33 to 94. Of the 30 female non-competitors who volunteered to be in this study, 15 were regular exercisers. Ages ranged from 30 to 77 for the female exercise group. The remaining 15 non-competitors were non-exercisers and ranged in age from 39 to 97. Tables 6 and 7 present a summary of comparable data collected from age matched non-competitors and non-exercisers.

**Table 6** Comparisons between **male** competitors and non-competitors

	(n=74) competitors	(n=23) exercisers	(n=13) non-exercisers
age	48.4 yrs	44.2 yrs	62.5 yrs
height	178.96 cm	179.79 cm	176.48 cm
weight	75.87 kg	76.46 kg	80.39 kg
resting HR	54.5 bpm	63.9 bpm	77.4 bpm
resting BP	120.2/74.7	124.0/75.1	138.9/81.1
chest skinfold	8.04 mm	7.98 mm	12.35 mm
abdominal	17.88 mm	20.00 mm	25.23 mm
thigh	12.58 mm	13.72 mm	18.12 mm
skinfold sum	38.50 mm	41.70 mm	55.70 mm
percent body fat	13.44%	14.33%	19.24%
hrs/wk training	7.30	6.07	0.38
smoke cigarettes	6.8%	8.7%	38.3%
drink alcohol	67.5%	82.6%	69.2%
married *	74.3%	45.5%	50.0%

\* Widowed counted as unmarried.

**Table 7** Comparisons between **female** competitors and non-competitors

	(n=20) competitors	(n=15) exercisers	(n=15) non-exercisers
age	52.6 yrs	48.6 yrs	66.1 yrs
height	163.56 cm	165.10 cm	162.62 cm
weight	57.56 kg	68.52 kg	75.86 kg
resting HR	59.4 bpm	59.7 bpm	69.2 bpm
resting BP	114.8/70.3	120.8/78.2	133.5/76.0
tricep skinfold	15.50 mm	24.07 mm	26.60 mm
suprailium	12.60 mm	19.03 mm	21.60 mm
thigh	24.00 mm	36.53 mm	38.00 mm
skinfold sum	52.10 mm	76.63 mm	86.20 mm
percent body fat	22.13 %	30.28%	32.09%
hrs/wk training	6.43	4.04	0.30
smoke cigarettes	10.0%	20.0%	7.7%
drink alcohol	85.0%	73.3%	69.2%
married *	50.0%	53.3%	33.3%

\* Widowed counted as unmarried.

## Chapter 5

### Discussion

The purpose of this study was to construct a profile of the Masters track & field athlete. This profile can be used to compare the Masters track & field athlete with their non-competitive and non-exercising peers.

Caution must be used in the interpretation of data from this study due to the sample size and selected geographic sites for data collection. Comparison with the non-exercise group is further cautioned because the average age is approximately 15 years older for the non-exercisers than the other groups.



Demographic Variables

The sample of Masters athletes in this study represented a wide range of social status and athletic abilities. The athletes ranged from semi-recreational to elite Masters athletes. The mean income for the males athletes (\$44,910) represented a figure far above the national mean income for males (\$24,054) (U.S. dept. of Commerce, 1991). It is possible that economic status may play an important role in the individual's ability to compete at the Masters levels. Those who compete must travel to one of the few sites hosting Masters meets. Traveling, especially out of state, is expensive and some individuals may find it economically difficult to travel to Masters meets. Economic selection is supported by income data which showed that the male Masters athletes who traveled out of state (n=31) averaged an income level of  $\$52,226 \pm \$33,121$ , while the male Masters athletes who remained in state (n=33) to compete had an average income level of  $\$38,030 \pm \$21,544$ . The mean income for the women athletes (\$29,500) also represented a figure above the mean national income level for women (\$12,311) (U.S. dept. of Commerce, 1991). The women who traveled out of state showed the same economic advantage over their instate female rivals. The female athletes who remained in state to compete had an average income level of  $\$26,800 \pm \$13,962$  (n=10), while the female athletes who competed out of state averaged  $\$36,250 \pm \$16,297$  (n=4).

Since the majority of Masters track & field meets take place in the summer, the track & field schedule would seem to accommodate those who can take a long summer vacation from employment. School teachers and coaches fit into this category which may explain the large number of male athletes from these occupations.

#### Exercise and Health

Many sports such as cycling, swimming, tennis, skiing, golf, bowling and racquetball offer the opportunity for adult competition. Participation and competition in team or individual sports may provide the motivation for the post collegiate population to maintain health and fitness levels by remaining active. It is likely that every sport will attract a segment of the population into a continuation of activity beyond the scholastic or collegiate level. The majority of the 94 athletes in this study, had competed in track & field in high school and/or college. Masters track & field athletes may have adopted healthier lifestyles because of the growing availability of competition. Exercise combined with proper nutrition has been shown to have a positive effect on health (Hammer et al. 1989; Kuta et al. 1970; Meredith et al. 1987; Powers & Howley, 1990; Skrobak & Anderson, 1975). Other health related factors may be related to participation.

#### Smoking

Cigarette smoking was a habit to some degree by seven of the 94

athletes. Three reported everyday use of smoking and four others smoked irregularly. Of the three everyday smokers, two were throwers and the other was a multi-event athlete. Only one of the seven smokers was under 42 years of age. Small minorities of smokers were reported in all groups with the exception of the non-exercising males who had a much higher percentage of smokers (38.3%) than any other group. The latest government statistics show that 40.7% of males age 26-34 years of age smoke and 32.2% of males age 35 and older smoke cigarettes (U.S. dept. of Commerce, 1991). Therefore, it may be concluded that exercise tended to discourage cigarette smoking.

#### **Heart Rate/Blood Pressure**

Both the competitive and exercising groups of both sexes had lower resting heart rates and blood pressures than their non-exercising peers. It is likely that the lack of exercise and age were both influencing factors. Exercise, in particular endurance exercise has shown to decrease resting heart rate and blood pressures (Howley & Franks 1986; McGlynn 1987; Montoye, Christian, Nagle & Levin 1988).

#### **Exercise Hours/Reasons for Exercise**

With both the Masters track & field athletes and exercise groups, multiple hours of exercise per week was a very important component in the lifestyles of both groups. The American College

of Sports Medicine (ACSM) recommends 3-5 days of exercise per week with a duration of 20-60 minutes each day for healthy adults (American College of Sports Medicine, 1990). The athletes and exercisers in this study exceeded the ACSM guidelines. Both athletes and exercisers were exercising for the indirect benefits of socialization, health and enjoyment. The exercise groups primary reason for exercising was for health benefits (male exercisers 82.6%, female exercisers 53.3%). Health benefits appear to be met when compared with the non-exercising groups (Table 6, Table 7).

### **Body Composition**

Anthropometric comparative data from this study as well as from other studies, suggests that track & field competition is advantageous in slowing down increases in body fat associated with aging (Heath et al. 1981; Meredith et al. 1987; Pollock et al. 1974, 1987, 1991; Skrobak & Anderson, 1975). The three groups of males in this study did not show large differences in mean height or weight but estimated percent body fat was higher in the group that did not exercise (Table 6). Figure 1 further analyzes percent body fat differences between the male groups.

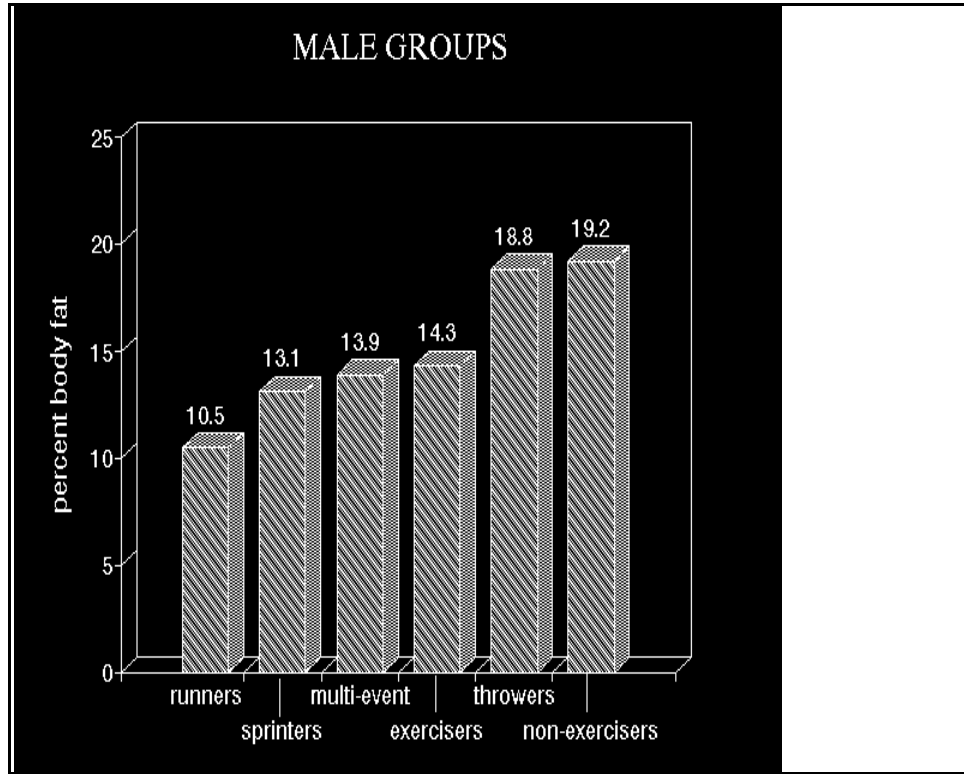


Figure 1

Percent body fat was lowest with middle and long distance runners and highest with throwers among the Masters track & field groups. The throwers were equivalent in body fat proportions with the non-exercisers. This is probably a reflection of the training of the 11 throwers; only three used running as a training technique. The three groups of females did not show any differences in mean height. However, the females did demonstrate a difference in body weight. Estimated percent body fat increased substantially from the competitive group to the exercising group and even more so with the non-exercising group (Table 7). Figure 2 further analyzes percent body fat differences between the female groups.

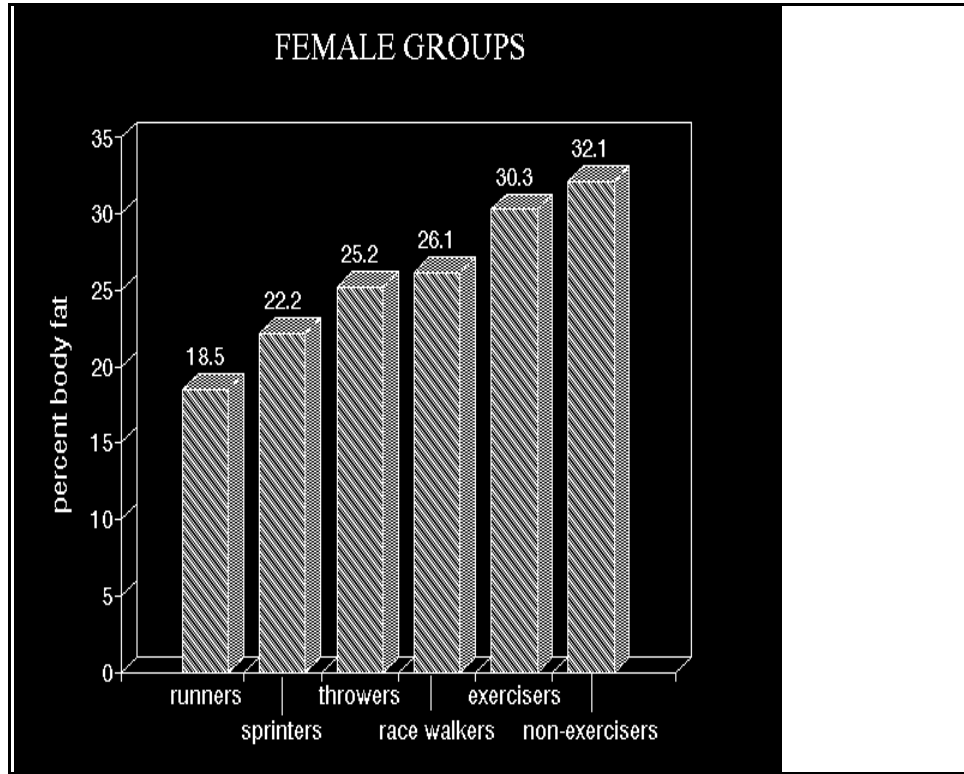


Figure 2

As an average, the male exercise group and three of the four competitive male groups were within the recommended ranges for body fat percentage among males (10-17%, Howley & Franks 1986; 18% or less, Morehouse & Miller 1976; 20% or less, Brooks & Fahey 1984). Although the male throwers and non-exercisers were within the guidelines from Brooks & Fahey (1984), (20%), these groups were borderline for excess body fat. Among the female athletes, only the runners and sprinters had an average estimated body fat percentage that was within the recommended range for fitness (Figure 2) (17-24%, Howley & Franks 1986; 16-25%, Brooks & Fahey 1984; 28% or less, Morehouse & Miller 1976). Although the throwers and racewalkers were within the guidelines from Brooks & Fahey (1984), (28%), these groups were borderline for excess fat. Both of the non-competitive groups were overfat.

The number of hours spent training or exercising per week has been found to correlate with percent body fat (Hammer et al. 1989; Meredith et al. 1987; Pavlou et al. 1985; Sidney et al. 1977; Skrobak et al. 1975;) and was confirmed in this study as demonstrated by the data in tables 6, 7 and figures 1 and 2.

### **Injuries**

There are risks involved in exercise. One of the negative aspects of exercise can be injury. Male track & field athletes



reported the highest injury rate and hamstrings as the most common injury site. The Masters athletes in this study reported that weight training and sprint running were the most commonly used training methods (Table 4). Weight training was the most widely used training technique used by the athletes, and was performed by athletes from the youngest to the oldest. In this study, 67.6% of the men and 60% of the women used weight training. This is a much higher figure than that found by Kavanagh et al. (1988), who found only 30.2% of the men and 31.0% of the women using weight training among 1,220 Masters athletes of various sports. It may be true that track & field athletes value weight training as more productive to their sport than do athletes involved in swimming, cycling and other sports where Masters athletes compete. The risks of hamstring injury is higher when an imbalance between the quadriceps and hamstrings exist. The hamstring muscles should be 60% to 70% of the quadricep muscle's strength (DePalma, 1990). Subjecting the hamstrings to rapid eccentric movements during sprinting by a much stronger quadricep can cause injury to the hamstring muscle. Hamstring strains or pulls have a reputation for recurrence and becoming chronic. Considerable atrophy and weakness of the hamstring muscle groups occurs following a hamstring injury. Athletes have been made aware of the importance of hamstring stretching and flexibility after an injury. However, many athletes concentrate their efforts on stretching and not on strengthening. The solution for the chronic hamstring pull is a

comprehensive rehabilitation program utilizing both stretching and strengthening techniques (Garrick & Webb, 1990).

#### Summary

In summary, Masters track & field athletes surveyed for this study range widely in athletic background and ability. Average income exceeds the national average and more so for those that travel out-of-state for competition. These athletes also appear to be healthier and more fit. Few smoke, both blood pressure and resting heart rate are indicative of a much younger age and all but the male throwers have low body fat percentages in comparison to health recommendations. Undoubtedly health related benefits are related to the exercise habits of these athletes. A relatively high rate of injury with hamstring muscles was the only negative factor uncovered. Finally, the Masters track & field athletes appear to be better off when compared to those who regularly exercise and more so in comparison to the non-exercising controls.

## Chapter 6

### Summary, Conclusions and Recommendations

#### Summary

Physiological parameters have been shown to deteriorate with age due to inactivity. Exercise and sport competition has been shown to slow down the aging process. The purpose of this study was to construct a profile of 94 Masters track & field athletes

and compare the Masters track & field athlete with their non-competitive and non-exercising peers. Ninety-four Masters track & field athletes, 74 males and 20 females, volunteered to be surveyed and have their body composition estimated at six track & field meets during the 1991 summer track season. Sixty-six non-competitors, 30 females and 36 males, also volunteered to have similar information collected and were divided into exercise and non-exercise groups. Data collected consisted of demographic, anthropometric, health and dietary habits, track & field background, training/exercise habits and injuries.

Average income exceeded the national average and more so for those that travel out-of-state for competition. These athletes also appear to be healthier and more fit. The majority of the male and female athletes exercised at a frequency and duration at or above the recommended guidelines of the American College of Sports Medicine. Few smoke, both blood pressure and resting heart rate are indicative of those who train and all but the throwers and racewalkers have low body fat percentages in comparison to health recommendations. Undoubtedly health related benefits are related to the exercise habits of these athletes. A relatively high rate of injury with hamstring muscles was the only negative factor uncovered. Finally, the Masters track & field athlete appears to be better off when compared to those who regularly exercise and more so in comparison to the non-exercising controls.

### Conclusions

- 1 - The principal reasons for participation in Masters track & field were for socialization, health and enjoyment of competition.
- 2 - Masters track & field athletes displayed a mean annual income level far above the national mean income levels and may play an important role in competition participation.
- 3 - Male athlete hamstring injuries were high and may represent errors in training and rehabilitation techniques.
- 4 - Female exercisers, racewalkers and both male and female throwers appear to be exercising at a rate below recommended levels needed to maintain optimal fitness levels.
- 5 - The Masters athletes who competed in running events were much leaner than their non-exercising peers.

### Recommendations

- 1 - Further long term prospective studies of Masters track & field athletes need to be completed to better determine the retarding effects on aging.
- 2 - A survey of track & field athletes during their scholastic

and collegiate careers should be completed to determine the interest in post-graduate competition.

3 - Make more track & field competitions available for the non-elite - post collegiate/pre-Masters level athlete as an incentive for continuous competition.

4 - Insurance companies should provide more definitive criteria for health behaviors to provide the incentive for lower rates for those who qualify.

5 - More written articles in Masters track & field literature along with regular athletic training clinics at track meets regarding proper muscle rehabilitation and improvements in muscle strength, endurance and flexibility.

**APPENDICES**

APPENDIX A



APPENDIX B

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Vita

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