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Transitional Nurturing Determines Performance in Elite Sprinting

Rachael Irving*

Department of Basic Medical Sciences, University of the West Indies, Kingston 7, Jamaica
*Corresponding author: rachael.irving@uwimona.edu.jm

Abstract **Objectives**: The aim of the study was to determine what factors account for the selection of athletes to represent Jamaica in track and field events at the Olympics and World Championships. **Methods and materials**: One hundred and twenty athletes who represented Jamaica between 1948-2015 in track and field events were interviewed. The athletes were classified based on athletic disciplines: Sprinter (S:100– 400m, n =80), jumper, hurdler and thrower (JHT, n = 23), and middle distance runners (Mdr: 800–3000m, n =17). The athletes were further sub-divided into athletes who represented Jamaica at the Olympic Games and the World Championships (highest level games) and those who represented Jamaica at the Pan-American, Commonwealth, World Junior Championships, World Youth Olympics, World University Games and the CARIFTA Games (other games). Each athlete was administered a questionnaire. The questionnaire was designed based on models used in studies elite athletes from Ethiopia Kenya and Jamaica who were competitors in international games. The questions elicited the following information: age, gender, event/s participated in, place of birth of athlete and parents, secondary/high school athlete attended and yes or no for living arrangements with adult/s) other than family members during athletic development in high schoool. The data were analyzed using the Statistical Packages for the Social Sciences, Version 21. Statistical significance was set at P <0.05%. Cross tabulations for statistical associations and binary regression for influence of independent variables on a dependent variable were utilized in the analysis. **Results**: The majority of athletes, 83.3% who represented Jamaica in track and field and their parents, 79.2% were born in Jamaica. There were slightly more females than males, 50.8 % versus 48.2%. Approximately 91.7% of athletes attended high school in Jamaica defined as having a strong history of participation in athletics and 85% lived with adults other than family members during athletic development at the high school level. More than 66% of athletes participated in the 100-400m sprints but only 26.6 % of participants were selected to represent Jamaica in the highest level games. Secondary/high school the athlete attended influenced selection to represent Jamaica in the highest level games and in the sprint events. **Conclusion**: Selection to represent Jamaica in the sprint events at the Olympics and World Championships is influenced by the secondary school the athlete attended.

Keywords: *Athletes, performance, high school, sprints*

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1. Introduction

Some nations are more successful than others in particular sporting events [1]. Jamaicans since 1948 and noticeably since 2008 have been particularly successful in sprinting events at high level games such as the Olympics and World Championships [2]. Some researchers attribute sustained performance in power sports to genetics [3]. Sprint/power phenotypes and elite performance are often linked to angiotensin convertining enzyme (ACE) and α actinin 3 (ACTN3) genes, which are regared as two of the key candidate genes for performance. A study in a cohort of successful Jamaican and Americans sprinters found that the ACE and Actinin 3 genotypes were not significant determinants of sprinting success [4]. Therefore other factors or a combination of factors and genetics might be influencing the performance of Jamaicans in these high level games. Optimal physical performance is more linked to a synergy between the environment and inherited factors. Epigenics impact physical performance [4]. Performance modification of athletes are influenced by friends, family and neighbourhood [5]. This study examined nurturing in athletic performance by moving the focus away from the individual athlete and genetics to the environmental synergies including which produce the athlete/s. Talent development (identification and nurturing) has proven in other studies to be highly impactful on physical performance. Researchers have also examined the influence of other environmental factors including parental on transition from junior to the elite level [6]. Different researchers have advocated different pathways to athletic talent development. Some advocate early specialization for those with inherent traits [7]); others advocate wide exposure to many sports as early as possible and specilaization after wide exposure when talent is identified [7]. School the athlete attends as the athlete transcends to elite level is also important as sport is influenced by the cultural features of the practice setting

in the school [7]. Secondary school sports in Jamaica seems highly impactful as it is often from high school that junior track and field athletes transition to the elite level. No where else in the world is this transition as established as seen in the regular transition of high schools athletes from the yearly Boys and Girls Championships into representaion at the elite level in the Olympics and World Championships [8]. Genetics have been postulated as key determinants of sprinting success of Jamaicans at these highest level games but genetics have also been debunked [4,10]. This study approach was to examine environmental synergies including high school atended on selection for certain events in track and field athletes at highest level and other games because it is widely held that successful teams and individuals especially those who become legacies are built on draft [11].

2. Methods

One hundred and twenty athletes and former athletes who represented Jamaica in track and field events between 1948 to 2015 were recruited. The study was approved by the Ethics Committee of the University of the West Indies, Kingston, Jamaica Informed written consent was obtained from each participatnt. Participants represented Jamaica at international games including the Olympic Games and World Championships (highest level games) and the Commonwealth Games, the Pan American Games, Junior World Championships, World Youth Champioships and the CARIFTA Games (other games). The athletes were classified as three groups based on athletic disciplines: sprinters (S: 100– 400m, n =80), jumper, hurdlers and throwers (JHT, n =23), and middle distance runners (Mdr: 800–3000m, n = 17). The groups were further sub-divided into those who represented Jamaica at the highest level games and those who represented Jamaica at other international games. Each participant was administered a questionnaire. The questionnaire used was modeled off studies done on world class athletes from Ethiopia Kenya and Jamaica [12,13,14] who are competitors in international games. The questions elicited the following information: age, gender, event/s participated in, place of birth of athlete and parents, a yes or no for living arrangements with adult/s) other than family members during athletic development in high school and , secondary school athlete attended. Secondary or high schools attended by athletes were classified into three groups: Traditional high schools with strong track and field programs (TTFHS , non-traditional high schools with track and field programs that are not well established (NTTFHS) and schools outside of Jamaica (SOJ). This classification was necessary because some Jamaican high school have well established track and field programs, with some schools dominating the annual Boys and Girls High Schools Championships [2].

2.1. Statistical Analysis

The data were analyzed using the Statistical Packages for the Social Sciences, Version 21. Statistical significance was set at P <0.05%. Cross tabulations for statistical associations and binary regression for influence of independent variables on a dependent variable were utilized in the analysis

3. Results

Table 1 presents the socio-demographic characteristics of the athletes (1948-2015)

3.1. Socio-demographic Data

Table 1. Socio-demographic data, n = 120

Description		
Age		
Represented Jamaica before 2000	50±30 years	
Represented Jamaica after 2000	26±9 years	
Gender	N	%
Female	61	50.8
Male	59	48.2
Country of birth of athletes		
Jamaica	100	83.3
Other Caribbean Countries	3	2.5
USA/Canada	16	13.4
Europe	1	0.8
Country of birth of parents		
Jamaica	95	79.2
Other Caribbean Countries	10	8.3
USA/Canada	12	10.0
Europe	3	2.5
Secondary school attended		
TTFHS	110	91.7
NTTFHS	6	5.0
SOJ	4	3.3
Events Participated In		
100m &/or 200m &/or 400m	80	66.6
Hurdles, Jumps, Throws	23	19.2
800-3000m	17	14.2
Games participation		
Highest Level Games	32	26.7
Other Games	88	73.3
Lived with non-family members during development		
Yes	102	85
No	18	15

Data are generally presented as % with the exception of age presented as mean ± SD.

The majority of athletes who participated in the sprints (100-400m) attended schools which a strong history of athletic participation (TTFHS). There was a lack of representation (0%) of athletes in the jumps, hurdles and throws from schools with well established track and field programs(NTTHS).

Table 2. Cross tabulation between schools athletes attended and events participated in

Description	School attended			Total
Event participated In	**TTFHS**	**NTTFHS**	**SOJ**	
	n (%)	n (%)	n (%)	
Sprints (100m, 200M,400m)	72(90.0)	5 (6.3)	3(3.7)	80 (66.7)
Hurdles, Jumps & Throws	21 (91.3)	0(0)	2(8.7)	23 (19.2)
800m-10,000m	8(47.7)	8 (47.7)	1(5.8)	17 (14.2)
Total	**101**	**13**	**6**	**120**

A significant association was found between event athlete participated in and school attended ($\chi 2$ (df = 2) = 0.042, P = 0.01).

Table 3 presents a binary logistic regression of selected socio-demographic variables and their likely influence on athletes' participation in the highest level games (Olympics

and or World Championships). Three variables were examined for their influence on the dependent variable. Gender, high school an athlete attended, and event the athlete participated in. Of the three variables, only one emerged as a factor of dependent variable – secondary school the athlete attended prior to selection. Athletes who attended NTTFHS were 0.98 times less likely (OR = 0.05, 95% CI: 0.001– 1.14) likely to participate in the highest level games. This means that athletes were more likely to participate in the highest level games if they attended a TTFHS. Those who attended TTFH and SOJ were more likely to participate in the sprints than those who attended a NTFHS. No difference emerged between male and female.

Table 3. Binary logistic regression of selected socio-demographic variables on those who participated in Olympics

	B	Std. Error	Wald	*P*	OR	95% C.I.	
						Lower	Upper
Gender (1=Male)	-1.22	1.15	1.132	0.287	0.29	0.03	2.80
TTFHS	-2.05	1.59	1.659	0.198	0.15	0.01	2.91
NTTFHS	-2.99	1.60	3.521	0.061	0.05	0.002	1.14
SOJ l (reference group)					1.00		
	0.12	0.05	5.496	0.019	1.12	1.02	1.24
Sprinters (100-400m)	2.57	1.35	3.643	0.056	13.09	0.93	183.5
Constant	-1.96	1.87	1.104	0.293	0.14		

-2LL = 24.22
R^2 = 0.586
Model χ^2 (df = 5) = 18.55, *P* = 0.002.

4. Discussion

Yearly athletic coaches from overseas attend the annual Boys and Girls High School Athletic Champuionships (CHAMPS) to recruit student athletes for college programs. It is in the best interest of recruiters to evaluate factors that may add predicative values to selection considerations. This study is the only one that examine the environmental synergies that work together to produce the elite Jamaica athletes thereby providing valuable data for college recruitment. Other studies on the demographics and genotypes of Jamaica athletes have been documented. These studies however did not examine elite athletic development in the context of the culture of secondary school sports in Jamaica and nurturing of junior athletes by adults other than parents. The data indicated that Jamaica tend to have more representatives in the sprints at the highest level and other games. Over the years (1948-2015), Jamaica had the least number of representatives (17) in the middle distance events when compared to the jump, hurdles and throws (23) and the sprints (80). Only about a quarter (26.6%) of the national representatives in track and field transitioned to the highest level games. The data indicated that nurturing of the student athletes by adults other than parents is important as 85% of all athletes in the study lived with adults other than parents during high school athletic development. The data indicated the importance of the secondary school the athlete attended in transition to elite status. The data also pointed to the probability of selection to national athletic representation been influenced by the attendance at traditional track and field high schools in Jamaica. This practice put many of the non- traditional track and field high schools in Jamaica at a disadvantage because scouts from the traditional track and field high schools usually recruit talents early from the less equipped schools [2]. These schools lose sponsorship dollars because companies are less willing to give money to schools with provide little branding or marketing opportunities. The Ministry of Education in Jamaica may want to step in to ensure that not only students from traditional track and field high school benefit from transition to elite representation but also students from non-traditional schools. Non-traditional track and field schools which have invested in talented students might want to institute a policy that states that athletic development to a certain level is tied to attending the school for at least 3 years. These schools can then begin to develop their athletic program by money sourced through school sponsorship deals. While an established model of track and field development through a strong component of athletic school culture helps in the elite development of Jamaica athletes, it also weakens the athletic program in non-traditional track and field schools.

5. Conclusion

Student athletes who attended high school with well established track and field programs are more likely to represent Jamaica at the Olympics and World Championships.

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