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# Demographics Variables and Athletes' Performance in Track Events in Calabar Metropolis, Cross River State

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## Abstract

This research studied the performance of athletes in 100m, 200m, 400m, and 4 x 400m relay races in secondary schools based on two demographic variables (age and experience). The bivariate and interactive effects of these variables were assessed based on three null hypotheses formulated to guide the study. The research is quantitative and followed the ex-post facto design. The population comprised 1,180 junior and senior secondary schools students in 24 public secondary schools in Calabar Metropolis. A total of 863 students were selected based on their previous experiences in track events. Data were collected using a questionnaire tagged "Performance in Track Events Questionnaire (PTEQ). Collected data were analyzed using descriptive statistics; while inferential statistics such as one- and two-way ANOVA were used to test the null hypotheses at the .05 level of significance. No significant influence of age on athletes' performance in all the track events was found. Athletes experience significantly influenced their performance in all the track events. There is a significant interaction of age and experience on athletes' performance in all track events in secondary schools. It was concluded that some demographic variables affect student-athletes performance in track events, while others do not. Based on this conclusion, relevant practical and research implications were discussed for sustained or improved performance in track events.

**Keywords:** Age; Athletes; Demographic variables; Experience; Performance; Track events.

## 1. Introduction

Sports in school plays an important role in building the psychomotor, psychosocial, health and physical attributes of the learners. Beyond these, physical education tends to improve students' teamwork, accountability, responsibility, self-confidence, hard work, resilience and self-discipline. Physical exercise is important in this setting since it influences general well-being, daily living skills, and life expectancy (Holme and Anderssen, 2015; Warburton *et al.*, 2006). At least three million premature deaths might have been prevented by early intervention and health promotion, according to research estimates (Kohl *et al.*, 2012; Lee *et al.*, 2012; World Health Organization, 2009). Cardiovascular illnesses are among the leading causes of mortality in the European Union (Holme and Anderssen, 2015; Lee *et al.*, 2012). This is due in part to the fact that inadequate physical activity is a risk factor for these diseases (Lübs *et al.*, 2018). In Africa, specifically in Nigeria, estimates of death cases due to a lack of or inadequate physical exercise seems to be unavailable.

However, the need for the physical training of students in sports and related areas is increasingly becoming pervasive, drawing the attention of several researchers globally (Bailey *et al.*, 2009; Fernandez-Rio *et al.*, 2020; Griban *et al.*, 2020; Hinojo *et al.*, 2020; Quennerstedt, 2019). This has led to the development of diverse strategies, theories and models to aid the effective teaching of the subject at all levels of education (Casey and MacPhail, 2018; Galimovich, 2020; Lei *et al.*, 2021; Sitovskyi *et al.*, 2019; Yarmak *et al.*, 2017). In the context of Nigeria and perhaps other parts of the world, the teaching of physical education mostly occurs in the classroom, with opportunities often created for practical teaching and demonstrations during inter-house sports competitions. Among the key events that usually occur during such competitions are track events.

Track events involve activities involving racing or joggling on a defined path. Traditionally, track events have been said to comprise five major activities including the; dash (sprint), steeplechase, hurdle, relay race and distance races. The dashes/sprints are short distances between 100 metres and 400 metres individual races requiring speed with limited time (Ducksters, 2021). This race is often termed an anaerobic race because it requires swiftness and less breathing (Louis, 2020). Track events require skills, energy, body stamina, and constant training (Huxley *et al.*, 2017). Track events have always been paired with field events (DeWolfe *et al.*, 2011; Huxley *et al.*, 2017; Melin *et al.*, 2019). Unlike the professional athletes who have all their time training, the secondary school athletes have some

divided interest with a focus on academic and track events (Muñoz-Bullón *et al.*, 2017) which in turn, may alter their performances.

Considering that the event requires some level of focus and commitment for training and body/physique fitness (Melin *et al.*, 2019; Thaqi *et al.*, 2021), some students believed that academics is the primary assignment of enrolling in schools, as such, pay less attention to track activities, unless during school annual inter-house sports (Bagaya and Sekabembe, 2012). On the other hand, Rees and Sebia (2010) reported that students who involved in sports activities tend to perform academically more than their counterparts that focused only on academics. The scholars added that every participation in sport leads to an increase in their academic performances. Many studies had focused on sport and academic performance (Granacher and Borde, 2017; Marques *et al.*, 2017; Muñoz-Bullón *et al.*, 2017; Singh *et al.*, 2019), while the present study is aimed at exploring the performances of secondary school athletes in track events. Track event was considered in this study owing to the perceived poor performance of students in such events as 100m, 200m, 400m and 4 x 400m relay races. Although many previous studies have identified and studied similar problems at the higher education level (Buhaș and Dragoș, 2017; Espinosa *et al.*, 2019; Muñoz-Bullón *et al.*, 2017), the issue at the secondary education level has been under-assessed.

In this study, sports performance refers to the degree to which athletes excel in track events. When it comes to sports performance, biomechanics, emotions, and training methods all work together in complicated ways. Performing in an athletic environment often implies striving for perfection, where athletes judge their performance by the increasing rate of advancement towards it. Athletes who are motivated by performance gravitate to competitive or elite levels, while those who are focused on wellness or weight management fall into the wide category of leisure athletes. Unfortunately, in most sporting events, secondary school students in Calabar Metropolis tend to be associated with poor take-off, sprinting and speed. It was also observed by the researcher during an inter-house sports event in Calabar Metropolis that some secondary school students fainted due to high rates of heart response and recovery.

Some student-athletes also give the impression that they lack the techniques, skills and tactics needed to excel in short and long distances races due to poor preparation, which ultimately seems to affect their rate of success in sports. One of the ways to evaluate an athlete's performance is to do exercise tests that measure the anaerobic capacity (Lim, 2020). Thus, during sporting events, players should be able to generate continuously high levels of both strength and power, which may be attained via specific activities such as team games, combat sports, or training regimes that include intermittent exercises (Sienkiewicz-Dianzenza *et al.*, 2005). Measuring the performance of secondary school pupils in sports activities is very essential. This is because it gives physical education instructors more authority to check and modify workloads, detects deficiencies, and perhaps avoid injuries (Bromilow *et al.*, 2020; Peart *et al.*, 2019). This will be especially helpful for the selection of players and will be valuable in increasing the safety of students' athletic experience. This study was undertaken to assess the influence of some demographic factors (age and experience) on athletes' performance in track events (100m, 200m, 400m and 4 x 400m relay races) in secondary schools in Calabar Metropolis of Cross River State, Nigeria.

## 1.1. Age and Athletes' Performance

Previous researchers have assessed peak age and performance in sports events such as marathons, short-, middle- and long-distance races, throwing and jumping (Allen and Hopkins, 2015; Haugen *et al.*, 2018; Hollings *et al.*, 2014; Walther *et al.*, 2021). For instance, Haugen *et al.* (2018) showed that athletes gained the most by their fifth year before peak age, ahead of those who specialize in long jumps, running the middle distance, hurdling, sprinting, and other distance events. Similarly, except for throws, the top 10 athletes improved more than the top 11-100 competitors in all events. Except for sprints, women outperformed men in all events. In contrast to previous findings, which concluded that men had faster performances at earlier ages than women, in a mixed linear model, Hollings *et al.* (2014) discovered disparities in the age at which men and women achieve peak performances. The experts concluded that the various participation, ethnic representation, professionalization, and specialization patterns are shown across sports-related events were because of the variations between events and are an evident consequence of generational differences. The cited studies on age-peak performance only showed the age at which performance in athletics reached the highest level. However, the focus was not on students neither was the focus on age differences in performance.

In bridging this gap, some scholars have assessed age-related decline in athletics performance (Alvero-Cruz *et al.* (2021); Dahl *et al.*, 2020; Young and Starkes, 2005). The research of Young and Starkes (2005) investigated the relationship between running speed and age and found that this phenomenon is more linear and steadier than data from other studies. Overall, the graph indicated that longitudinal performances of 10 km improved the rate of age-related decline to a larger extent than 1500 m events. The relative effect of age on athletes' performance has also attracted much attention in the literature. Studies tend to show age differences in athletics (Kearney *et al.*, 2018; Medic *et al.*, 2009), although not among secondary school students, as the focus of the present study. Track and field athletes, particularly in the lowest age group, will have relative age as an influential element in their athletic performances, according to findings published by Kearney *et al.* (2018). The findings of the study done by Medic *et al.* (2009) indicate that an involvement relative age effect in Masters sports is significantly stronger for males, and it becomes increasingly prevalent over time. In particular, the findings suggest that relative age effects in Masters sports for males are even stronger as people get older. Also, a performance-related relative age effect in Masters sports, such as swimming, seems to be greater for older athletes. However, the effects of relative age are not the same for male and female athletes, and they are stronger at older ages rather than younger ages.

On the other hand, the study of Tanaka and Seals (2008) showed that peak endurance performance can be maintained until about age 35, following which there is a more gradual fall that slows to a more precipitous drop in the 60s. Reductions in endurance performance with age seem to be related to a gradual decrease in maximum oxygen consumption. A different point of view: While exercising economy (e.g., the metabolic cost of prolonged submaximal exercise) does not alter with age in endurance-trained adults, training economy (i.e., work rate and work intensity trade-off) does decline. There is an age-related decrease in the images in athletes who are regularly training for long distances.

Within the context of age-group track running, Nikolaidis *et al.* (2017) studied the results of 100m, 200m, 400m, 800m, 1500m, 5000m, 10,000m, and marathon races, as well as the sex disparities, between 1975 and 2015. Within the age brackets of 35-39 and 95-99, athletes were rated in five-year age groups. In the study, it was discovered that younger runners were quicker than older runners, and age affected speed the most in 800 m (running distance) and the least in the marathon (running distance). a minor variance in the pace was seen in terms of the years per year. In a nutshell, athletes and coaches need to be aware of the different levels of competition across genders in short race lengths. As long as competitors are competing in the 100m and 200 m sprints, female athletes should be geared towards the 200 m, while male athletes should be geared towards the 400 m.

When it comes to both men and women, the research of Allen and Hopkins (2015) found the tendency for linear trends to estimate connections between event length and estimations of age of peak performance held. Throughout the different events, estimations dropped concerning the length of the event, ranging from 27 years (in athletics, throws) to 20 years (in running, sprints) (swimming). Extensive research conducted by Stones and Hartin (2017) shows how much time each runner took to finish. The results indicate that the historical decline in running and cycling times has been compensated by a dramatic rise in swimming times. While women's performance times were slower than men's, the gender gap was larger in older age groups. The researchers previously found that one age group in their study (for example, in the Half-Ironman triathlon) saw a decrease in performance for all triathlon events by age (i.e., 35 to 39 years). Although substantial longitudinal improvements for swimming, running, and overall times were found, the combination of cohort age and age change was nonsignificant for cycling. Cohort disparities and age variations in triathlon performance are enhanced by these interactions.

Similarly, another study by Stones (2019), analyses the world's Top 100 age group times for marathon runners, using Olympic and world championship competitors as reference points. It was found that men have an average age of 62.05 years, while women have an average age of 60.5 years. For males, the mean number of performances is 6.64 while for women, it is 6.4. An MLM model that incorporates both a linear and quadratic expression of age at the entrance into the database (also known as the "entry cohort") and age changes (also known as "elapsed age") as variables provides the greatest goodness of fit for logarithms of performance time. When using this approach, findings indicate that at older age cohorts, performance time may be expected to rise faster. An interaction between cohort age and elapsed age produces an increase in performance time (i.e., with greater increases in women than men). Finally, cohort age and elapsed age are directly proportional to the increases in performance time.

## 1.2. Experience and Athletes' Performance

The experience of an athlete reflects his or her years of activity in athletics including the number of games contested. There is a subject claim that "experience is the best teacher", making many people assume that a high rate of experience (usually measured in years of activity) is usually correlated with athletic excellence. The evidence from the study of Gabbett and Ryan (2009) provides support to these claims by revealing that there is a positive correlation between playing experience and level of play, and a greater amount of playing experience and game level was correlated with better tackling technique. An additional study by Ergun *et al.* (2008) revealed that there is a favourable connection between the number of years of basketball play and earning an eight-figure+ basketball career, a 20-meter sprint record, and passing for accuracy assessments.

In the study conducted by (Cui *et al.*, 2017), which is referred to as the Study of Cui et al., high-experienced players who performed at a higher relative level had better results when compared to other players when it came to returning (fewer double faults, more return points won), rally winners, and break opportunities. Highly experienced players that have achieved greater levels of quality play strike first serve and ace more often, and they are also more aggressive when returning (resulting in return wins and fewer unforced mistakes). In addition, they travel less distance throughout the match. In practice and competition, experts believe that how many and how diverse a practitioner's experiences are together with the quality of those experiences influence both in-depth and precise customized training and performance improvement.

A recent study by Rodriguez-Romo *et al.* (2021) showed that the more people performed various sports, the faster they were able to recover emotionally. Nevertheless, having participated in sports for a longer period was inversely related to emotional attention. Men who exercised harder and were more competitive had a higher ER. Whether you believe the connections were strong or weak, it is still essential to account for all of them. On the contrary, the research of Fulton *et al.* (2021) found no significant difference in the medalling achievement of experienced and inexperienced athletes. Similarly, the study of Jack *et al.* (2019) discovered that compared to postoperative players and controls, "National Football League", "Major League Baseball", and "National Basketball Association" athletes had almost identical games per season, career duration, and preoperative performances, but the postoperative athletes had somewhat greater overall performance levels.

### 1.3. The Present Study

All the cited studies on age are related to the present study, they were all focused on professional athletes. This is in contrast with the present study designed to assess the effect of age on performance differences among student-athletes in track events at the secondary education level. The present study will also focus on creating some interaction effect of age by other variables on performance in athletics in secondary schools. The review on experience and sports performance show that there is little concentration of previous studies. Based on the studies cited, it was discovered that there is an ongoing argument among studies regarding the effect of experience on performance in athletics generally. Concerning track events specifically, nothing seems to have been done from the context of Nigeria regarding the influence of age and experience.

The review of the literature revealed studies that have assessed the influence of several demographic, psychographic and psychosocial factors on the performance in specific sports such as discus, high and long jumps, field events and so on, with none on specific track events. The few studies focusing on track events tend to treat performance in track events generally without contextualising into various aspects of track events. None of the cited works looked at the secondary education athletes, instead of higher education students and professional athletes, especially the latter, who has been the dominant population in past studies. Bridging these gaps, the present study has been undertaken to assess the main and interactive effects of demographic factors (age and experience) on the performance of secondary school athletes in specific track events such as 100m, 200m, 400m and 4 x 400m relay races.

### 1.4. Hypotheses

1. There are no significant age differences in the track events performance among secondary school athletes.
2. Athletes with different years of experience do not vary in their performance in track events in secondary schools.
3. There is no significant interaction of age and experience on athletes' performance in track events in secondary schools.

## 2. Methods

### 2.1. Design and Participants

The quantitative research methodology was adopted for this study, with emphasis on the ex-post facto research design. The population of this comprised 1,180 junior and senior secondary schools' athletes distributed across 24 public secondary schools in Calabar Metropolis. Public secondary schools were considered in this study due to accessibility. The study's population is made of 774 and 406 participants from Calabar Municipality and Calabar South respectively. The sample of this study was chosen in two stages. In stage one, the researchers used a brief survey to determine students' engagement in athletics activities and to identify only those who had participated in competitive athletic events (specifically track events). The responses of the targeted population were used to screen those without experiences in track events. A total of 863 students (Calabar Municipality, N = 565; Calabar South, N = 298) were selected based on their previous experiences in competitive athletics, particularly in track events. Due to the manageable number in the streamlined population, a convenient sampling approach was adopted in enumerating all the 863 students with experience in athletics.

### 2.2. Ethical Consideration

Written informed consent was obtained from all the participants after explaining the research objectives, implications and how collected data will be aggregated and managed to promote anonymity. Respondents were made to understand that aggregated data will be used for academic and publication purposes. All the respondents participated voluntarily in the exercise after their consent was solicited.

### 2.3. Instrument and Measures

Data for this study were collected using a questionnaire tagged "Performance in Track Events Questionnaire (PTEQ). This instrument was designed by the researcher and structured into two sections. Section A was designed to collect personal information of the respondents such as age, gender, and experience. Age was measured in years; gender was measured using the status of being a male or female; experience was measured using the number of competitive track events games respondents have participated in in the past. Section B of the question was composed of four domains. The first, second, third and fourth domains were dedicated to assessing the number of times students have emerged victorious (first, second or third position) in 100m, 200m, 400m and 4 x 400m relay races. These four track events were considered and not others because they are the most commonly practised in the area. Victories in first, second and third positions, across the four selected track events, were considered as positions of athletic excellence. These are the positions that medals are often awarded. In this study, performance in track events is defined as the total number of times an athlete has emerged first, second or third in competitive games, divided by his or her experience (i.e., the total number of competitive games participated).

### 2.4. Data Collection and Analysis

Copies of the instrument were administered to the respondents in all the participating schools on different occasions. Before administering, the principals (school heads) of the respective schools were duly informed. With the support of seven research assistants, copies of the instruments were administered to the targeted respondents. These research assistants were subjected to a two-day briefing about the research, its objectives, methods and their job description. Due to factors beyond the control of the researchers, some students (n = 24) did not show up for the exercise. Thus, data were collected from 839 available students. Collected data were analysed using descriptive statistics such as frequency and percentages. Inferential statistics such as one- and two-way ANOVA were used to test the null hypotheses at the .05 level of significance.

## 3. Results

### 3.1. Demographic Characteristics of Participants

The demographic analysis revealed that the respondents were 57.4% males (N = 482) and 42.6% females (N = 357). In terms of age, 33.3% (N = 279) were between 10 and 14 years; 34.7% (N = 291) were between 15 and 19 years; 32.1% (N = 269) were 20 years or older. The experience of the respondents in track events such as 100m, 200m, 400m and 4 x 400m relay races is as presented in Table 1.

**Table-1.** Frequency distribution showing the number of athletes with different experience levels in Track events

| Track events | Experience Level | Frequency | Per cent |
|---|---|---|---|
| 100 Metres | Low (1-6 games) | 119 | 14.2 |
| | Average (7-12 games) | 251 | 29.9 |
| | High (13-18 games) | 251 | 29.9 |
| | Very high (19 games and above) | 218 | 26 |
| | Total | 839 | 100 |
| 200 Metres | Low (1-6 games) | 125 | 14.9 |
| | Average (7-12 games) | 248 | 29.6 |
| | High (13-18 games) | 240 | 28.6 |
| | Very high (19 games and above) | 226 | 26.9 |
| | Total | 839 | 100 |
| 400 Metres | Low (1-6 games) | 135 | 16.1 |
| | Average (7-12 games) | 232 | 27.7 |
| | High (13-18 games) | 263 | 31.3 |
| | Very high (19 games and above) | 209 | 24.9 |
| | Total | 839 | 100 |
| 4 x 400m relay | Low (1-6 games) | 123 | 14.7 |
| | Average (7-12 games) | 236 | 28.1 |
| | High (13-18 games) | 274 | 32.7 |
| | Very high (19 games and above) | 206 | 24.6 |
| | Total | 839 | 100 |

**Hypothesis 1**

There are no significant age differences in the track events performance among secondary school athletes. This hypothesis was tested using the one-way analysis of variance at the .05 level of significance. The descriptive output of the ANOVA revealed that athletes' performance was generally better in the 400 metres race ($\bar{x}$ = 72.61 ± 54.30). This is followed by performance in the 100 metres ($\bar{x}$ = 65.97 ± 50.11), 200 metres ($\bar{x}$ = 47.52 ± 33.28) and the 4 x 400 metres relay ($\bar{x}$ = 41.79 ± 32.99) races respectively.

In specific terms, performance in 100 metres race was highest among athletes who were between 10 and 14 years ($\bar{x}$ = 68.8 ± 54.20), followed by those between 15 and 19 years ($\bar{x}$ = 64.68 ± 47.28) and those 20 years or older ($\bar{x}$ = 64.43 ± 48.70). For 200 metres race, athletes between 15 and 19 years performed the highest ($\bar{x}$ = 47.74 ± 32.96), followed by those 20 years or older ($\bar{x}$ = 47.45 ± 32.64) then those between 10 and 14 years ($\bar{x}$ = 47.36 ± 34.32). In terms of 400 metres race, athletes' performance was highest in the 10-14 years age category ($\bar{x}$ = 76.74 ± 57.01), higher in the 15-19 years age category ($\bar{x}$ = 74.01 ± 54.98), and lowest in 20 years or above category ($\bar{x}$ = 66.81 ± 50.22). In terms of the 4 x 400 metres relay race, performance was highest in the 20 years or above category ($\bar{x}$ = 42.38 ± 33.91), higher in the 10 to 14 years category ($\bar{x}$ = 42.23 ± 42.23) and lowest in the 15 to 19 years age category ($\bar{x}$ = 40.83 ± 31.460).

The one-way ANOVA result presented in Table 2 revealed that there is no significant influence of age on athletes' performance in 100m, 200m, 400m and 4 x 400m relay races respectively. Based on this evidence, the null hypothesis formulated earlier is upheld. Tukey post hoc test of multiple comparisons was performed to compare the mean performance in track events across the various age groups. The result of the Tukey test did not find any significant difference in the pairwise comparison of the various age categories across all the track events studied.

**Table-2.** One-way ANOVA of the influence of age on athletes' performance in track events

| Track events | Source | SS | df | MS | F | p |
|---|---|---|---|---|---|---|
| 100 metres | Between Groups | 3386.21 | 2 | 1693.11 | 0.67 | 0.51 |
| | Within Groups | 2100702 | 836 | 2512.80 | | |
| | Total | 2104088 | 838 | | | |
| 200 metres | Between Groups | 22.15 | 2 | 11.08 | 0.01 | 0.99 |
| | Within Groups | 928099.4 | 836 | 1110.17 | | |
| | Total | 928121.6 | 838 | | | |
| 400 metres | Between Groups | 14374.7 | 2 | 7187.35 | 2.45 | 0.09 |
| | Within Groups | 2456091 | 836 | 2937.91 | | |
| | Total | 2470466 | 838 | | | |
| 4 x 400 metres relay | Between Groups | 418.48 | 2 | 209.24 | 0.19 | 0.83 |
| | Within Groups | 911885 | 836 | 1090.77 | | |
| | Total | 912303.4 | 838 | | | |

**Hypothesis 2**

Athletes with different years of experience do not vary in their performance in track events in secondary schools. This hypothesis was tested at the .05 alpha level using the one-way analysis of variance indicates for all the track events (100, 200, 400 and 4 x metres relay races) that athletes with a low experience performed the highest ($\bar{x}$ = 150.41 ± 61.93, $\bar{x}$ = 157.71 ± 64.79, $\bar{x}$ = 95.20 ± 42.76 and $\bar{x}$ = 95.86 ± 42.89), followed by those with an average experience ($\bar{x}$ = 77.67 ± 32.76, $\bar{x}$ = 80.85 ± 37.92, $\bar{x}$ = 57.33 ± 26.00 and $\bar{x}$ = 47.92 ± 22.37), high experience ($\bar{x}$ = 43.70 ± 19.09, $\bar{x}$ = 50.62 ± 22.63, $\bar{x}$ = 33.4301 ± 13.53 and $\bar{x}$ = 28.33 ± 12.53) and those with a very high experience ($\bar{x}$ = 32.07 ± 12.59, $\bar{x}$ = 36.17 ± 14.47, $\bar{x}$ = 25.3427 ± 10.27 and $\bar{x}$ = 20.39 ± 8.55). The one-way ANOVA results in Table 3 reveals that athletes experience significantly influence their performance 100, 200, 400 and 4 x 400 metres relay races respectively. Based on this result, the null hypothesis was discarded, implying that athletes with different years of experience vary significantly in their performance in track events in secondary schools.

**Table-3.** One-way ANOVA of the influence of experience on athletes' performance in track events

| Track events | Source | SS | df | MS | F | Sig. |
|---|---|---|---|---|---|---|
| 100 metres | Between Groups | 1257815 | 3 | 419271.59 | 413.69 | 0.00 |
| | Within Groups | 846273.3 | 835 | 1013.50 | | |
| | Total | 2104088 | 838 | | | |
| 200 metres | Between Groups | 466870.4 | 3 | 155623.48 | 281.72 | 0.00 |
| | Within Groups | 461251.1 | 835 | 552.40 | | |
| | Total | 928121.6 | 838 | | | |
| 400 metres | Between Groups | 1398050 | 3 | 466016.81 | 362.85 | 0.00 |
| | Within Groups | 1072415 | 835 | 1284.33 | | |
| | Total | 2470466 | 838 | | | |
| 4 x 400 metres | Between Groups | 512342 | 3 | 170780.68 | 356.54 | 0.00 |
| | Within Groups | 399961.4 | 835 | 479.00 | | |
| | Total | 912303.4 | 838 | | | |

**Hypothesis 3**

There is no significant interaction of age and experience on athletes' performance in track events in secondary schools. In testing this hypothesis, a two-way analysis of variance was performed to find out whether there are significant differences in the performance based on the intersection of their age and experience. The result presented in Table 4 indicates that there is a significant effect of age and experience on athletes' performance in 100 metres race. The interaction explained 60% of the total variance in athletes' performance in 100 metres race. For 200 metres race, a significant interactive effect of age and experience was reported, accounting for 51% of the total variation in athletes' performance in track events. In terms of 400 metres race, a significant effect of age and experience was reported, contributing 57% to the total variance in athletes' performance. The result in Table 4 also indicated a significant interactive effect of age and experience on athletes' performance in a 4 x 400 metres relay race. The interaction of age and experience is responsible for 58% of the total occurrences in athletes' performance in a 4 x 400 metres relay race. Based on these results, the null hypothesis was declined due to a lack of statistical support, while the alternate hypothesis is upheld. This implies that there is a significant interaction of age and experience on athletes' performance in track events in secondary schools. To reveal the underlying patterns and differences among the various age by experience groups, the charts in Figures 1, 2, 3, 4 will suffice.

**Table-4.** Two-way ANOVA test of the between-subject effect of age and experience on athletes' performance in track events

| Track events | Source | Type III SS | df | MS | F | p | Partial $\eta^2$ |
|---|---|---|---|---|---|---|---|
| 100 meters | Corrected Model | 1267237.885a | 11 | 115203.44 | 113.85 | 0.00 | 0.60 |
| | Intercept | 4359706 | 1 | 4359705.98 | 4308.39 | 0.00 | 0.84 |
| | Age * Experience | 1267238 | 11 | 115203.44 | 113.85 | 0.00 | 0.60 |
| | Error | 836850.2 | 827 | 1011.91 | | | |
| | Total | 5755873 | 839 | | | | |
| | Corrected Total | 2104088 | 838 | | | | |
| | a R Squared = .602 (Adjusted R Squared = .597) | | | | | | |
| 200 metres | Corrected Model | 469405.989a | 11 | 42673.27 | 76.93 | 0.00 | 0.51 |
| | Intercept | 2146081 | 1 | 2146081.08 | 3869.08 | 0.00 | 0.82 |
| | Age * Experience | 469406 | 11 | 42673.27 | 76.93 | 0.00 | 0.51 |
| | Error | 458715.6 | 827 | 554.67 | | | |
| | Total | 2822668 | 839 | | | | |
| | Corrected Total | 928121.6 | 838 | | | | |
| | a R Squared = .506 (Adjusted R Squared = .499) | | | | | | |
| 400 metres | Corrected Model | 1405731.991a | 11 | 127793.82 | 99.26 | 0.00 | 0.57 |
| | Intercept | 5150206 | 1 | 5150206.41 | 4000.27 | 0.00 | 0.83 |
| | Age * Experience | 1405732 | 11 | 127793.82 | 99.26 | 0.00 | 0.57 |
| | Error | 1064734 | 827 | 1287.47 | | | |
| | Total | 6893805 | 839 | | | | |
| | Corrected Total | 2470466 | 838 | | | | |
| | a R Squared = .569 (Adjusted R Squared = .563) | | | | | | |
| 4 x 400m relay | Corrected Model | 524932.421a | 11 | 47721.13 | 101.88 | 0.00 | 0.58 |
| | Intercept | 1778565 | 1 | 1778565.41 | 3797.07 | 0.00 | 0.82 |
| | Age * Experience | 524932.4 | 11 | 47721.13 | 101.88 | 0.00 | 0.58 |
| | Error | 387371 | 827 | 468.41 | | | |
| | Total | 2377796 | 839 | | | | |
| | Corrected Total | 912303.4 | 838 | | | | |
| | a R Squared = .575 (Adjusted R Squared = .570) | | | | | | |

**Fig-1.** Bar chart showing the differences between the performance of athletes in 100 metres race based on the interaction of age and experience

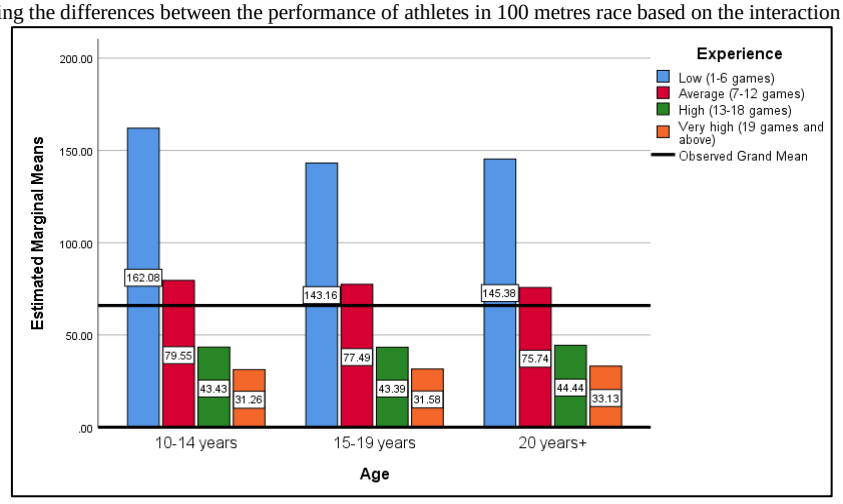



**Fig-2.** Bar chart showing the differences between the performance of athletes in 200 metres race based on the interaction of age and experience

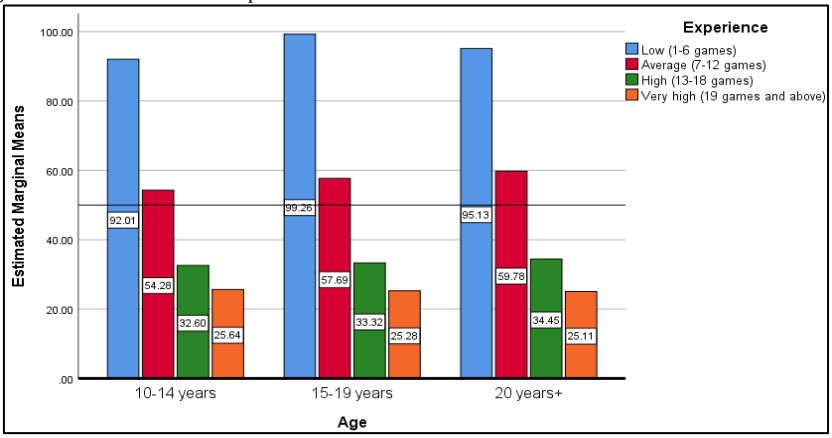


**Fig-3.** Bar chart showing the differences between the performance of athletes in 400 metres race based on the interaction of age and experience

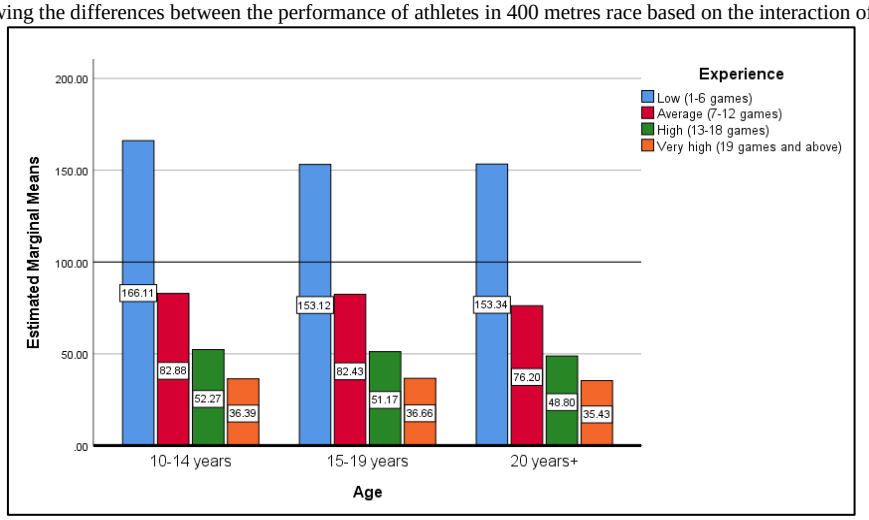
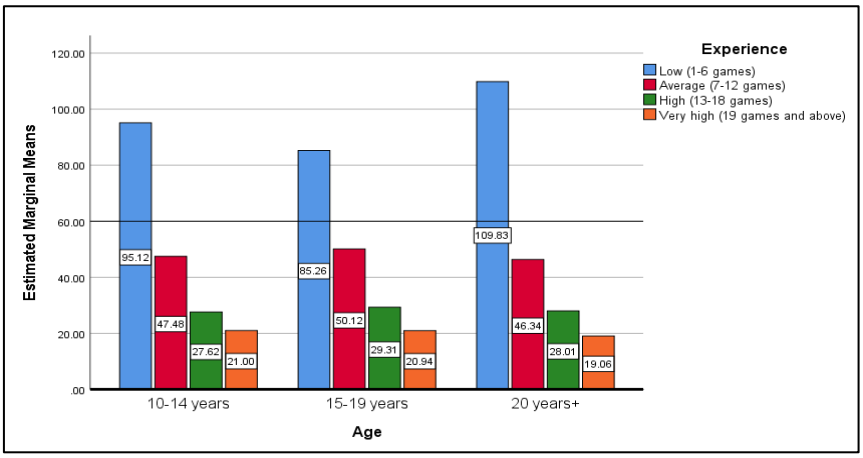



**Fig-4.** Bar chart showing the differences between the performance of athletes in 4 x 400 metres relay race based on the interaction of age and experience




As shown from Figures 1, 2, 3, 4, athletes' performance in 100, 200, 400 and 4 x 400 metres relay races across all the age groups is a descending function of their experience. This implies that the performance of athletes' decreases with their experiences across all the age groups studied. In figures 1 and 2 only athletes with low and average experience levels reached or surpassed the reference mean point; while in Figures 3 and 4, only athletes with a low level of experience surpassed the reference mean point.

# 4. Discussion

This study found that there is no significant influence of age on athletes' performance in track events. This finding is so because no significant difference in the pairwise comparison of the various age categories across all the track events studied was reported. This result is not surprising because no consistent pattern was observed in the performance of athletes of various age groups. The performance of athletes in certain track events seems to associated with different age groups, although there were no significant differences were observed. For instance, while the youngest age category (10-14 years) demonstrated the highest performance in 100 and 400 metres races, athletes between 15-19 years and those 20 or older performed best in the 200 metres and 4 x 400 metres relay races respectively. However, all the differences were not significant and may have been due to chance. This result may have been due to the age groups studied, which are all still within their youthful days with much energy. This finding confirmed the research of Young and Starkes (2005) which found that longitudinal performances of 10 km improved the rate of age-related decline to a larger extent than 1500m events. Within the context of age-group track running, Nikolaidis *et al.* (2017) discovered also that younger runners were quicker than older runners, and age affected speed the most in 800 m (running distance) and the least in the marathon (running distance).

The study also revealed that athletes experience significantly influence their performance in track events. This finding is attributed to the significant differences that exist among athletes with different levels of experience. The result of this study may be attributed to the eagerness of inexperienced athletes to challenge already known names to set their legacies. Furthermore, fatigue and injuries (which are often associated with experienced athletes) may also hinder the performance of seasoned athletes in track events, especially short distance races (e.g., 100, 200 and 400 metres races) that require more speed, power, technique and less of endurance. This finding corroborates the research of the contrary, the research of Fulton *et al.* (2021) which found no significant difference in the medalling achievement of experienced and inexperienced athletes. Similarly, the study of Jack et al. (2019) discovered that compared to postoperative players and controls, "National Football League", "Major League Baseball", and "National Basketball Association" athletes had almost identical games per season, career duration, and preoperative

performances, but the postoperative athletes had somewhat greater overall performance levels. This finding, however, disagrees with the findings of other studies that a significant correlation exists between experience and performance in sports generally or track events specifically (e.g., (Cui *et al.*, 2017; Ergun *et al.*, 2008; Gabbett and Ryan, 2009)). The variation in results may be due to the areas where these studies were carried, the methodology employed or other uncontrolled factors.

It was uncovered that there is a significant interaction of age and experience on athletes' performance in track events in secondary schools. This finding is attributed to the differences that exist in track events performance of athletes of various age groups based on their levels of experience. The finding suggests that athletes with low experience levels in the younger age category are better performers in track events, with the trend suggesting a decreasing function. This finding may be attributed to the excitement that less experienced athletes bring to competitions, seeking to establish a name for themselves. Experienced and older athletes may witness a decline in their track events performance due to fatigue, speed decrease due to age or injuries and sometimes arrogance. Experienced athletes, most often, are associated with a history of success which may create a feeling of pride among those without self-discipline. These may explain why younger and less experienced athletes perform better in 100, 200, 400, and 4 x 400 metres relay races respectively.

This study faces the limitation of a small scope in geography, which may affect the extent of generalisations. Furthermore, conclusions drawn in this study is limited to the track events covered in this study. Results may differ if other races such as 800m, 1500m or marathon are considered. It is therefore recommended that future studies focus on studying the demographic influence of age and experience on athletes' performance in long-distance races. Other variables such as gender, marital status and location (events' venue) should be explored concerning athletes' performance in track events. It is also recommended that future studies focus on expanding the scope of the current to wider geography by covering regional, national or inter-country scope.

## 5. Conclusion

This study was conducted to understand the pattern of demographic influence on athletes' performance in track events such as 100m, 200m, 400m, and 4 x 400m relay races in secondary schools. The study's finding led to the conclusion that some demographic variables affect student-athletes performance in track events, while others do not. In this study, age was discovered as one of those variables that do not (significantly) affect the performance of athletes in specific track events as 100m, 200m, 400m, and 4 x 400m relay races. On the contrary, athletes' experience level was revealed as one of those demographic attributes that influence performance in the above-listed track events. The conclusion of this study implies that highly experienced athletes should be offered the needed support to sustain or improve their performance. The study also has practical implications for both less experienced and seasoned athletes to understand their stands and seek better ways of improving themselves consistently.

## References


Allen, S. V. and Hopkins, W. G. (2015). Age of peak competitive performance of elite athletes: A systematic review. *Sports Medicine*, 45(10): 1431-41. Available: https://doi.org/10.1007/s40279-015-0354-3

Alvero-Cruz, J. R., Brikis, M., Chilibeck, P., Frings-Meuthen, P., Vico Guzmán, J. F., Mittag, U. and Rittweger, J. (2021). Age-related decline in vertical jumping performance in masters track and field athletes: Concomitant influence of body composition. *Frontiers in Physiology*, 12: 404. Available: https://doi.org/10.3389/fphys.2021.643649

Bagaya, J. and Sekabembe, B. (2012). Influence of involvement in sports on students' involvement in academic activities at Ndejje University. *Makerere Journal of Higher Education*, 3(2): 57-67. Available: https://doi.org/10.4314/majohe.v3i2.7

Bailey, R., Armour, K., Kirk, D., Jess, M., Pickup, I., Sandford, R. and Education, B. P. (2009). The educational benefits claimed for physical education and school sport: an academic review. *Research Papers in Education*, 24(1): 1-27. Available: https://doi.org/10.1080/02671520701809817

Bromilow, L., Stanton, R. and Humphries, B. (2020). A structured e-investigation into the prevalence and acceptance of smartphone applications by exercise professionals. *The Journal of Strength and Conditioning Research*, 34(5): 1330-39. Available: https://doi.org/10.1519/JSC.0000000000003301

Buhaș, S. and Dragoș, P. (2017). Aspects regarding the organizational structure, quality and performance of sport in higher education in Romania. Annals of the University of Oradea. *Physical Education and Sports Issue*, 27: 37-44. Available: https://bit.ly/3yuIVTu

Casey, A. and MacPhail, A. (2018). Adopting a model-based approach to teaching physical education. *Physical Education and Sport Pedagogy*, 23(3): 294-310. Available: https://doi.org/10.1080/17408989.2018.1429588

Cui, Y., Gómez, M. Á., Gonçalves, B., Liu, H. and Sampaio, J. (2017). Effects of experience and relative quality in tennis match performance during four Grand Slams. *International Journal of Performance Analysis in Sport*, 17(5): 783-801. Available: https://doi.org/10.1080/24748668.2017.1399325

Dahl, J., Degens, H., Hildebrand, F. and Ganse, B. (2020). Do changes in middle-distance running kinematics contribute to the age-related decline in performance? *Journal of Musculoskeletal and Neuronal Interactions*, 20(1): 94. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7104580/

DeWolfe, J., Waliczek, T. M. and Zajicek, J. M. (2011). The relationship between levels of greenery and landscaping at track and field sites, anxiety, and sports performance of collegiate track and field athletes. *HortTechnology*, 21(3): 329-35. Available: https://doi.org/10.21273/HORTTECH.21.3.329

Ducksters (2021). *Track and field running events.* Ducksters. https://www.ducksters.com/sports/trackandfieldrunning.php

Ergun, N., Düzgün, İ. and Aslan, T. E. M. İ. N. E. (2008). Effect of the number of years of experience on physical fitness, sports skills and quality of life in wheelchair basketball players. *Physiotherapy Rehabilitation*, 19(2): 55-63. Available: https://bit.ly/3ywzEdB

Espinosa, H. G., Shepherd, J. B., Thiel, D. V. and Worsey, M. T. (2019). Anytime, anywhere! Inertial sensors monitor sports performance. *IEEE Potentials*, 38(3): 11-16. Available: https://doi.org/10.1109/MPOT.2019.2896343

Fernandez-Rio, J., de las Heras, E., González, T., Trillo, V. and Palomares, J. (2020). Gamification and physical education. Viability and preliminary views from students and teachers. *Physical Education and Sport Pedagogy*, 25(5): 509-24. Available: https://doi.org/10.1080/17408989.2020.1743253

Fulton, T. J., Baranauskas, M. N. and Chapman, R. F. (2021). World championship and olympic games experience influences future medal performance in track-and-field athletes. *International Journal of Sports Physiology and Performance*, 1((aop)): 1-4. Available: https://doi.org/10.1123/ijspp.2021-0027

Gabbett, T. and Ryan, P. (2009). Tackling technique, injury risk, and playing performance in high-performance collision sport athletes. *International Journal of Sports Science and Coaching*, 4(4): 521-33. Available: https://doi.org/10.1260/174795409790291402

Galimovich, G. R. (2020). Theoretical basis of physical education of children of preschool age. *Academic Research in Educational Sciences*, 1(4): 871-76. Available: https://bit.ly/3hIHTg2

Granacher, U. and Borde, R. (2017). Effects of sport-specific training during the early stages of long-term athlete development on physical fitness, body composition, cognitive, and academic performances. *Frontiers in Physiology*, 8: 810. Available: https://doi.org/10.3389/fphys.2017.00810

Griban, G., Kobernyk, O., Shkola, O., Dikhtiarenko, Z. and Mychka, I. (2020). Formation of health and fitness competencies of students in the process of physical education. *Sport Mont*, 18(3): 73-78. Available: https://doi.org/10.26773/smj.201008

Haugen, T. A., Solberg, P. A., Foster, C., Morán-Navarro, R., Breitschädel, F. and Hopkins, W. G. (2018). Peak age and performance progression in world-class track-and-field athletes. *International Journal of Sports Physiology and Performance*: 1-24. Available: https://doi.org/10.1123/ijspp.2017-0682

Hinojo, L. F. J., Lopez, B. J., Fuentes, C. A., Trujillo, T. J. M. and Pozo, S. S. (2020). Academic effects of the use of flipped learning in physical education. *International Journal of Environmental Research and Public Health*, 17(1): 276. Available: https://doi.org/10.3390/ijerph17010276

Hollings, S. C., Hopkins, W. G. and Hume, P. A. (2014). Age at peak performance of successful track and field athletes. *International Journal of Sports Science and Coaching*, 9(4): 651-61. Available: https://doi.org/10.1260/1747-9541.9.4.651

Holme, I. and Anderssen, S. A. (2015). Increases in physical activity is as important as smoking cessation for reduction in total mortality in elderly men: 12 years of follow-up of the Oslo II study. *British Journal of Sports Medicine*, 49: 743-48. Available: https://doi.org/10.1136/bjsports-2014-094522

Huxley, D. J., O'Connor, D. and Larkin, P. (2017). The pathway to the top: Key factors and influences in the development of Australian Olympic and world championship track and field athletes. *International Journal of Sports Science and Coaching*, 0(0): 1-12. Available: https://doi.org/10.1177/1747954117694738

Jack, R. A., Sochacki, K. R., Hirase, T., Vickery, J. W. and Harris, J. D. (2019). Performance and return to sport after hip arthroscopy for femoroacetabular impingement in professional athletes differ between sports. *Arthroscopy: The Journal of Arthroscopic and Related Surgery*, 35(5): 1422-28. Available: https://doi.org/10.1016/j.arthro.2018.10.153

Kearney, P. E., Hayes, P. R. and Nevill, A. (2018). Faster, higher, stronger, older: relative age effects are most influential during the youngest age grade of track and field athletics in the United Kingdom. *Journal of Sports Sciences*, 36(20): 2282-88. Available: https://doi.org/10.1080/02640414.2018.1449093

Kohl, H. W., Craig, C. L., Lambert, E. V., Inoue, S., Alkandari, J. R., Leetongin, G., Kahlmeier, S. and Lancet Physical Activity Series Working, G. (2012). The pandemic of physical inactivity: global action for public health. *Lancet*, 380: 294-305. Available: https://doi.org/10.1016/S0140-6736(12)60898-8

Lee, I. M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., Katzmarzyk, P. T. and Lancet Physical Activity Series Working, G. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet*, 380: 219-29. Available: https://doi.org/10.1016/S0140-6736(12)61031-9

Lei, T., Cai, Z. and Hua, L. (2021). 5G-oriented IoT coverage enhancement and physical education resource management. *Microprocessors and Microsystems*, 80: 103346. Available: https://doi.org/10.1016/j.micpro.2020.103346

Lim, J. (2020). Measuring sports performance with mobile applications during the COVID-19 pandemic. *SPSR*, 103: v1. Available: https://bit.ly/2UwKstG

Louis, S. (2020). Let's talk about race. *Nursery World Select*, 2020(11): 16-17.

Lübs, L., Peplies, J., Drell, C. and Bammann, K. (2018). Cross-sectional and longitudinal factors influencing the physical activity of 65 to 75-year-olds: a pan European cohort study based on the survey of health, ageing

and retirement in Europe (SHARE). *BMC Geriatrics*, 18(1): 94. Available: https://doi.org/10.1186/s12877-018-0781-8

Marques, A., Corrales, F. R. G., Martins, J., Catunda, R. and Sarmento, H. (2017). Association between physical education, school-based physical activity, and academic performance: A systematic review. Challenges: New trends in physical education. *Sports and Recreation*, (31): 316-20. Available: https://doi.org/10.47197/retos.v0i31.53509

Medic, N., Starkes, J. L., Weir, P. L., Young, B. W. and Grove, R. J. (2009). Relative age effect in masters' sports: Replication and extension. *Research Quarterly for Exercise and Sport*, 80(3): 669-75. Available: https://doi.org/10.5641/027013609X13088500160127

Melin, A. K., Heikura, I. A., Tenforde, A. and Mountjoy, M. (2019). Energy availability in athletics: Health, performance, and physique. *International Journal of Sports Nutrition and Exercise Metabolism*, 29: 152-64. Available: https://doi.org/10.1123/ijsnem.2018-0201

Muñoz-Bullón, F., Sanchez-Bueno, M. J. and Vos-Saz, A. (2017). The influence of sports participation on academic performance among students in higher education. *Sport Management Review*, 20(4): 365-78. Available: https://doi.org/10.1016/j.smr.2016.10.006

Nikolaidis, P. T., Zingg, M. A. and Knechtle, B. (2017). Performance trends in age-group runners from 100 m to marathon-The World Championships from 1975 to 2015. *Scand J. Med. Sci. Sports*, 27: 1588-96. Available: https://doi.org/10.1111/sms.12821

Peart, D. J., Balsalobre-Fernandez, C. and Shaw, M. P. (2019). Use of mobile applications to collect data in sport, health, and exercise science: A narrative review. *The Journal of Strength and Conditioning Research*, 33(4): 1167-77. Available: https://doi.org/10.1519/JSC.0000000000002344

Quennerstedt, M. (2019). Physical education and the art of teaching: Transformative learning and teaching in physical education and sports pedagogy. *Sport, Education and Society*, 24(6): 611-23. Available: https://doi.org/10.1080/13573322.2019.1574731

Rees, D. I. and Sebia, J. J. (2010). Sports participation and academic performance: Evidence from the national longitudinal study of adolescent health. *Economics of Education Review*, 29: 751-59. Available: http://doi.org/10.1016/j.econedurev.2010.04.008

Rodriguez-Romo, G., Blanco-Garcia, C., Diez-Vega, I. and Acebes-Sánchez, J. (2021). Emotional intelligence of undergraduate athletes: The role of sports experience. *Frontiers in psychology*, 12: 609154. Available: https://doi.org/10.3389/fpsyg.2021.609154

Sienkiewicz-Dianzenza, E., Tomaszewski, P. and Stupnicki, R. (2005). Performance index" and its application to the assessment of multiple bouts of leg exercise. *Wychowanie Fizyczne I Sport*, 49(2): 113. Available: https://bit.ly/36jfgk3

Singh, A. S., Saliasi, E., Van Den Berg, V., Uijtdewilligen, L., De Groot, R. H., Jolles, J. and Chinapaw, M. J. (2019). Effects of physical activity interventions on cognitive and academic performance in children and adolescents: A novel combination of a systematic review and recommendations from an expert panel. *British Journal of Sports Medicine*, 53(10): 640-47. Available: https://doi.org/10.1136/bjsports-2017-098136

Sitovskyi, A., Maksymchuk, B., Kuzmenko, V., Nosko, Y., Korytko, Z., Bahinska, O. and Maksymchuk, I. (2019). Differentiated approach to physical education of adolescents with different speeds of biological development. *Journal of Physical Education and Sport (JPES)*, 19(3): 1532 -43. Available: https://bit.ly/3hI2Qrf

Stones, M. (2019). Age differences, age changes and their generalizability in marathon running by master athletes. *Front. Psychol*, 10: 2161. Available: https://doi.org/10.3389/fpsyg.2019.02161

Stones, M. and Hartin, A. (2017). Ageing and half-Ironman performance. *Experimental Ageing Research*, 43(2): 178-91. Available: https://doi.org/10.1080/0361073X.2017.1276378

Tanaka, H. and Seals, D. R. (2008). Endurance exercise performance in Masters' athletes: Age-associated changes and underlying physiological mechanisms. *The Journal of Physiology*, 586(1): 55-63. Available: https://doi.org/10.1113/jphysiol.2007.141879

Thaqi, A., Berisha, M. and Asllani, I. (2021). The effect of plyometric training on performance levels of the shot /put technique and its related motor abilities. *Pedagogy of Physical Culture and Sports*, 25(3): 144-51. Available: https://doi.org/10.15561/26649837.2021.0301

Walther, J., Mulder, R., Noordhof, D. A., Haugen, T. A. and Sandbakk, Ø. (2021). Peak age and relative performance progression in international cross-country skiers. *International Journal of Sports Physiology and Performance*: 1-6. Available: https://doi.org/10.1123/ijspp.2021-0065

Warburton, D. E., Nicol, C. W. and Bredin, S. S. (2006). Health benefits of physical activity: the evidence. *Canadian Medical Association Journal*, 174: 801-09. Available: https://doi.org/10.1503/cmaj.051351

World Health Organization (2009). Global health risks: Mortality and burden of disease attributable to selected major risks. *World Health Organization*: Available: https://apps.who.int/iris/handle/10665/44203

Yarmak, O., Galan, Y., Hakman, A., Dotsyuk, L. and Blagii, O. (2017). The use of modern means of health improving fitness during the process of physical education of student youth. *Journal of Physical Education and Sport (JPES)*, 17(3): 1935-40. Available: https://bit.ly/3AAK3Xv

Young, B. W. and Starkes, J. L. (2005). Career-span analyses of track performance: longitudinal data present a more optimistic view of age-related performance decline. *Experimental Aging Research*, 31(1): 69-90. Available: https://doi.org/10.1080/03610730590882855