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THE EFFECT OF A SPORT DEVELOPMENT PROGRAMME ON SPRINTING AND LONG JUMP ABILITIES IN 10-15 YEAR OLD BOYS FROM DISADVANTAGED COMMUNITIES IN SOUTH AFRICA

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ABSTRACT

Sixty-two (N=62) boys between the age of 10 and 15 years from two different farm schools in the Potchefstroom district were subjected to a Talent Search testing protocol. Potentially talented athletes (n=21), with a mean age of 12.0 ± 1.67 years, at one of the farm schools were randomly assigned to the experimental group. A control group was selected in the same way consisting of equally talented boys from the other farm school, with an average age of 12.1 ± 1.26 years. The talented children in both groups then underwent a specific test battery designed for sprinting and long jump. Maturity was determined by means of a maturity questionnaire. The development programme contributed statistically significant to the improvement in flexibility, muscle endurance, 0-40 meter speed and long-jump ability. Explosive power, reaction time, speed endurance, acceleration and stride length did not improve. The results revealed that a development programme of 10 weeks had a positive effect on the conditioning of motor and physical abilities and skills for sprinting and long-jump in talented 10 to 15 year old boys, regardless of poor socio-economic circumstances and a restricted environment.

Key words: Performance; Sprint; Long jump; Motor development; Talent identification.

INTRODUCTION

Youth from disadvantaged communities in South Africa are confronted by social crises in regard to family, crime, violence, own identity and limitations in terms of participation in sport and recreation. The community, especially in the rural areas, is usually limited to self-built facilities and a lack of the necessary equipment results in almost no opportunity for participation in sport (Goslin, 1996). Furthermore, Chappel (2004) is of the opinion that the level of poverty in these disadvantaged communities places a further hindrance on participation in sport, as financial resources are used primarily to address the immediate social problems.

Except for socio-economic status, an individual's participation in sport is often determined by social factors, tradition, ideals, desire to participate in popular types of sport, parental pressure, a teacher's expertise and the availability of the necessary infra-structure and sporting facilities (Burgess, 2005). Other factors that could also influence participation in sport are the physiological, heredity, anthropometrical and psychological factors (Jarver, 1982; Hahn, 1990; Peltola, 1992; Bompa, 2000).

Biological maturation, which is prevalent in boys between the ages of 11.75 and 14.85 years of age, is a further important factor which can influence sport performance abilities, especially in the adolescent years (Malina *et al.,* 2004). The rate at which biological maturation takes place is, therefore, not necessarily the same as the child's chronological age. In some instances some children are biologically more advanced than their chronological age (early developers), while the opposite is also true (late developers). As a result these differences in individuals with the same chronological age can affect their performance abilities (Malina *et al*., 2004)

It is often argued that the outcome of a competition is the best form of talent identification because the best or most talented athletes usually perform at these events (Peltola, 1992). Biological maturation is not taken into account in these events and the opportunity for children from disadvantaged communities to participate in these events is relatively small, taking into account that transport and financial support is not readily available (Burnett & Hollander, 1999). This can lead to children who are not exposed to competitions are overlooked and in so doing potential talent is lost to the world of sport. It could also be possible that those who do not show potential during the competitions as well as those who show a degree of potential, could have the potential to perform well in another sport, but not know this as they have never been evaluated. From this discussion it is clear that many potentially talented children in disadvantaged communities sometimes do not receive the opportunity to participate in sport due to the restrictions placed on them, which eventually leads to their talent never being discovered or developed. This is an indication of the importance of talent identification in disadvantaged communities, which must be conducted in a scientific manner, as well as the development of these athletes who have been identified with potential.

Motor and physical abilities such as speed, explosive power, muscle strength and endurance are important contributors to performance in sport (Hakkinen *et al.,* 1989). If abilities and skills with regards to performance in a specific sport are to be improved in a development programme, then the training must be specific with regard to that type of sport (Penfold & Jenkins, 1996).

An analysis of sprinting indicated that it is comprised of various components, e.g. the start, acceleration, maximum speed and speed endurance (Delecluse *et al*., 1994). According to Dick, as quoted by Bowerman and Freeman (1991) for a sprinter to perform he must possess a good sprinting technique as well as motor and physical characteristics which consist of aerobic endurance, strength and speed abilities, maximum strength and speed. Penfold and Jenkins (1996) concur by indicating that reaction time, increased velocity, maximum speed, balance, flexibility and speed endurance must be trained to enable the athlete to develop maximum speed.

With regards to long-jump, Kiefer (2004) indicates that this event in relation to other athletic events demand a large amount of athletic abilities. Researchers (Kiefer, 2004; Moura *et al*., 2005) indicate that speed, explosive power, strength and flexibility are important motor abilities that can contribute to performance in long-jump. A long-jump athlete must be able to obtain maximal speed, which is of great importance during the run-up. Explosive power allows the athlete to control the direction of the centre of gravity, while flexibility allows the athlete to participate without injury to the muscles, connective tissue and joints which plays a major role during the ballistic input placed on an athlete during long-jump (Kiefer, 2004).

Strength endurance and maximum strength form an important foundation for the improvement of special strength aspects as well as the prevention of injuries (Moura *et al*., 2005). From the abovementioned, it is clear that sprinting and long-jump possess many similar underlying components.

Limited research findings with regard to the specificity of training and development of various physical and motor abilities that are important for performance in sprinting and long-jump in young athletes has, however, been published. Little research also exists on the effect of the level of maturity on performance in young athletes with potential. As a result, the aim of this study is to determine the influence of a sport development programme to improve sprinting and long-jump ability in 10 to 15 year old potentially talented boys from disadvantaged communities.

METHODOLOGY

Subjects

Sixty-two boys between the age of 10 and 15 years from two different farm schools in the Potchefstroom district voluntarily participated in the study. The socio-economic status of all the children involved in the study can be regarded as low and equal, since they are mainly children of farm workers in the vicinity of or those living on farms close to the schools. Both the children and their parents were informed as to the nature of the project and the parents signed an informed consent form. This study received ethical approval from the North-West University (Number 04M12). Thirty-two of the 39 subjects who were initially in the experimental and control groups completed the study. The information of five boys in the experimental group and of two in the control group was incomplete consequently their data had to be omitted and resulted in an experimental group of 16 and a control group of 16. After all the boys (N=62) were subjected to a talent search testing protocol, potentially talented athletes (n=21) with a mean age of 12.0 ± 1.67 years at one of the farm schools were randomly assigned to the experimental group. Furthermore, a control group was selected in the same way consisting of 18 boys from another farm school, with an average age of 12.1 ± 1.26 years. Maturity of the boys was determined by means of a maturity questionnaire (by means of an interpreter) based on the Tanner stages for pubic hair and genital development (Malina *et al.,* 2004). This biological maturity (BMQ) questionnaire is based on the study of Duke *et al.* (1980) and Rickey *et al.* (1988), as well as the recommendations of Docherty (1996). The above maturity classification was determined by means of two questions that each of the subjects had to answer. They were asked to choose a line diagram (from the five Tanner stages) that represented their own genital (G1-G5) and pubic hair (PH1-PH5) development the most. Thirty boys (of the initial 39) consented to complete the maturity questionnaire.

The five general stages for pubic hair and genital maturation as described by Tanner (Malina *et al.,* 2004) are described as follows: Stage 1 indicates the prepubertal state or the absence of development of each characteristic. Stage 2 indicates the early puberty state or the initial, overt development of each characteristic. Stage 3 and 4 indicate the midpuberty state which indicates continued maturation of each characteristic, while stage 5 indicates the adult of mature state for each characteristic.

Experimental protocol

All the boys between 10 and 15 years in the experimental (n=31) and control (n=31) groups were tested by means of the Australian Talent Search protocol (Australian Sports Commission, 1995). It is an existing protocol that is used to identify general sports talent and consists of 10 test items namely, body mass, stature, sitting height, arm span, basket ball throwing, throwing and catching, vertical jump, 40-meter sprint, flexibility and endurance. The most talented children were identified based on percentile scales that were compiled for boys between 10 and 15 years in the North West Province with the protocol from the Thusa Bana study. These percentiles were used to identify the most talented (top 30%) boys from the 62 initial participants. Rank order of the results in the 100 meter and long-jump tests was also used to identify the potential talented children. This resulted in 21 boys in the experimental group and 18 boys in the control group respectively. These boys were then tested again by a sport specific test battery that consisted of 10 sport specific tests with subtests for speed and long-jump. These tests were:

Flexibility**:** The sit-and-reach test, with high reliability (r=0.99), was used to determine the flexibility of the hamstrings, while flexibility of the iliopsoas, quadriceps and ankle was determined by means of a goniometer in accordance with the method of Harvey and Mansfield (2000). A smaller value in thigh and iliopsoas muscle flexibility indicates improvement whereas a larger value in the hamstring, quadriceps and ankle values indicates improvement.

Motor ability components**:** Explosive power of the leg muscles was determined by means of the vertical (r=0.93) and horizontal jumps (r=0.88-0.99) (Kirby, 1991). The better of two attempts was recorded. Reaction time was determined by means of a 0-5 m speed test. The test was started with the blow of a whistle while the participant was in a crouched position. Maximum speed (r=0.95) over 100 meters was measured with speed lights on 40, 60, 80 and 100 meters. Electronic timing lights (Brower timing systems) were used in this test and the better of two attempts was recorded.

Endurance**:** Abdominal (a) and upper body muscle endurance (b) were respectively determined by means of sit-ups (r=0.94) (a), push-ups (r=0.93) and pull-ups (r=0.89) (b) until exhaustion (Kirby, 1991). Speed endurance was tested by the 120 meter speed endurance test as prescribed by Dintiman and Ward (2003).

Stride length**:** The stride length of the participants was determined by means of the stride length test, as prescribed by Dintiman and Ward (2003). The better of two attempts was recorded.

Acceleration**:** Acceleration was determined by using a formula described for this purpose by Dintiman and Ward (2003). Subtract the flying 40 m time from the stationary 40 m time. The difference between the stationary 40 m time and the flying 40 m time is the time delay required to accelerate.

Long jump ability**:** The long-jump ability of the participants was determined by means of a long-jump attempted with a seven stride approach without any prior technical coaching.

Intervention programme

The experimental group participated in the sprint and long jump developmental programme three times a week during school hours for a period of 10 weeks (30 sessions). The duration of the programme was approximately half an hour on two days and an hour and a half on one of the allocated days. These times were determined by available time that was allocated by the school. Both the experimental and control group (who did not participated in any programme) were retested after 10 weeks to determine the effect of the development programme. The program consisted of exercises aimed to develop both long jump and sprinting ability. Table 1 provides a brief outline of this programme.

TABLE 1. **OUTLINE OF THE DEVELOPMENT PROGRAMME**

Components	Activity	Intensity	Rest	Frequency
Warm-up 10-15 minutes	Jog Aerobic circuit programme Static stretches Ballistic stretches			3 x per week
Speed and reaction time (Bompa, 2000; Botha & De Villiers, 1979) 15 minutes	0-5 meters on whistle from different positions Underhand slap 50 meter sprints Beenbag relay	1-10 repetitions 5 repetitions, increased with one repetition every second week	3-5 minutes	3 x per week
Running form drills (Dintiman & Ward, 2003) 10 minutes	Sitting & standing arm swings Butt kickers	3 x 15 sec 3 x 20m	15 seconds Walk back for recovery	3 x per week

Components	**Activity**	**Intensity**	**Rest**	**Frequency**
	Down and offs	3 x 20m	Walk back for recovery	3 x per week
	African dance Drum major Ladder drills	3 x 20 m 3 x 20 m 3 x 4 m ladder	Walk back for recovery Walk back for recovery Walk back for recovery	
Speed endurance (Dintiman & Ward, 2003) 15 minutes	60-80 meters	Week 1-5 3 x 60 m 3 x 80 m Week 6-10 80 m repetitions increased with one every second week up to 6 x 80m	Walk back as recovery, progress, jog back as recovery	3 x per week
Plyometry (Chu, 1998) 15 minutes	Plyometric circuit programme • Bunny hops • Hop scotch • Lateral leaps • Single runs • Double leg bound • Single leg bound	Week 5 – 10 2 repetitions of the circuit	1 minute rest between each repetition	2 x per week

Components	Activity	Intensity	Rest	Frequency
Strength (Chu, 1998) 15 minutes	Leg strength Assisted squats Walking lunges Core strength Medicine ball crunches Partner leg raise	Week 1-3: 3 x 5 reps. Week 4-6: 3 x 10 reps. Week 7-10: 3 x 15 reps 2 sets of 10 reps increased by 2 reps every second week	Complete recovery after each set	1 x per week
Warming down 10 minutes	Jog Static stretches (as in warm-up)			After every training session

The training session focused on exercises aimed to develop both sprint and long-jump ability and consisted of different exercises to develop running form, speed, reaction time, leg strength, power and speed endurance. The correct execution and technique of the exercises were strongly accentuated.

Running form was exercised by using sitting and standing arm swings, buttock kicks, down and offs, African dance, drum major and stick drills (Dintiman & Ward, 2003). Reaction time was trained by letting the participants lie in different positions and when the coach blows the whistle, the children had to react as quickly as possible and run towards a beacon 5 meters away Reaction time was trained in a playful manner together with the above mentioned exercises. Speed was trained using maximum sprints over 50 meters with 3-5 minutes rest between each exercise. Once a week speed was also trained in a playful manner based on exercises described by Bompa (2000) together with the maximum sprint exercises.

Statistical analysis

The Statistica for Windows computer programme (StatSoft, 2004) was used to analyze the results. Scatter plot graphs based on a regression analysis were used to determine the effect, if any, of maturity on the post-test of both groups. However, although differences occurred in the maturity status of the group (see table 2), this analysis indicated that these differences had no effect on the post-test results and was therefore not further used in the analysis. Inter-group comparisons (table 3) were done by means of an independent t-test in order to indicate statistically significant differences between the experimental and control group's pre- and post-test results. The practical significance of differences between the pre- and post-test was determined by means of effect sizes (ES) (0.3 is seen as small, 0.5 as moderate and 0.8 as large). Differences were found between the pre-test values of the experimental and control group, therefore an ANCOVA was done to even the two groups in order to determine the effect of the development programme. Adjusted means (table 4) were, therefore, calculated for the post-test with an ANCOVA (Thomas & Nelson, 1990) where the pre-test was used as a co-variable to determine the effect of the development programme. The level of significance was set at $p<0.05$.

RESULTS

Table 2 gives an indication of the age distribution as well as the mean maturing levels of the various subjects (Tanner phases G1-G5 en PH1 – PH5). From this it is clear that the genital development of the boys in the control group was at a slightly more mature stage than those of the boys in the experimental group, due to the development of these subjects being distributed between phases two and four, whereas all the development of the subjects in the experimental group fall within phases 1 and 3. With regard to the pubic hair development, both groups fall within phases one to three which is an indication that the two groups were more or less on the same maturity level. The slightly higher maturity level of the control group can possibly be attributed to the fact that the control group had more 13 year olds and one 14 year old, whereas the experimental group consisted of a higher number of 10 and 11 year old boys. It must, however, be taken into account that seven boys (13, 14 and 15 years of age) in the experimental group and two in the control group (10 and 12 years) would not give permission to complete the questionnaire.

TABLE 2. **AGE DISTRIBUTION AND MEAN MATURATION LEVELS OF THE SUBJECTS**

Experimental group											
Age	**n**	**Genital development**					**Development of pubic hair**				
		G1	**G2**	**G3**	**G4**	**G5**	**PH1**	**PH2**	**PH3**	**PH4**	**PH5**
10	5	4	0	1	0	0	4	0	1	0	0
11	6	1	3	2	0	0	2	2	2	0	0
12	2	1	1	0	0	0	1	1	0	0	0
13	1	0	1	0	0	0	0	0	1	0	0
14	0	0	0	0	0	0	0	0	0	0	0
Total	**14**	**6**	**5**	**3**	**0**	**0**	**7**	**3**	**4**	**0**	**0**
Control group											
10	2	0	1	1	0	0	0	1	1	0	0
11	2	0	2	0	0	0	0	2	0	0	0
12	1	1	0	0	0	0	0	1	0	0	0
13	10	0	3	4	3	0	1	4	5	0	0
14	1	0	0	1	0	0	0	1	0	0	0
Total	**16**	**1**	**6**	**6**	**3**	**0**	**1**	**9**	**6**	**0**	**0**

G1-G5 = Stages for genital maturation; PH1-PH5 = Stages for pubic hair

The average attendance of the 16 boys in the experimental group in the development programme was 89%. The results of the experimental and control groups with regard to the pre- and post-tests, as well as the statistical significance within group differences between the pre- and post-tests in each group are displayed in table 3. These results indicate significant improvements in the experimental group, compared to significant weakening in the control group in some of the variables.

TABLE 3. **INTRA-GROUP DIFFERENCES BETWEEN THE PRE-TEST AND POST-TEST IN THE EXPERIMENTAL AND CONTROL GROUPS**

Sport specific tests	**Experimental group (n=16)**				**Control group (n=16)**			
	Pre-test		**Post-test**		**Pre-test**		**Post-test**	
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Flexibility								
Sit and reach (cm)	41.66	5.91	47.29*	5.56	45.06	4.05	44.98	4.83
Iliopsoas(°)(L)	-1.00	5.50	-2.00	4.92	-0.75	7.39	2.31	5.71
Iliopsoas (°)(R)	3.38	6.75	0.75	4.49	-0.38	9.07	-1.97	3.97
Quadriceps(°)(L)	70.56	11.87	76.44	9.36	72.44	1.26	75.56	6.68
Quadriceps(°)(R)	70.63	5.98	77.81*	6.67	72.69	13.57	75.19	9.32
Ankle flexibility(°)(L)	51.00	10.97	55.31	8.50	53.56	8.11	57.56	8.87
Ankle flexibility(°) (R)	47.56	8.84	55.25*	10.08	48.81	6.62	53.75	9.42
Explosive power (cm)								
Vertical jump	29.31	5.49	32.31	7.42	26.63	4.27	27.13	4.43
Horizontal jump	151.25	21.60	167.19*	21.18	150.06	16.02	155.31	16.94
Muscle endurance (maximum number)								
Sit-ups	40.19	15.00	46.06	15.94	51.75	20.85	43.06	16.02
Pull-ups	3.75	2.86	5.25	3.07	3.44	2.39	2.06	2.14
Push-ups	14.69	6.00	18.06	7.13	14.69	8.56	10.63	5.84
Reaction time (sec)								
0-5 m test	1.86	0.14	1.70*	0.09	1.76	0.15	1.82	2.20

Sport specific tests	Experimental group (n=16)				Control group (n=16)			
	Pre-test		Post-test		Pre-test		Post-test	
	M	SD	M	SD	M	SD	M	SD
Running speed (seconds)								
0-40 m	7.41	0.48	7.3	0.46	7.44	0.42	7.60	0.44
0-60 m	10.52	0.76	10.38	0.74	10.79	0.66	10.91	0.62
0-80 m	13.75	1.09	13.60	1.04	14.25	0.90	14.27	0.96
0-100 m	17.11	1.39	16.94	1.37	17.75	1.14	17.76	1.29
Speed endurance (sec)								
Speed endurance	0.91	0.29	0.78	0.23	0.44	0.24	0.66	0.43
Acceleration (sec)	1.07	0.26	1.03	0.12	0.64	0.26	0.99*	0.37
Stride length (cm)								
Stride length (left to right)	139.69	21.73	143.88	18.40	131.63	15.69	136.00	13.12
Stride length (right to left)	138.06	16.35	146.81	23.93	132.25	20.79	143.75	18.84
Long jump (meters)								
Long jump with 7-stride approach	314.94	32.01	332.38	34.79	312.38	26.32	287.75*	34.18

p<0.05, (R) - right side, (L) – left side, M – mean, SD – standard deviation

Because there were significant inter-group differences in the pre-testing of the experimental and control groups, an ANCOVA was performed where statistical adjustments were made to correct for the differences to eventually verify the effect of the programme. Statistically significant pre-testing differences identified in this manner were also tested with regard to the practical significant effect thereof.

TABLE 4. **SIGNIFICANT DIFFERENCES IN THE ADJUSTED POST-TEST MEANS OF THE EXPERIMENTAL AND CONTROL GROUPS (N=16)**

Variables	Group	Mean	SE	ES
Flexibility				
Sit and reach	1	48.90	0.52	
	2	43.36	0.52	2.75
Iliopsoas (L)	1	-1.62	1.29	
	2	2.30	1.29	0.76
Iliopsoas (R)	1	0.24	0.94	
	2	5.01	0.94	1.29
Muscle endurance				
Pull-ups	1	5.12	0.40	
	2	2.19	0.40	1.84
Push-ups	1	18.06	1.33	
	2	10.63	1.33	1.39
Running speed				
0-40 meters	1	7.32	0.64	
	2	7.59	0.64	1.04
Long-jump ability				
Long-jump with 7 stride approach	1	331.30	6.13	
	2	288.83	6.13	0.73

1 = Experimental group; 2 = Control group; M = adjusted mean; SE = standard error; ES = effect size; (R) = right side; (L) = left side

According to the results analyzed in this manner and displayed in table 4, the development programme led to statistically significant improvements in aspects of flexibility, muscle endurance, speed and long-jump ability. Although not statistically significant, the development programme also contributed to improvement in the vertical jump, muscle endurance, speed, speed endurance, acceleration, stride length and long-jump with a seven stride run-up of the children in the experimental group (table 3). The only two significant changes that were apparent in the control group (but which indicated a weakening) were in velocity and long-jump with a seven stride run-up.

According to the results of the ANCOVA (table 4), where the pre-test was used as a co-variable in the analysis of the corrected pre-test differences between the groups, it is apparent from the adapted post-test means that the development programme contributed to a significant improvement in three components of flexibility, two of muscle endurance, speed and long-jump with a seven stride run-up. With regard to flexibility, the development programme contributed to improved flexibility in the hamstring groups $F(1.29)=53.88 (p=0.000)$, with a large practical significance (ES=2.75). Improvement in flexibility of the left iliopsoas $F(1.29)=4.63 (p=0.04)$ as well as the right iliopsoas $F(1.29)=12.55 (p=0.001)$ indicated a large practical significance of EG=0.76 and ES=1.29 respectively. The development programme also contributed to an improvement in muscle endurance in the upper body, as determined by an improved number of pull-ups F(1.29)=26.93(p=0.000) and push-ups F(1.29)=15.56(p=0.000) up to exhaustion. Improvements in both pull-ups (ES=1.84) and push-ups (ES=1.39) showed a large practical significance. With regard to the running speed, the development programme also contributed to a significant improvement F(1.29)=8.72(p=0.006) with a large practical significance (ES=1.04). Lastly the development programme led to the improvement of the boys' long-jump abilities as determined in the seven stride run-up F(1.29)=23.97(p=0.000) with a moderate practical significance (ES=0.73).

DISCUSSION

The practically significant improvement of flexibility in the experimental group corresponds with the findings of Bloomfield and Wilson (1998), Bompa (1999) and Dintiman and Ward (2003). The improvement in muscle endurance abilities can also be attributed to the development programme, as no improvement (mean values indicate a weakening) in the muscle endurance of the control group was apparent. The literature indicates that training three times per week is necessary to accomplish an improvement in muscle endurance abilities (Howley & Franks, 2003; Wilmore & Costill, 2004).

The statistically significant improvement in the 0-40 meter speed (table 4) can be attributed to the development programme, as no improvement was visible in the control group. Dintiman and Ward (2003) indicate that optimal speed can be improved by repeated sprints with sufficient rest between each attempt. These findings support the fact that speed can be improved by way of training, regardless of the fact that genes play an important role in the individual's natural speed talent (Bompa, 2000).

With regard to the long-jump with a seven stride run-up it is clear that the development programme contributed to the improvement in the experimental group, as there was a statistically significant weakening in the control group. McNaughton (1988), Hancock (1993), Othersen (1992), Delecluse *et al*., (1994), Jacoby and Fraley (1995), Chu (1998), Fulcher and Fox (1998) and Dintiman and Ward (2003) are of the opinion that the use of plyometric exercises such as those used in this exercise program can contribute to the practically significant improvement in long-jump distance.

CONCLUSIONS

From the results obtained in this study it is clear that the item specific development programme of 10 weeks that was developed for this study can be applied in practice to improve the long-jump and sprinting potential in 10-15 year old potentially talented boys from disadvantaged communities. The programme exhibits a few shortcomings that need to be addressed to improve the effectiveness thereof further.

As running speed exhibited no statistically significant improvement (except in the 0-40 m), a recommendation is made that an adaptation be made to this component of the programme to ensure development. Sessions of a longer duration or more sessions per week with specific exercises to improve speed and speed endurance are also recommended. With regard to abdominal muscle endurance, it is recommended that more sessions be done with the specific exercise, as it is clear that one session per week is not sufficient to improve the abdominal muscle strength and endurance.

As growth and development still take place at the ages of 10 to 15 years and, therefore, can still contribute to individual differences, it must be taken into account that this specific development programme could possibly only have an application value on boys at a specific maturity level and may not have the same effect if applied to younger or older boys.

When judging the generalization of the study, it must be remembered that the programme was developed from the information obtained from a group of athletes from disadvantaged communities. Exercises were adapted to the infrastructure and terrain that was available. This could result in the sport development programme having a different effect on children from privileged communities with the necessary infrastructure and terrain on which to train. Therefore, it is recommended that follow-up studies be performed to analyze the practical value of this development programme further. A further recommendation is that more subjects be used to be able to make more generalized assumptions. The programme should also be adapted with regard to the maturity levels of the boys and it might be better to have less variance in the maturity levels.

The results, however, indicate that an item specific development programme of 10 weeks, which is offered three times a week with the aim of developing sprinting and long-jump talent, had a positive effect on the conditioning of motor and physical abilities and skills in talented 10 to 15 year old boys from poor socio-economic circumstances and a restricted environment.

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