

**A Model for Talent Identification and
Development for Team Sports
in South Africa**

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Declaration

I, the undersigned, hereby declare that the work contained in this dissertation is my own original work, and that I have not previously in its entirety or in part, submitted it to any university for a degree.

Signature

Date

ABSTRACT

The purpose of this study was to investigate the influence of participation in a special squad-based talent development programme on selected physical variables and skills in adolescent girls. This investigation was initiated in the team sport of netball in order to determine if participation in a talent development programme of this kind can be successful in the South African context. A second purpose was to consider the effectiveness of the squad-based model in relation to the traditional school-based model that is commonly implemented for talent development in South African netball.

This study followed a static group design in a field setting. The squad-based group (N=22) was composed of netball players ages 14 – 18 years old from two senior high schools in a previously disadvantaged community. The school-based group (N=45) was composed of netball players from the first and second teams at three schools in the same region, that maintained a good standard of netball and had qualified coaches.

The subjects in the squad-based group participated in a special eight-month training programme, which consisted out of 2 training sessions (90minutes) and 1 match per week. The subjects in the school-based group participated in their normal pattern of netball practices and school matches.

The results of this study lead to some general conclusions about the squad-based training model:

- Four components of skill development improved significantly
- Significant changes were found in four of the physical variables associated with netball performance.
- The squad-based model appeared to have been significantly more effective than the school-based model in the development of the physical variables of flexibility, speed, throwing velocity and aerobic fitness.

Based on the results the squad-based model is proposed as an approach to talent development that can make a significant contribution to the development of skill. Continuous refinement of current models and even the creation of new models, may one day create systems where every child can reach toward his or her own sporting potential.

OPSOMMING

Hierdie studie behels die deelname van 'n geselekteerde oefengroep adollesente meisies aan 'n talentontwikkelingsprogram. Die doel van die studie was om die invloed van deelname aan sodanige program op gekose fisiek- en vaardigheidskomponente na te gaan. Netbal, as 'n spansport, is gebruik om te bepaal of hierdie tipe talentontwikkelingsprogramme suksesvol in die huidige Suid-Afrikaanse konteks kan wees. 'n Verdere doelwit was om die effektiwiteit van hierdie oefengroepmodel teenoor die meer tradisionele skoolgebaseerde-model, wat tans algemeen in Suid-Afrikaanse netbal toegepas word, na te gaan.

Die studie het 'n statiese-groepontwerp gevolg in 'n veldtoetsing omgewing. Die oefengroep (N=22) het bestaan uit netbalspeelsters tussen die ouderdomme 14-18 jaar, van twee senior hoërskole vanuit die agtergeblewe gemeenskappe. Die skoolgebaseerde groep (N=45) het bestaan uit speelsters van die eerste en tweede netbalspanne van drie skole in dieselfde streek. Hierdie drie skole beskik oor gekwalifiseerde afrigters en handhaaf 'n hoë speelstandaard.

Die speelsters van die oefengroep het aan 'n spesiale agtmaande oefenprogram deelgeneem, met twee oefensessies per week (90 minute) asook een wedstryd per week. Die netbalspeelsters in die skoolgebaseerde-program het hulle normale oefenpatroon gevolg en aan skoolwedstryde deelgeneem.

Die resultate van hierdie studie het gelei tot sekere algemene gevolgtrekkings omtrent die geselekteerde oefengroepmodel:

- Vier komponente van die spelvaardighede het statisties beduidend verbeter.
- Beduidende statistiese veranderinge is waargeneem in vier van die fisieke komponente wat met netbal geassosieer word.
- Dit blyk dat die oefengroepmodel statisties meer effektief was in die ontwikkeling van fisieke komponente soos lenigheid, spoed, aerobiese fiksheid en spoed van gooie, as die skoolgebaseerde oefengroep.

Gebaseer op die resultate van die oefengroepmodel, kan hierdie benadering tot ontwikkeling 'n beduidende verskil maak in die ontwikkeling van netbalvaardighede. Verdere verfyning van huidige talentontwikkelingsmodelle, mag in die toekoms aanleiding gee tot bruikbare sisteme waar elke deelnemer die kans gegun sal word om sy sportpotensiaal te bereik.

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Chapter 1

Setting the Problem

It is almost certain that there are many talented athletes in South Africa who are not aware of their sporting talent, as they are not provided with an opportunity to try a wide range of sports (South African Task Team, 2003:4).

Talent is a quality or substance that a person or group has, that sets them apart from other people, usually in reference to a single subject (Wikipedia, 2004). The identification of talent in sport traditionally has been associated with individual sports that have discrete physical and physiological requirements, such as cycling, running, rowing, etc. However, research in team sports such as basketball (Hoare & Hunt, 1999a and Hoare & Hunt, 1999b), men's soccer (Hoare, 1999a), netball (Hoare, 1997) and women's soccer (Hoare, 2000), have successfully isolated the contribution of selected anthropometric and physiological attributes to sport performance.

Although the topic of talent identification has become increasingly complicated, its aim is still simply stated: to operate a system that can be employed to predict accurately those athletes who are most likely to succeed in sport in the future (Woodman, 1985). Attempting to find talent by using "natural selection" to compare one athlete's performance with that of others of the same age, has obvious limitations. It takes no account of the effect of the potential interactions between genetics, maturation and training, and often involves subjective assessment.

From a more contemporary perspective, Peltola (1992) defined talent identification as the process by which children are encouraged to participate in the sports in which they are most likely to succeed, based on results of testing selected parameters. These parameters have been shown to predict future performance, taking into account the child's current level of fitness and maturity. Russell (1989) went beyond the identification of talent, and proposed that the scientific perspective on the pursuit of excellence in sport be broken down into 4 key stages: Detection, selection, identification and development (see Figure 1).

- *Talent detection* refers to the discovery of potential performers among those who are not currently involved in the sport in question (Williams & Reilly, 2000).

- According to Salmela and Regnier (1983), talent detection refers to a process in which a long-term prediction is made that a given individual has the necessary attributes to achieve excellence in a specified sport.

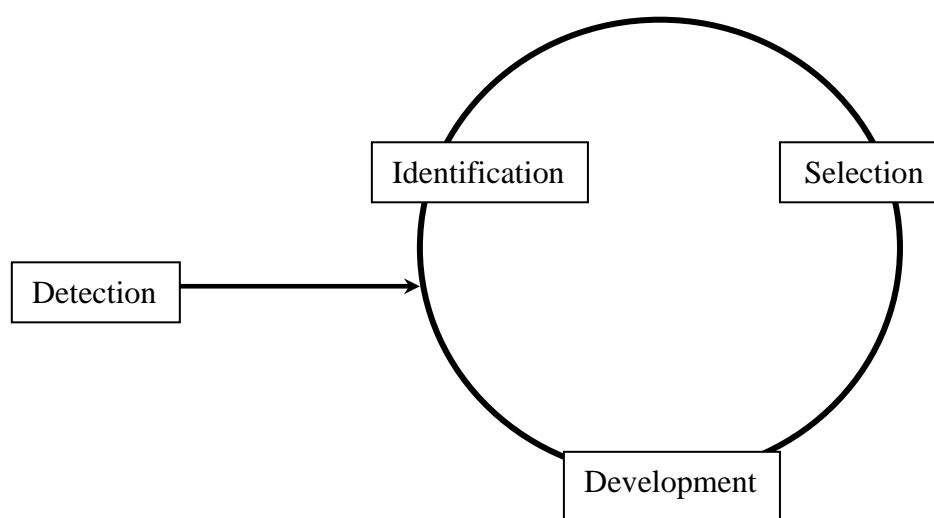


Figure 1

Key stages in the talent identification and development process (Williams & Reilly, 2000)

- *Talent selection* refers to an ongoing process of identifying individuals currently playing a particular sport, who demonstrate prerequisite levels of performance needed for participation at more advanced levels (Williams & Reilly, 2000). Selection involves choosing appropriate tasks within a specific sporting context and using performance on those tasks as evidence of future level of achievement. Salmela and Regnier (1983) defined talent selection as an operation by which a short term prediction is made that a given individual has the necessary attributes, level of learning, training and maturity to perform better in the immediate future, than other members of his/her group.
- *Talent identification* refers to the process of recognizing the potential to become an elite player, among a current group of participants. It entails predicting performance over long periods of time by measuring physical, physiological, psychological and sociological attributes as well as technical abilities (Williams & Reilly, 2000). Talent identification cannot exist in isolation without talent development (Gulbin, 2001). Talent identification has been viewed as part of talent development, in which identification may occur at various stages within

the development process. Talent identification is based on scientific principles, while talent development refers to a comprehensive approach to guiding the athlete to achieve his/her potential to participate in sport.

- *Talent development* implies that players are provided with a suitable learning environment so that they have the opportunity to realize their potential (Williams & Reilly, 2000). Talent development has received considerable interest of late, leading several researchers to suggest that there has been a shift in emphasis from talent detection and identification to talent guidance and development.

According to Hoare (1997), there are two mechanisms by which to approach talent identification for team sports.

1. To identify talent from within the sport, by testing athletes who are currently participating in a sport to try and identify those more likely to succeed. This mechanism is more precisely referred to as talent selection.
2. To identify athletes from outside of the sport who may have the necessary attributes (physical, physiological, skill) to succeed at a high level. This mechanism is talent identification.

In sports with low numbers of participants, it is more desirable to use talent identification. This is because the initial talent pool within the sport may not be large enough to have sufficient number of “talented” participants, which makes it necessary to identify and recruit talented athletes from outside of the sport. In sports with high numbers of participants (such as netball in South Africa), the initial talent pool is large, which means that the standard of players currently involved is potentially high. Thus, in these sports, it is appropriate to recruit from within the sport, as well as outside (Hoare, 2000).

There is no argument about the importance of genetic influences on behavior and the potential to achieve excellence in specific domains. Research efforts continue to focus on determining the ideal genetic dispositions and environmental conditions necessary to optimize the probability of achieving excellence in a specific sport (Singer & Janelle, 1999). In addition to these efforts, the study of the role of deliberate practice has also gained momentum. It is accepted that the amount and quality of practice remains a critical ingredient in the development of expert performers (Ericsson et al. 1993). Still another dimension of achieving excellence in sport is presented by the Scanlan, Carpenter,

Schmidt, Simons and Keeler (1993a) Sport Commitment Model. This model suggests that commitment is central to the achievement of excellence. They defined sport commitment as a function of five independent factors: sport enjoyment, involvement alternatives, personal investments, social constraints and involvement opportunities.

To further complicate the identification and development of talent in sport, the factors that lead to success in individual sports are not necessarily the same as in team sports. Team sports require interactive skill and fitting in with the context and skills of other players (Singer & Janelle, 1999). Only limited attempts have been made to embark on structured talent identification programmes with team sports because of difficulties in quantifying a suitable amount of the variance in performance. Team sports have been less inclined to conduct talent identification programmes as it has commonly been thought that success in team sports is related to knowledge of the strategies and skills of the game, more than physical and physiological characteristics. Talent selection programmes are more commonly used.

Significance of the Study

Although there is no argument about the raw talent available in South Africa, there is concern about the small proportion of this talent that develops to its full potential (Lambert, 2002). The talent identification and development system in South Africa is not well defined. National sports associations have tended to concentrate only on those athletes/players who already take part in competitive school sport (Amusa, 2002). School sport was previously used as the means for talent selection and development. However, recent changes in the educational system in South Africa have left only remnants of physical education in the curricula at many schools, and no physical education in many schools. This has contributed substantially to the compromise of the school sport system.

Sport federations have been trying to promote talent identification and development programmes. According to Lambert (2002), some sporting codes in South Africa are trying hard to project a professional image, have a vision for promoting the sport and generally have an established structure that identifies and nurtures talent. But he also stated that “other sporting codes are poorly administered and have overpaid, incompetent administrative staff around whom the sport seems to revolve” (p.1).

Talent identification and development has become a focus of concern for the South African government. In 1996, Du Randt completed a comprehensive study in which she collected normative data for tests of basic sporting ability, among high school age students across the country, including townships and rural areas (Hoare, 2003). This data was compared to Australian normative data for identical tests and age groups. The results showed that South African children were consistently superior across a number of tests. Hoare (2003) cautioned, however, that talent *identification* initiatives only have the potential to unearth talented individuals. Identification must be accompanied by a holistic *development* programme that is part of a structured performance pathway in a sport. According to Hoare, the key factor to consider before engaging in the search for sporting talent, is not the tests for the identification of talented athletes, but rather the development programme that can be implemented for these athletes.

Talent identification and talent development are linked. Hoare (2003) made it clear that South Africa must not invest in talent identification projects, if the country is not able to provide programmes that will proceed to develop talented athletes who have been identified. She stated that all sports should have a development programme – a performance pathway - where athletes can enter the sport at a certain spot and then progress toward achievement of their goals. At all stages along this pathway, athletes should be provided with scientific support to enable them to develop their talent.

Defining development pathways may not be simple. Du Randt, Headley, Loots, Potgieter, De Ridder and Van der Walt (1992) conducted a research study on talent identification and development in selected countries, and found that countries differ in their application of talent identification and especially development models. The difference can especially be noticed between the former communist-socialist countries and the capitalist countries. Based on this information, Du Randt et al. (1992) recommended that a model for talent identification and development for selected sports be developed in South Africa.

The current study is one response to the Du Randt et al. (1992) position. It compares two different models for talent development in the sport of netball currently applied in South Africa. The first model is the squad-based model, where players from several schools volunteer to participate in a battery of netball talent identification tests. A squad is then chosen based on the results of the tests, and that squad receives special

training over a period of time, by qualified netball coaches. The second model is the school-based model, where the players practice and compete as part of their school team, receiving netball coaching from a qualified coach from the school. In a sense, the first model makes use of talent identification, while the second makes use of talent selection. It is intended that the results of this investigation will provide important insights about the relative effectiveness of each of the models, and that recommendations can be made about which model may be better suited to the South African context.

Research Questions

The following questions guided this research:

1. Will there be a significant change in the netball performance of players who participate in a squad-based netball development programme?
2. Will there be any significant changes in any of the physical variables associated with netball performance, after participation in a squad-based netball development programme?
3. Will there be any significant changes in any of the physical variables associated with netball performance, after participation in a school-based netball development programme?
4. Will there be any significant differences in the changes in physical variables achieved by members of the squad-based group, compared to members of the school-based group?
5. What were the perceptions of the players of this squad-based experience?

Methodology

This study followed a quasi-experimental design in a field setting. The squad-based group (N=22) was composed of netball players ages 14 – 18 years old from two senior high schools in a previously disadvantaged community. The subjects were identified as the top players from a pool of players that completed a battery of physical performance tests recommended by Hoare (2003) as netball relevant. The school-based group (N=45) was

composed of netball players from the first and second teams at three schools in the same region, that maintained a good standard of netball and had qualified coaches.

Identification of the Subjects

All of the girls at the high schools selected for the squad-based programme were invited to take part in the battery of talent identification tests recommended by Hoare (1997). They were told that they might be invited to participate in a special netball development programme, based on their performances on the tests.

Girls on the first two teams from three different high schools in traditionally strong netball high schools were invited to take the pretest and posttest in order to serve as a reference group for this research. This group did not follow any special intervention programme, but did follow their usual school netball activities.

Coach Evaluation

The two coaches selected to implement the intervention evaluated the netball playing performance of all the subjects in the squad-based programme. This was done using a scale of 1 (poor) to 7 (excellent) in four areas, namely: attacking skills, defensive skills, catch/pass skills and overall ability.

Intervention

The subjects in the squad-based group participated in a special eight-month training programme, which consisted of two training sessions (90 minutes) and one match per week. The subjects in the school-based group participated in their normal pattern of netball practices and school matches.

Post-test

The players completed the identical assessment experience as in the pre-test. Twenty-two players from the squad-based group completed the post-tests. Forty-five participants in the school-based group completed the post-tests.

Limitations

The following limitations may have had an impact on one or more aspects of this investigation:

1. The subjects from the squad-based group who participated in this study were from a single ethnic group and were from one geographical location. This may limit the generalisability of the results in this study.
2. The coaches used their own coaching strategies based on their judgements about the needs and capabilities of the players on their squads. The outcome of the study may have been different if a different combination of content and method of instruction had been pursued.
3. There was no control group for this study. Coaches from the high schools that served as representatives of the traditional school-based model were not interested in reporting the content and methods of their training sessions. They also did not want to implement similar programmes in their schools.
4. As with all forms of field research, there were many opportunities for influences unknown to the researcher, to influence the results of the training of the squad-based group. However, such variables will inevitably affect any talent development programme. In that light, these unknown sources of error are accepted as part of the process of conducting research in real-world settings.

Definitions

The following terms were defined in the following ways for the use in this research.

Talent identification

For the purpose of this study, talent identification will be defined as the screening of children and adolescents using selected tests of physical, physiological and skill attributes in order to identify those with potential for success in a designated sport. Previous involvement in the sport is not a pre-requisite for identification.

Talent selection

Talent selection is defined as the screening of young athletes currently participating in a sport using experienced coaches and/or physical, physiological and skill tests in order to identify those most likely to succeed in that sport.

Talent development

Talent development includes the provision of appropriate coaching, training and competition programs along with access to facilities, equipment and sports science/medicine support.

Summary

Identifying sporting potential at an early stage ensures that players receive specialized coaching and training to accelerate the talent development process. For this process to be successful it is naturally important to know specific qualities required to succeed in a specific sport. Team ball sports such as netball are complex in nature, with evidence of anthropometric, physiological, psychological, perceptual and technical contributions to performance. In addition there is a requirement for game knowledge to develop strategy and a “game sense” or awareness. Thus any attempt to identify early netball talent must take into account these multiple factors together with the influence of growth and maturation factors across the development cycle.

Chapter 2

Review of Literature

High level performance is rare and low level performance is frequent in most domains (Walberg, Strykoski, Rovai & Hung, 1984). Not all children will inherit those prerequisites needed to succeed in their sporting activities. Proper coaching, training facilities, and the willingness to train are some of the critical factors that influence the development of excellence. An integrated approach to talent identification and development has been recognized as one of the key ingredients in elite sport programmes. From a scientific perspective, the pursuit of excellence can be defined in terms of four key concepts: detection, selection, identification and development (Russell, 1989).

Perspectives on explaining the attainment of expertise in sport vary, considering hereditary contributions and the role of dedicated practice over many years. The relative influence of each is difficult to determine clearly. Both interact along with other factors to produce excellence. Even the term “expert” is defined differently in different contexts . According to Singer & Janelle (1999), the great athlete not only knows what to do in a variety of situations, but also how to apply this knowledge. In sport, competition serves as the quantitative measurement of excellence, so expertise in sport is more easily determined than might be the case in other domains.

Hereditiy and Expert Performance

There is little argument that genes influence behavior and the potential to accomplish in specific domains. The ideal genetic disposition and environmental conditions help to optimize the probability of athletic success. With such considerations in mind dedicated practice alone will typically not suffice to achieve world-class recognition for excellence in a sport.

Although it is generally agreed that motivation, commitment and hard work lead to exceptional success, the premise that genetic determinants are more powerful than experiences and environments in life is not new. Because the attainment of the highest levels of excellence in sport depends on so many variables, it is not easy to partial out the

role of heredity. The following genetic predispositions, according to Singer and Janelle (1999), are possible contributors to the attainment of expertise in a specific sport:

1. Personality characteristics associated with being a tough competitor and yet under personal control.
2. Physique and body composition.
3. Motor abilities such as speed, power, agility and flexibility.
4. Adaptability to training.
5. Ability to process information appropriately and make effective decisions.
6. Health.

Very few individuals achieve expertise in more than one sport. This may be due to the genetic-specific principle for specific sports and/or the inability to dedicate sufficient practice and training for more than one sport. Research to determine human differences in inherited characteristics, have primarily involved the study of twins and non-twin siblings raised together or apart (Singer & Janelle, 1999). However a more precise estimate can be determined by calculating the heritability (h^2) statistic. It describes the proportion of variance for a characteristic that is associated with genetic differences among individuals. A heritability value of 60% of the variance is considered to have reached the standard of “genetic determination.”

Physical Attributes Associated with Expertise

In many sports, ideal physical attributes are associated with ultimately attaining a level of excellence. Cowart (1987) suggested that genetics play an important part in aerobic capacity, adaptability to training and the composition of muscle tissue. Bouchard, Malina & Pérusse (1997) made two general observations following an extensive review of the literature. First, the elite athlete is probably an individual with a favorable profile in terms of the morphological, physiological, metabolic, motor, perceptual, biomechanical and personality determinants of the relevant sport. Second, the elite athlete is a highly responsive individual to regular training and practice. They also discussed research findings on active life styles and the contribution of genetics. They pointed out that

children with active parents tend to be 5.8 times more likely to also be active than the children of inactive parents.

Personality and Expertise

Success in each sport is probably partially associated with the presence of ideal personality characteristics that facilitate learning/training and competitive advantage. In spite of many attempts through the years to identify specific personality characteristics or a profile that are predictably associated with success in sport, research results are not conclusive (Williams & Franks, 1998).

Most personality traits according to Plomin, Owen and McGiffen (1994) seem to be to some degree inherited (they estimated a range of 40% to 50% inherited). For example, any sport event requires a degree of risk-taking, sensation-seeking and the ability to deal with potentially dangerous situations. Genetic factors may predispose some individuals to be psychologically able to cope with such situations (Singer & Janelle, 1999).

Intelligence and Expertise

Many athletes develop a set of strategies that allow them to analyze the major features of their opponents' game. Such behaviors represent a form of intelligence. What complicates this matter according to Singer and Janelle (1994), is that many psychologists favor the notion of at least three aspects of intelligence. Luria (1973) has been quite influential in the way many educators view intelligence. He describes three functional units: (1) the regulation and focus of attention, (2) the ability to process information, receiving it and retaining it and (3) the ability to form a plan of action or solution to a problem, execute and determine its effectiveness. In sports involving speeded reactions with uncertainty as to the opponent's intentions, the three functional units identified by Luria need to be activated under severe time pressure as well as arousal conditions. As is the case with other personal dimensions associated with expertise in sport, genetics will favor some and not others for meeting the demands for information processing intelligence.

Little research is available to determine the degree to which information processing intelligence is trainable, meaning that a person with normal intelligence and a sufficient amount of dedicated practice could become skilled in strategic situations (Singer & Janelle,

1999). Neisser and his colleagues (1996) in a comprehensive review of the literature on all aspects of intelligence, concluded that the speed with which people perform very simple perceptual and cognitive tasks correlated positively with psychometric intelligence (IQ). In general, people with higher intelligence test scores tended to apprehend, scan, retrieve and respond to stimuli more quickly than those who scored lower. These observations provide some support for a genetic base for intelligence that appears to be related to information processing speed.

The Role of Deliberate Practice

Practice is a necessary mediating factor for the attainment of expertise in any domain. Although the claim that practice actually causes expertise is not universally agreed on, it is the position adopted by Ericsson, Krampe and Tesch-Römer (1993). They proposed a theory of expertise based solely on what they labeled “deliberate practice”. They defined deliberate practice as any activity specifically designed to improve the current level of performance. They contrasted deliberate practice to other activities such as play, work and observing others. They made three statements about deliberate practice:

1. The total number of hours of deliberate practice is directly related to the level of expertise achieved.
2. Effort, determination and concentration are required as characteristics of deliberate practice.
3. Deliberate practice is not inherently enjoyable.

According to Singer & Janelle (1999) deliberate practice involves:

1. A task that is well-defined and that is challenging to the person.
2. The presence of informative feedback during and after performance.
3. Frequent opportunities for repetition and error correction.

The Amount or Volume of Practice

A substantial body of evidence suggests that elite performers require more than 10 years of practice to acquire the necessary skills and experience to perform at any international level. This 10-year rule was first discussed by Simon and Chase (1973) and was true for many domains investigated: Sports (Ericsson, Krampe & Tesh-Römer, 1993; Helsen, Starkes & Hodges, 1998; Schulz, Musa, Staszewski & Siegler, 1994), music (Ericsson, Krampe & Tesch-Römer, 1993) and chess (Charness, Krampe, Mayr, 1996). The 10-year rule is offered as a guideline, but it is proposed that at least 10 years of meaningful practice is a requirement for expertise in a particular specialization.

Much of the reasoning behind the requirement for 10 years of practice is related to limitations posed by potential burnout and lapses of concentration. By definition, deliberate practice can only occur when concentration is devoted to the task. Therefore, any time during which concentration is not being maintained cannot be accepted as deliberate practice. Ericsson, Krampe & Tesch-Römer (1993) provided evidence to show that as the amount of deliberate practice increases, so does the amount of hours devoted to sleep. They also suggested that the amount of deliberate practice tends to increase with age. This may be due to more opportunities for deliberate practice as a person becomes more specialized in the task and has more time to devote to the task. Thus the 10-year rule applied to the acquisition of expertise is based primarily on the need not only to practice, but also to have enough time between deliberate practice sessions to recover the necessary concentration, fitness and effort to be capable of continuing deliberate practice.

Contrary to existing theories of skill acquisition that focus primarily on the importance of experience, Schulz et al. (1994) suggested that there are limits to the benefits of experience. In a major league baseball study they found that peak hitting performance improves little after 1500 hits and that less able players never catch up to better players, regardless of the amount of experience. It is likely that experimental-based gains become marginal over time and that physiological capacity overrides the benefits of experience.

The Intensity of Practice

Deliberate practice consists of activities that are highly taxing (Young & Salmela, 2002). Due to the mental and physical demands of such efforts, Ericsson, Krampe and

Tesch-Römer (1993) suggested that deliberate practice could only be sustained for a limited amount of time in each training session. The performer must find a balance between maximal bouts of effort and opportunities for recovery. Young & Salmela (2002) emphasized the importance of recovery activities in order to maximize performance gains and to avoid athlete burn-out. Helsen, Starkes & Hodges (1998) reported that sleep was a remarkably relevant everyday activity for improving performance.

Pinker (1997) stated that genius can be explained not only through the ability to constantly challenge oneself to explore and develop further, but also by being genetically favored. Singer and Janelle (1999) found the following observation in their review of research that, when compared to novices, sport experts:

- Have more elaborate task-specific knowledge.
- Make more meaning of available information.
- Encode and retrieve relevant information more efficiently.
- Visually detect and locate objects and patterns in the visual fields faster and more accurately.
- Use situational probability information better.
- Make more rapid and appropriate decisions.

Expertise in Team Sports

In team sports, the volume, content and intensity of practice is largely coach-determined (Helsen et al. 1998). This is true both in terms of the absolute amount of time put in and which skills are actually practiced. As a result, the absolute amount of accumulated practice might be less predictive of an individual's performance attained. This could also be because a large percentage of practice must be devoted to the lower or highest common skill denominator within a team, rather than focusing on individual practice of those aspects that would most benefit each individual.

Individual practice and team practice are two possible forms of deliberate practice. The relative contribution of each is likely to change over the course of an athlete's career,

or even over a competitive season. Still another consideration is the underlying nature, history and type of team sports chosen. Within the South-African context, for example, netball is a popular sport that has relatively little spectator support and no professional system. This context may have a negative influence on the seriousness with which players approach practice, which in turn would decrease the likelihood that players would engage in deliberate practice.

Development of the Expert Performer

Glaser (1996) suggested that the type of training needed at different stages in the development of expertise may warrant a reduced dependence on external guidance. He has identified three stages in the progression to expert levels.

1. The *external support stage* involves great commitment from parents, coaches, teachers and other support sources to help the learner acquire basic skills.
2. The *transition stage* is characterized by a reduction in the amount of external support and a shift toward more autonomous learning. This stage also tends to be characterized by the acquisition of self-monitoring and self-correction skills that lead to the final stage.
3. The *self-regulation stage* of learning has been purported to characterize a high level of competence. In this stage much of the learning that takes place is structured by the learners themselves and is directly under their control. They may still depend on feedback from coaches and other support personnel, but tend to rely primarily on their own error correction and perfection mechanisms.

Glaser and Chi (1988) identified several common characteristics displayed by experts from different domains. They include:

- The ability to perceive complex patterns in the domain of expertise quickly and efficiently (the more efficient use of cognitive resources).
- The ability to recognize meaningful information more easily and as a result, represent that information at a deeper level than novices.

- The ability to monitor their own deficiencies or limitations and evaluate their own performance.

Although these qualities all relate to information processing, it is not clear how these qualities are developed. It has been suggested that these are cognitive advantages that are a function of the expert's more sophisticated knowledge structure (Thomas, 1994).

The Role of Enjoyment

Helsen et al. (1998) (with field hockey and soccer players) and Hodges & Starkes (1996) (with wrestlers), tested the theory of deliberate practice by listening to what athletes said about the relevance, effort, enjoyment, and concentration associated with practice, leisure and everyday activities. Their findings, according to Helsen et al., were that when practice activities were rated as most relevant and most effortful, they were also rated as inherently enjoyable. Helsen et al. pointed out that team sports such as wrestling, field hockey and soccer are inherently social activities, as well as competitive and physical in nature, all of which athletes seem to find enjoyable. They posited that sport enjoyment was an important factor explaining athletes' long-term commitment to practice and participation. According to their studies, athletes would put in the long hours of practice required because they:

- Enjoyed working with a coach.
- Enjoyed activities most related to the actual performance.
- Found rest as necessary and enjoyable.

The importance of enjoyment in deliberate practice in sport, does not fit well with Ericsson's definition of deliberate practice. Wantanabe (2000) found that athletes rated the primary sources of enjoyment in sport in the following order:

1. Challenge.
2. Mastery.
3. Achieved results.

The Sport Commitment Model

Sport may be unique to other domains regarding the development of expertise. In sport, talent selection or identification may have to center on finding those individuals who have the commitment necessary to put in the hours of practice to achieve expertise. Within the sport psychology literature, the sport commitment model offers some insight into this aspect (Scanlon, Carpenter, Schmidt, Simons & Keeler, 1993a; Scanlan, Simons, Carpenter, Schmidt & Keeler, 1993b). Since staying in sport (sustaining deliberate practice) is a consequence of this commitment, it is important to consider the sources of such commitment. This model suggests that commitment to sport is a function of several independent factors (see Figure 2).

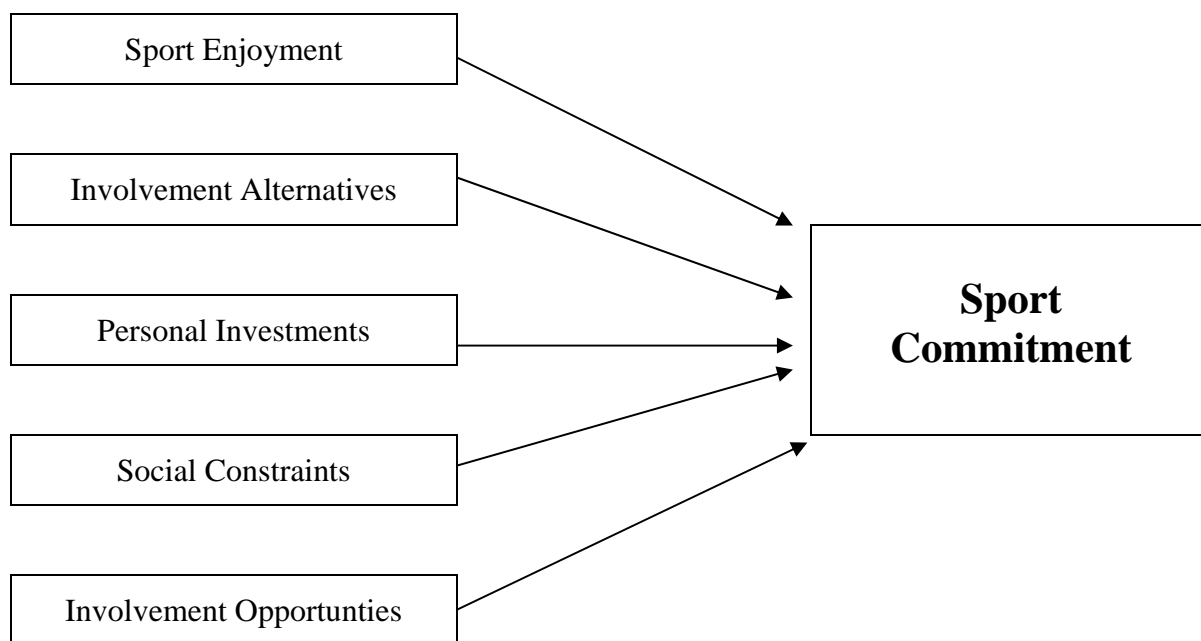


Figure 2

The Sport Commitment Model (Scanlan et al. 1993b).

The constructs in the model were defined by Scanlan et al. (1993b):

- *Sport Commitment*: A psychological construct representing the desire and resolve to continue sport participation.
- *Sport Enjoyment*: A positive affective response to the sport experience that reflects generalized feelings such as pleasure, liking and fun.

- *Involvement Alternatives*: The attractiveness of the most preferred alternative(s) to continued participation in the current endeavor.
- *Personal Investments*: Resources that are put into activities, which cannot be recovered if participation is discontinued
- *Social constraints*: Social expectations or norms which create feelings of obligation to remain in the activity.
- *Involvement Opportunities*: Valued opportunities that are present only through continued involvement.

Two tests of this model with young athletes demonstrated that sport enjoyment, personal investments and, to a lesser extent, involvement opportunities, are the most important factors in determining sport commitment, with more than 68% of the variance in commitment explained by these three variables (Scanlan et al. 1993b, Carpenter et al. 1993). The types of investments that have proven most important to commitment are personal time and effort. The implication of sport commitment on deliberate practice is increased number of hours practiced per week as one's career progresses, and more effort put into practice activities related to performance.

Scanlan et al. (1993) pointed out that enjoyment of sport is critical to commitment. However, Ericsson et al. (1993) suggested that deliberate practice is not inherently enjoyable. Since the majority of time in sport is spent in training and a lesser amount in actual performance, it is difficult to reconcile the theories. Helsen et al. (1998) replicated the results of Scanlan and colleagues, whose soccer players and hockey players also reported relevant practice activities as enjoyable. Ericsson (1996) explained that practice in sport is inherently social and it is the social aspect that individuals find enjoyable, as opposed to practice itself. If this is correct, how can one explain why field hockey players working totally alone on ball-handling skills, continue to rate this practice activity as highly enjoyable (Helsen et al. 1998)?

Situational Circumstances and Expertise

Bloom (1985) stated that situational circumstances play a role in the development of talent. These include having the opportunity and realization of positive initial

experiences in the chosen domain. According to Singer and Janelle (1999), the availability of the best facilities in which to train and the right coaches to train under help tremendously. Parent involvement and support also contribute to achievement possibilities by dedicating the time to do things on behalf of the would-be expert. Minimizing severe injuries can also result in an increased probability of continued practicing toward goals. Situations and individual differences due to genetics have to work together in order for most ideal outcomes to occur.

Family Influence

Although not a necessary condition for attaining excellence, family structure and support can be very influential in stimulating a young person's interest and enthusiasm for developing expertise in a particular domain (Singer & Janelle, 1999). A dedicated parent (especially if reasonably affluent) can provide continued opportunities for a child to practice under the leadership of qualified coaches. Sports such as gymnastics, tennis, and golf are made accessible through a strong economic base (family, sport federation or government). Financial considerations eliminate potential experts because opportunities are restricted to the more affluent.

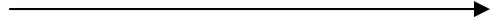
Coté (2000) suggested four distinct stages of participation in sport over a lifetime:

1. Sampling years.
2. Specializing years.
3. Investment years.
4. Recreation years.

At each stage, the individual has the potential to move to the next level, drop out of the sport or enter the recreation stage. In a child's pursuit of excellence in sport, important changes also occur at parental and family level. According to Coté (2000) the roles of parents change from a leadership role in the sampling years, to a supporter role in the investment years. Parents assumed leadership during the sampling years by initially getting their children interested in sport and allowing them to sample a variety of sporting activities. During the specializing years, parents become committed supporters of their child's decision to be involved in a limited number of sports. The role of follower becomes more apparent in the investment years where parents make sacrifices in their personal lives

and their family's life, to allow their child optimal training conditions. Coté stated that the role of the family in children's sport involvement is complex in nature and should be studied further to understand the influence on talent development. Williams and Reilly (2000) offered another development presentation of the influence of family on sport development (Table 1).

Table 1. Potential characteristics of talented soccer players and their coaches and parents, at various stages of their careers (from Williams & Reilly, 2000)

	Career progression 		
	Initiation Stage Characteristics	Development Stage Characteristics	Perfection Stage Characteristics
Player	Joyful Playful Exited Special	Hooked Committed	Obsessed Responsible
Coach	Kind Cheerful Caring Process-centered	Strong Respected Skilled Demanding	Successful Respected/feared Emotionally-bonded to players
Parents	Shares player's excitement Supportive	Make sacrifices, Own activities are restricted	Sought mentors, positive

Facilities, Equipment and Coaching

A great advantage to talent development is having convenient and available facilities in which to train. An additional impetus for attaining success is the ability to acquire the appropriate apparel and equipment associated with specific sports (Singer & Janelle, 1999)

Bloom (1985) pointed out that being under the tutelage of caring and knowledgeable coaches, especially during the formative years, could make a great difference. Good coaches know when to push the athlete to work harder, when to reduce the intensity and pressure, and how to shape the athlete's career. According to Singer & Janelle (1999), perseverance, withdrawal or drop-out will occur if harmony does not exist between the coach and athlete.

Injuries

An athlete's potential to succeed is blessed by the fortune to experience minimal injuries over the years of training for competition. Injuries may be attributed to extrinsic factors such as playing surface or intrinsic factors such as biomechanical defects or fitness. Clear guidelines are required to prevent overuse injuries in children as a result of inappropriate training frequency or intensity (Williams & Reilly, 2000). The prevention and detection of injuries should therefore be a constant concern in any system of player development.

The ability to recover quickly from injuries, physiologically and psychologically, is also a determinant of probable achievements over the course of time (Singer & Janelle, 1999). The timely recovery from injuries reflects good medical care, the severity of injury, and the psychological ability to cope with and overcome each occurrence. The tendency to be injured reflects on a number of factors such as lifestyle, the ability to cope with stressors, sensation-seeking, attention focus and extreme motivation (Williams & Anderson, 1998). Most successful athletes are able to remain reasonably injury-free or at least recover well from such adversities.

Models of Talent Identification, Selection and Development

A brief review of some of the models that deal with talent identification, selection and/or development, may help gain clarity on the relationship between these three concepts. The models generally present talent identification as a process dependent on the isolation and testing of underlying performance determinants (Salmela & Regnier, 1983).

Some of these models or a combination of these models could be usable in the South African context. The chosen model should include all three phases of the talent process namely talent identification, talent selection and talent development. The choice of a model is dependable on the chosen sport and the culture of the sport in South Africa. For a more comprehensive discussion of the models included in this section, see Du Randt (1992).

Bar-Or's model - 1975

Bar-Or(1975) proposed a five component protocol for talent identification. He did not specifically refer to talent selection or talent development as separate concepts, however his inclusion of a short training programme in which children's reaction to training could be observed, is compatible with the definition of talent selection.

Talent Identification	Talent Selection	Talent Development
<i>Component 1:</i> Evaluation of morphological, physiological, psychological and performance variables.		
<i>Component 2:</i> A development index is applied to account for biological age.		
<i>Component 3:</i> Test the child's reaction to training by exposing them to a short training programme.		
<i>Component 4:</i> Evaluates the child's family history.		
<i>Component 5:</i> A multiple regression analysis model is used to predict future performance from results obtained in components one to four.		

Gimbel's Model – 1976

Gimbel (in Du Randt et al. 1992) suggested that promising athletes be identified at 8-9 years of age, before their growth spurt has started. Gimbel suggested a 4-step model for creating a talent identification and development programme:

Talent Identification	Talent Selection	Talent Development
<p><i>Step 1:</i> Identify morphological, physical and psychological factors underlying performance</p> <p><i>Step 2:</i> Testing children at the schools on selected variables</p>	<p><i>Step 3:</i> 12-24 month instructional programme, where children's progress is monitored</p>	<p><i>Step 4:</i> Prediction is made about each child's probability of success in their respective sport. Each child will be given access to a training programme. If the results of the prediction process are not conclusive, children will undergo a further year of training, after which final decisions are made.</p>

Jones & Watson's Model - 1977

Jones and Watson's conception of talent identification (in Du Randt et al. (1992) was based on procedures used in psychological studies. The four elements in their model draw on an analysis of performance in order to identify the predictors of success. Neither talent selection nor talent development were dealt with in their model.

Talent Identification	Talent Selection	Talent Development
<i>Element 1:</i> Identification of target performance.		
<i>Element 2:</i> The selection of a criterion to represent the target performance.		
<i>Element 3:</i> The selection of potential performance predictors and the verification of the predictive power of these variables		
<i>Element 4:</i> Application of results to determine which sport is recommended for which individual.		

Harre's Model - 1982

Harre's model (in Du Randt et al. (1992) is based on the assumption that only training and practice can determine if a child has the required attributes to succeed. This is reflected in the overlap between talent identification and talent selection, and between talent selection and talent development in the chart below. The model consists of two stages. The first stage of talent identification according to Harre, is to expose as many children as possible to training programmes. Harre emphasizes a close relationship between talent identification and development and talent is continuously re-identified as it is being developed.

Talent Identification	Talent Selection	Talent Development
<i>Stage 1:</i> Identification of important performance factors.		
	<i>Stage 2:</i> Involves the confirmation of sport talent during junior training programmes. Indicators include level of performance, rate of improvement, performance stability and reaction to training demands.	

Bompa's Model – 1985

Bompa (in Du Randt et al. (1992) maintained that comprehensive talent identification is not solved in one attempt, but is accomplished over several years in three main phases of participation. In each phase, a scientific effort is made to identify performers with potential, which blurs the distinction between talent identification and talent selection. Bompa also stated that each sport must create its own model.

Talent Identification	Talent Selection	Talent Development
<p><i>Primary Phase:</i> Occurs during pre-puberty (3-8 years), and includes a physician's examination of a child's health and physical development – child may or may not be already involved in sport activities.</p>		
	<p><i>Secondary phase:</i> Used with teenagers who have already experienced organised training. Detailed health examination to detect obstacles to future sport development. Sport psychologists test and compile psychological profile on each athlete.</p>	<p><i>Final phase:</i> Concerns primarily national team candidates. Factors examined include: health, physiological adaptation to training and competing, ability to cope with stress and potential for further performance improvements.</p>

Regnier's Model – 1987

Regnier identified six principles to guide a formal approach to talent identification after reviewing talent identification models (in Du Randt et al. 1992). These principles were:

1. Talent identification must be viewed as a process within the larger context of talent development.
2. Talent identification should focus on long-term predictions about the success of individuals.
3. Talent identification must be sport specific.
4. Talent identification must incorporate a multi-disciplinary approach.
5. Talent identification must assign a significant role to those predictors of performance that are determined by heredity.
6. Talent identification must take into account the dynamic aspect of sport performance, including the changes in performance contexts and situations.

This model identifies two major steps that must be completed prior to the application of a talent identification assessment instrument.

Talent Identification	Talent Selection	Talent Development
<p><i>Step 1:</i> Selection of the capacities that will be used for the detection process.</p> <p><i>Step 2:</i> The design of a specific detection tool for every target-population (age level) and sport</p>		

Russell's Model – 1987

Russell outlined three stages (in DuRandt et al. 1992) that occur sequentially from detection to the perfection of talent.

Talent Identification	Talent Selection	Talent Development
<p><i>First Stage:</i> Talent detection – Measurement of athletes in the following areas.</p> <ol style="list-style-type: none"> 1) Perform a thorough task analysis. 2) Screen athletes to determine if they have the qualities to meet performance demands. 3) Identify athletes whose qualities best match performance demands. 4) Detecting talent by testing athletes selected in #3 with a battery of tests (morphological, organic, perceptual, psychological and demographic data). 	<p><i>Second Stage:</i> Talent selection – Information collected in the first stage is used in the following ways:</p> <ol style="list-style-type: none"> 1) Provide children with information on which to base their choice of sport. 2) Provide coaches with athletes's performance profiles to assist with design of training. 3) Provide an objective foundation for possible selection procedures for teams, special programmes/schools, future screening and even awarding financial assistance. 	<p><i>Third Stage:</i> Talent perfection – Coaching talented athletes based on information gained in preceding stages.</p>

Hebbelinck's Model – 1988

Hebbelinck (in Du Randt et al. 1992) proposed a model with three distinct stages for talent identification, that included talent selection and talent development efforts.

Talent Identification	Talent Selection	Talent Development
<p><i>Initial stage:</i> Mass screening of primary school children using a battery of physical performance tests. Children who excel are encouraged to join a training programme.</p>	<p><i>Secondary stage:</i> The evaluation of the children's progress. Recommendations are given about the most suitable sport for each child to pursue.</p>	<p><i>Final stage:</i> The development of sport-specific qualities through a systematic training programme.</p>

Trainability is the genetic endowment of an athlete as he or she responds individually to a specific stimulus and adapts to it accordingly (Balyi & Hamilton, 2000a). The trainability of athletes is determined by critical periods of development. These periods are specific in a child's physical, cognitive and emotional development, and they are optimal for learning certain skills. Introducing sport skills during the correct critical period will enable children to learn the skill more easily and to retain them in their memory. If the appropriate skills are not introduced and practiced during these periods, the athlete will not easily be able to learn and master these skills (Balyi & Hamilton, 2000b).

For a player to achieve peak performance, his or her training programme must be arranged so that they will peak simultaneously in a variety of areas including the tactical, technical, physical, mental and nutritional aspects of training (Bompa, 1985). In addition, the medical and environmental elements of training must be optimized.

Coaches at all levels of development who are responsible for planning practice sessions must carefully integrate and sequence the many factors listed above. In other words the emphasis of training changes as players advance in their training. For the novice, the focus of sport training should be acquiring basic technical skills in a fun and supportive environment (Balyi & Hamilton, 2000). Only when the athlete has fully mastered the fundamental movement skills, which are common to most similar sports, as well as the basic technical and tactical skills of their sport, should the coach shift the emphasis of training.

In many Western countries, expert sport development has adopted a generic model based on five components: talent identification, recruitment, training, competition and retainment (Balyi & Hamilton, 2000). Currently administrative and coaching practices emphasize only two of these components: training and competition. According to Balyi and Hamilton, little attention is paid to systematic talent identification and recruitment at early training ages. Efforts to retain athletes as they near the end of their athletic career, is also neglected.

Models of Talent Identification and Development from Selected Countries

In the search for a suitable model for talent identification and development for South Africa, it may be instructive to look at the approaches that have been implemented in some other countries.

Australia

In recent years a number of Australian sports have initiated a more systematic process for identifying talented athletes. When Sydney was awarded the 2000 Olympic Games, the government provided additional funding and support for developing elite athletes (Hoare, 1995 & 1998; Australian Institute of Sport, 2003). The first step in this talent identification process was to determine the physical and physiological requirements of different sports and then to make recommendations regarding the type of athletes suited for competition (Hoare, 1998). There were three phases in the Talent Search programme of Australia:

1. School screening.
2. Sport specific testing.
3. Talent development.

Phase 1 involved the screening of students in schools through a battery of eight simple physical assessments. In most cases physical education teachers conducted the tests and the results were forwarded to State/territory coordinators, who compared the results against a national database. In general, students who were in the top 2% in one of the eight tests, were invited to participate in Phase 2.

Phase 2 testing included some Phase 1 tests, but also incorporated sport-specific laboratory tests. Students identified with talent for a specific sport in phase 2 testing, were invited to join a “talented athlete programme” organised by the state or national sporting organisation. Of those students participating in Phase 2 testing, approximately 10% were invited to join these specialised training groups. Athletes not selected to participate in a talent development programme were encouraged to participate in club level sport to allow them to develop their skill.

Eastern European Countries

According to Riordan (1988), there is a general pattern followed for talent identification and development in Eastern European countries.

Stage 1 is a *basic selection phase*. This takes place at school during Physical Education lessons or at various sport clubs. The main standards observed at this stage normally include height and weight, speed, endurance, work capacity, power and sport-specific tests for performance level and technique efficiency.

Stage 2 occurs 18 months after Stage 1 and is the *preliminary selection stage*. Assessment is based on factors like progress made in physical ability and sport specific tests, rate of physical growth, biological age, psychological aptitude etc. At this stage it is usual to guide children towards a particular sport or sports group. Although some children will be eliminated after the preliminary selection, they will be given another chance one year later. Those selected during the second assessment join the training squads at the sport schools.

Stage 3 is the *final selection phase* which occurs about 3 or 4 years after Stage 1. Final selection is based on factors such as: standards attained in a specific sport, rate of progress in the sport; stability of performance; results of physical capacity tests; results of event/sport specific performance capacity tests; results of psychology tests and anthropometric measurements. Once the person is identified as possessing potential talent the person may be offered a place at a residential sport-boarding school. According to Riordan (1988), many Eastern European countries regard the controlled environment of a sport school as the model for talent development, because these schools can provide participants with the best coaches and facilities, special diets and medical staff.

New Zealand

New Zealand follows a “pyramid principle”, which is premised on the prediction that if the base is wide, then the peak will be high and those athletes who reach the top will be the most talented (McClymont, 1996). Competitions are organised at beginner level in the belief that if more young people play a specific sport, then there will be a greater chance of a talented athlete being “discovered”.

Physical education, recreation and sport in the education system are the basis of the model. New Zealand has a network of development levels including sport academies, national and provincial development squads and training schools for talented performers. Prior to being selected for a specific sport at national level, athletes receive advanced instruction in sport skills for which they have shown aptitude. The development of these skills and the move into a specific sport discipline at national level will be dependant upon the complexity of the specialist skills and the time required for the performer to reach international status.

China

Rizak (1986) provided the following description of one path for talented athletes in China that utilised the school system. Talented children from the primary and secondary schools are enrolled for training after their normal academic classes and in spare-time sport schools. The athletes are recruited through the following means:

- Coaches who spot talented children at primary and secondary school competitions.
- Physical education teachers who make recommendations.
- Parents who request that their child be admitted. In these cases, the children have to pass a skills test before being admitted.

Children from 13 to 17 years of age may be selected from the less demanding junior sport schools to attend the more challenging secondary sport schools. Here the athletes live, train and study together. The school is attended only by those who specialize in sport. Other athletes living in the district may attend practices. Expenses are funded by the state (Rizak, 1986).

Trends Related to Political and Economic Systems

The approach to talent identification and development in sport appears to be associated with the political and economic systems within a country. Du Randt et al. (1992) conducted research on sport talent and development in selected countries. General differences were noted between countries which were formerly controlled by communist-socialist political systems and those that were controlled by capitalist political systems.

Although this bi-lateral distinction is no longer evident, it is interesting to note the impact of a country's political and economic system on its approach to sport talent identification and development (see Tables 2, 3 and 4).

Table 2. General differences in the approach to talent identification and development summarized from Du Randt et al. (1992)

Communist-Socialist Countries	Capitalist Countries
<ul style="list-style-type: none"> • Models are centrally planned and controlled. • A strong emphasis on health and fitness programmes in the schools contributes to the foundation necessary in order to reveal potential talent more effectively. • Co-operation between the school teachers and sports clubs exists • Access to sport scientific support services is available. 	<ul style="list-style-type: none"> • Generally, no strong central (governmental) control. • Support is provided by the general sport system operative in certain countries • Coaches and administrators employed to organize sport at national, regional and local level • Scientific support is available at accredited centers and training centers/camps

Table 3. Characteristics of the different approaches to talent identification summarized from Du Randt et al. (1992)

Communist-Socialist Countries	Capitalist Countries
<ul style="list-style-type: none"> • Includes several measurements and performance parameters for the different age groups. • Youth sport competitions complement the talent identification process. • Extensive screening of children at school as well as club levels – talented are identified early. • Appropriate training of physical education teachers allows the first and second stage of talent identification to take place at school. 	<ul style="list-style-type: none"> • A variety of approaches to talent identification are followed. • Approaches supported by research are sought. • Youth sports programmes organized to select talent.

Table 4. Characteristics of the different approaches to talent development summarized from Du Randt et al. (1992)

Communist-Socialist Countries	Capitalist Countries
<ul style="list-style-type: none"> • There is a specific model for each sport. • Children start at an early age in well-planned training programmes that are based on sound scientific principles • Financial support from the government. • Sport schools exist that range from part-time extra-curricular sport schools to full-time boarding sport schools. 	<ul style="list-style-type: none"> • No uniform model exists. • There are some sport schools (part-time and full-time), regional training centers and centers for excellence. • Financial support comes from both the government and private sector.

Former communist-socialist and capitalist countries differ in their application of talent identification and development models. For South Africa the capitalist approach will probably be a better approach to follow. Different models are implemented for different sporting codes, approaches for talent identification are sought through research, scientific support is available, and support is provided by a general sport system leads the investigator towards this approach.

Long-term Talent Identification and Development

Regardless of the country or political ideology, models for talent identification and development always incorporate stages and/or phases, and describe the process as one that occurs over a long period of time. Bompa (1995) identified a two-phase long-term periodisation model that underlined the importance of athletic development versus early specialization for young athletes.

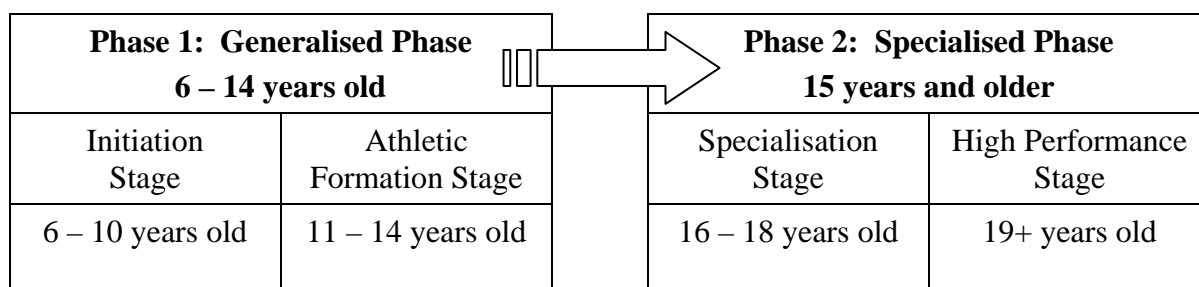


Figure 3

Bompa's (1995) Two-phase Model for Periodisation of Training.

Balyi and Hamilton (1996) identified differences in the development models for what they called, “early and late specialization sports.” They recommended that sports be classified according to these two categories before designing long-term development plans. They defined early specialization sports as those where early sport-specific training is essential to be successful, such as gymnastics, swimming and diving. Late specialization sports were defined as more “open sport skills” such as tennis, team sports, etc. Within each category they identified distinct stages of emphasis in training. Each stage has been described in greater detail (see Table 5).

Early specialization sports

Training to Train Stage (including aspects of the **FUND**amental Stage)

Training to Compete Stage

Training to Win Stage

Late specialization sports

*FUND*amental Stage

Training to Train Stage

Training to Compete Stage

Training to Win Stage

The **FUNDamental Stage**

The **FUND**amental stage of training is critical in the development of young athletes for the late specialisation sports (Balyi & Hamilton, 2000b). This stage lays the foundation for future excellence. Its emphasis is on mastering basic motor skills such as running, jumping, catching and throwing. The broad base of basic motor skills acquired during this stage will become a foundation for future mastery of specific skills needed in competitive sport, and could also provide a sound base for participation in a variety of recreational sports, if that direction becomes desirable. The **FUND**amental stage is presented between the ages of 6 and ten. Coaches should ensure that the content of the activities presented in

this phase develop the full variety of basic skills, fitness, social and cognitive qualities needed as the foundation for future sport skill development.

Table 5. General characteristics of the four stages of formal athletic development (Balyi & Hamilton (1996, 2000b, 2001)

FUNdamental Stage	Training to Train Stage	Training to Compete Stage	Training to Win Stage
Male and Female: 6-10years	Male: 10-14 Female: 10-13	Male: 14-18 Female: 13-17	Male: 18+ Female: 17+
Finding fun in participation	Learning how to train on a schedule	Learning how to train to compete	Learning how to taper and peak
General, overall development	Emphasis on general physical conditioning	Achieve top physical conditioning	Maintenance of physical capacities
Develop technique for fundamental skills, e.g. running, jumping and throwing, etc.	Develop progressively more sport-specific skills	Develop expertise while performing in competitive situations	Further development of technical, tactical and playing skills
Speed, power and endurance through fun and games Own body weight resistance for strength training	Individualisation of fitness training Introduction to mental preparation	Sport specific technical and fitness training 6-9 times per week	
Introduction to simple rules and ethics of sport	Fundamentals of tactical preparation	Advanced tactical preparation	
No periodisation, but well structured programmes	Single periodisation Sport-specific training 4 times per week with participation in other sports	Double or multiple periodisation	High performance Triple or multiple periodisation
Participation in vigorous activity 5-6 times per week.	Participation in complementary sports (similar energy systems and movement patterns)	Specialisation in one sport	Sport-specific technical, tactical and fitness training 9-15 times per week

The Training to Train Stage

The training to train stage of athlete development teaches young athletes how to train (Balyi & Hamilton, 2001). During this stage they also learn the skills necessary to perform a specific sport. In this stage the “training to competition ratio” will emphasise training time since the development focus is on practicing the skills and strategies needed for the selected sport. A 75% training to 25% competition ratio has been recommended in this stage.

The Training to Train stage may take up to four years. The athletes are introduced to the concept of periodisation of training. Their training years begins with a long general preparatory phase that is followed by a more specific preparatory phase (high volume, low intensity training). A short pre-competitive and then competitive phase follows, where lower volume but higher intensity training is followed). Technical and tactical preparation should be the focal point of training, and winning is de-emphasised (Balyi & Hamilton, 2001).

The Training to Compete Stage

The Training to Compete stage of an athlete’s development can be described as a phase of serious athletic preparation which Balyi and Hamilton (2001) described as follows:

- It is sport-specific training, conducted all year round.
- It includes training goals for technical, tactical, mental and fitness preparation, taking into consideration maturation levels of the athletes.
- It exposes athletes to a variety of competitive conditions during training.

During the Training to Compete stage, there is significant increase in the intensity of training when compared to the Training to Train stage. Sport science and medicine support programmes should also be introduced as part of the process of planning and monitoring of annual training and competition (Balyi & Hamilton, 2001).

The Training to Win Stage

The training to win phase of athletic preparation is the final stage of development of elites. The focus of this stage is on optimizing performance in strategically chosen competitions, in other words, peaking for the most important competitions. According to Balyi and Hamilton (2001), the focus of training includes:

- The maintenance of the already established physical capacities.
- Tapering and peaking for important competitions.
- Recovery and regeneration.

In order for athletes to achieve their performance potential, training plans must integrate every possible aspect of training, lifestyle and competition. The amount of detail required means that periodising the training year is complex.

The Effects of Age and Expertise Upon Skill Development

One of the basic questions in sports talent detection is to what extent the good performance of a 13-15 year old child can be maintained into adult life. For a long time it was thought that scores during childhood would not predict adult performance. The capacity of an individual to maintain the same position in a group with the passing of time or to stay in a certain percentile position is called stability (Malina, 1989). To establish the degree of stability, longitudinal studies determining correlation coefficients (Matsudo in Bar-Or, 1987) are necessary. The level of stability is the more practical way to track the athlete once selected.

Among the anthropometric variables, body height has stability coefficients of 0.65 - 0.80, when first measured at age of three years. Because of timing variables, intensity and duration in early puberty, the stability coefficients decrease, but after puberty they increase significantly (Beunen & Malina, 1988). High stability has been reported for the somatotype characteristics in Belgian boys (Claessens et al. 1986) and Czech girls and boys (Parizkova & Carter, 1976).

Tracking aerobic power with age from age 11 to 14 has yielded correlation coefficients of 0.70 in boys and 0.60 in girls, while in boys ranging from 11 to 18 years it

was 0.30 (Sprynarova & Parizkova, 1977). However, when boys between the ages of 10 to 12 years were tested annually over an eight-year period, their aerobic power correlations remained constant throughout (Vanden Eynde et al. 1988). Swimmers between the ages of 11 and 16 have shown age-to-aerobic power correlations year by year, from 0.08 to 0.92.

Correlation coefficients for reaction time and displacement speed were statistically significant although of low magnitude ($r < 0.50$) in 146 young boys, followed from ages 7 to 13 years. In 30m, 50m, 60m, 100m and 300m running tests, the annual tracking coefficients ranged from 0.51 to 0.91 (Kovar, 1981). Kovar (1981) also reported coefficients of 0.70-0.80 for hand-grip strength, knee extension and elbow flexion. Coefficients for vertical jump were found to be 0.70 for boys and 0.80 for girls (Rarick, 1981).

A great part of the tracking instability is due to the timing, intensity and duration of puberty (Malina, 1994) The body can have a positive influence on the yearly tracing value of motor variables, but they can have a negative influence on longer tracking intervals. One should realize that in fundamental and critical variables the talented subject is often not near the population mean, where the stability is lower and the tracking is poorer.

The relationship between age and performance has been studied for more than a century (Schulz, Musa, Staszewski & Siegler, 1994). According to research by Schulz et al productivity or creative output tends to increase relatively rapidly up to a definite peak productive age after which there is a gradual decline. The age of peak performance and the magnitude of the post-peak decline vary with the domain of creative achievement (Lehman in Schulz, 1994). Performance in poetry, pure mathematics and theoretical physics tends to peak in the late 20s or early 30s, whereas novel writing, history and philosophy tend to peak later in the 40s or early 50s. Domains that peak early shows relatively steep declines, whereas those that peak late show gradual declines (Schulz et al. 1994).

Schultz and Curnow (1988) found age-related patterns of performance in their analysis of peak athletic performance. Performance in swimming, jumping and tennis tended to peak in the early to mid 20s, whereas performance in long-distance running, baseball and golf peaked in the late 20s and early 30s. Schultz and Curnow speculated that reaction time, flexibility, explosive strength and gross body coordination peak relatively

early in life, whereas attributes such as control, precision, rate control, arm-hand steadiness, aiming and stamina peak somewhat later.

The relationship between performance and age is influenced by the nature of the task/event (Starkes, Weir, Singh, Hodges & Kerr, 1999). If a task is highly cognitive and the effect of cognitive aging can be staved off, then expertise in the task may be more readily retained such as in chess and music according to Starkes et al. With regard to sport expertise it would be important to know the type of practice most critical in open versus closed skill sports.

Problems in Talent Identification and Development

There are many difficulties to be faced in the attempt to create a perfect model for talent detection caused by many intervening variables that may hamper a good model or benefit a weak one.

When is the “Right” time to Identify and Develop Talent?

Arnot & Gaines(1986) stated that sports talent should be recognized and encouraged in children after the age of 10, since such talent is an important part of a child’s overall potential and one that deserves recognition and encouragement as much as any other. Du Randt et al. (1992) suggested that the first stage of identification should take place at the age of 8-10 years in the form of mass screening and this should be followed up 18-24 months later. Final talent identification should take place at around 14 years of age. Riordan (1998) suggested that the age at which a child gets involved in a specific sport should depend on the sport. He suggested age 7-8 for swimmers, gymnasts, tennis players and figure skaters, to age 12-13 in boxing and cycling and age 13-14 in shooting and weightlifting.

In the Milo (Australian) Talent Search program they almost exclusively concentrated on secondary school aged children, aged 12-15 (Gulbin, 2001). Peltola (1992) stated that the first stage of talent selection could be at the age of 12-14 years with basic field tests. Those who are selected in this stage are invited to do more sophisticated tests, after which the young athletes will be advised as to the sports to which they are considered best suited and will be given the opportunity to join various talent development squads

from age 13-17. Peltola (1992) proposed the following talent identification and development long-term process.

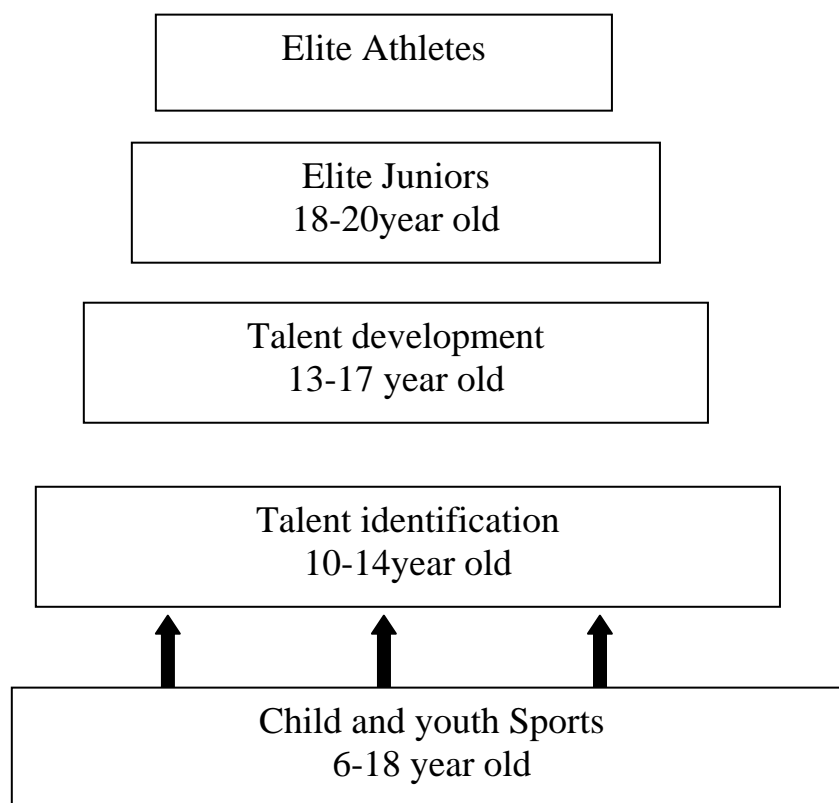


Figure 4

Petola's (1992) Long-term Model for Talent Identification and Development.

Hoare (1985) observed that in certain sports, such as gymnastics and swimming, athletes need to be identified at a much younger age than in many other sports, and that talent Identification programmes should be conducted at the primary school level. According to Hoare (1999), the age range is from 11-17 years to accommodate the requirements of different sports.

Ghita (1994) noted that the best age for peak performance in athletics events varies with distances in the events involved. Based on performances in the previous 6 Olympic Games before 1984 (see Table 6), the optimal ages for the different running events increase as the distances becomes longer and the speed requirements decrease. It also appears that best results are achieved over a fairly wide spread time period (6-10years),

indicating that the best age for the selection of potential in distance running events is between 12 and 16 (Ghita, 1994).

Table 6. The optimal ages on performances at the last 6 Olympic Games (Ghita, 1994)

Event	800m	1500m	3000m	5000m
Age	23±2	25±2	28±4	28±4

Conclusions about Age

There is still much disagreement about the most suitable age at which to commence sport specific training (Riordan, 1988). According to Goldberg and Boiardo (1984) children must not be pushed into a specific sport because of predictive variables that would suggest a high level of success, unless that sport is voluntarily chosen. However, if the intent of such evaluations is to prevent injury and adverse affects on existing medical problems and to improve fitness and performance, the child can only benefit. Londeree (1990) was of the opinion that the younger the individual is, the less likely the probability that the predictions would come true.

Conclusions about Maturation

The demonstration of expert behavior as a young sport participant does not automatically translate to expert behavior as an adult sport participant (Tenenbaum, Stewart & Sheath, 1999). Different rates of maturation are often responsible for early signs of talent in some children. Reilly and Stratton (1995) indicated that early maturing males are at an advantage in many sports because of their significant increase in muscle mass during peak growth.

Riordan (1988) also identified maturation as a problem since the progress in physical performance indicators vary, with surges forward at certain ages in some children and relatively slow development in others. Malina and Bouchard (1991) reported that baseball players, footballers, swimmers and track athletes tend to be, on average, advanced in their skeletal and sexual maturation, as these sports rely to a large extent on strength and power. With boys and girls entering their adolescent growth spurt phase, status of maturity should be assessed to ensure that late-maturing children with talent are not overlooked in

the talent identification process. Martens (1980) acknowledged that unfortunately there are no practical methods for precisely measuring psychological maturity.

Helsen, Hodges, Van Winckel and Starkes (2000) stated that physical “precocity” often forms the basis of talent selection. It has been shown that more players/athletes are chosen for teams in the first quarter of the year than in the last quarter (Boucher & Mutimer, 1994; Helsen et al. 2000). Helsen et al. (1998b) discovered that youth soccer players between August and October (early part of the selection year) were more likely to be identified as talented, and to be exposed to more coaching at a higher level.

The Role of Specificity in Testing

According to Matsudo (Bar-Or, 1996) one of the most common mistakes made in predicting future performance, is to base selection on a single variable. Such predictions often have a low validity. Even when assessing a variable such as a VO_{2max} , it must be remembered that it is only one of several critical aspects of potential for performance. Goldberg and Boiardo (1984) stated that children must not be “pushed” into a specific sport because of predictive variables that would suggest a high level of success, unless that sport is voluntary chosen.

The Role of Competition

It has been argued that the best form of talent identification is competition (Peltola, 1992). Talented athletes can be spotted by skilful observers during their actual participation in a sport. However, these observations do not take into account the effects of biological age, nor do they provide the opportunity to make predictions about possibility of success in other sports. Popular sports attract more participants, so finding talent through observation may be possible. However, this approach is not satisfactory for the less familiar sports, where there are few participants. Some children may never have the chance to try the sports for which they might be best suited.

Early Specilization

The success of former communist countries at international competitions, especially at the Olympic Games, demonstrated the benefits of a fully aligned sport system, including early talent identification, early selection and specialization (Balyi &

Hamilton, 2000a). But many Western societies do not readily accept this concept because of ethical concerns. Balyi and Hamilton reported that “winning at all” costs became the basic principle of training in many of the Communist countries, regardless of the consequences for the health and well-being of the athletes.

Problems occur when different sporting codes compete for talented youngsters and the nature of the sports demand a high degree of pre-pubescent training, for example gymnastics (Carl, 1984). Many educators and sport scientists are of the opinion that children should not commence serious participation in highly competitive sport before the age of 14 or 15. According to Martens and Seeveltdt (1979), the intensity of competition should be low, increasing only as the skill of the child increases. Sport participation should not take up all the child’s leisure time, denying them time to learn other sports and recreation skills. Pieterse (1991) supported this position with her research findings indicating that top child athletes experience high anxiety levels, and that the pressures from coaches and teachers can have a negative effect on the self-concept of these athletes.

Netball Talent Identification and Development

Because this research is specifically focused on netball, information about the sport and previous efforts at talent identification are relevant. Top-level netball is a fast and skilful game. Its physical requirements include a hard surface of 30.5m x 15.25m, two netball posts 3.05m high each with a ring 380mm in diameter, a size 5 ball, fourteen players, two umpires and a coach. The game involves a variety of ways of passing the ball successfully from one team member to another, so that a goal may be scored from within the shooting circle by shooting the ball through the ring. All seven players in the team have an equal part in achieving this aim and at some stage will need to defend and attack. This demands a variety of skills and the ability of each player to be selective in the use of these to produce a flowing game. The game is comprised primarily of open skills and the players must make fast and accurate decisions in the ever-changing situations presented to them.

In addition to all-round athletic ability, netball demands specialisation by position. Each player has a specific role to play and the emphasis is put on specialized attacking and defending skills. Positional play is also defined by the playing zones on the court, so that each time there are 2 shooters (primarily attackers), 3 center-court players (attackers and defenders) and 2 defenders (primarily defenders). These 7 players constitute a team. The rules impose certain limitations on how netball is played, which in turn has an impact on which performance attributes are critical to success in the various positions. The size of the playing area, for example, imposes spatial limitations. Every player has limitations placed upon them by the specific position in which they play (see Figure 5).

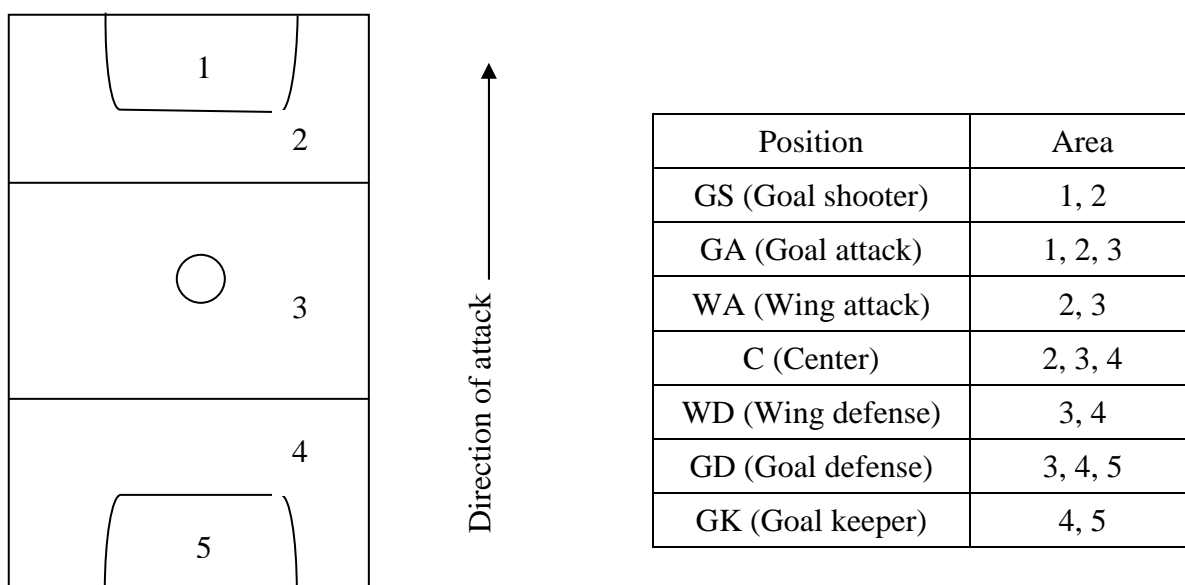


Figure 5

Positional Playing Zones on the Netball Court.

According to Wheeler (in Crouch, 1992) those skills needed in netball include landing, pivoting, changing direction, stopping, starting, throwing, catching, getting free, marking, intercepting and shooting. Players need spatial awareness of themselves, the court and the team. These are individual skills that must be learned and then applied in the open game situation.

There are many physical variables that affect netball performance (see Table 7). Each of these factors will be included when designing talent development programmes for netball. According to Campbell (in Couch, 1992) the following fitness factors and techniques are of importance in netball.

Table 7. Important fitness factors and possible training methods for netball (adapted from Crouch, 1992)

Fitness Factors	Training Methods
Strength/Power	Weight training, isometric training, power drills, skills work against resistance
Speed	Circuit training, power drills, repetition running (short shuttle runs)
Suppleness/Agility	Flexibility exercises, mobility
Stamina	Steady running, fartlek training, circuit training, skill/endurance training
Skill	Footwork, catching, throwing, getting free, marking, shooting, throw-up

There has been relatively little research published in regards to talent and netball. Hoare (1997) conducted a talent identification study in netball. The aim of the research was as follows:

- 1) To profile the physical, physiological and skill characteristics of elite junior netball players in Australia.
- 2) To identify the key performance areas where elite junior netball players differ from normative standards for the average population.
- 3) To determine which physical, physiological and skill tests are the best predictors of performance in netball.
- 4) To determine if physical, physiological and skill tests can account for a significant proportion of variance in performance in the sport of netball.

Hoare's (1997) study was used to identify appropriate tests for talent identification in this study.

Conclusion

Hereditary, physiological and psychological attributes play an important part in the development of physical performance capacities (Kutsar, 1991). It is clear, however, that not all children with the inherited prerequisites will achieve their sporting potential. The multiple factors that influence the development of expertise will also impact profoundly on their ultimate level of achievement. For example, Bloom (1985) identified three important phases in the development of expertise: initiation, development and perfection. His work suggested that social environments help to shape young talented individuals across the early, middle and late stages of their career. The implication is that various situational factors and the role of family members and mentors over-ride the natural ability of the performer. Socioeconomic level also acts as a factor in the development of expertise, including those social contexts in which the achievement of excellence in certain sports brings financial wealth, thus providing a special motivating factor for practice (Bar-Or, 1996).

An intensive literature survey on talent identification by Du Randt et al. (1992) documented the various approaches to talent identification that had been pursued in the former Eastern Bloc countries. Reilly and Straton (1995) noted that there are few models of talent identification and talent-nurturing that are at present globally acceptable. In 1992, Du Randt et.al. stated that talent identification and development in South Africa was both uncoordinated and under-researched. No literature could be found to indicate that the situation has changed in the past 12 years.

If there has been a common model in South Africa, it has probably been a school-based model that was effected in the schools in the higher socioeconomic communities. These would have been the primarily white communities in Apartheid South Africa. Some sporting federations have tried talent identification efforts and there have been some efforts to pursue talent development through sport schools and sport academies. This study adopted as its focus, a model specifically intended to assist with the development of girls from historically disadvantaged community. The model involved a talent identification process. Hoare's (1997) talent identification tests were used to identify girls with netball talent. Testing was followed by the creation of a special squad of girls identified in the process. These girls would then be taken out of their school and put into a squad-based training situation where they received qualified coaching and regular competition, two

requirements of talent development not accessible in their school environment. The model was conceived to provide practice in the Train to Train Stage of sport development, as described by Balyi and Hamilton (1996).

Chapter 3

Methodology

This investigation explored the influence of participation in a special squad-based talent development programme on selected physical variables and skills in adolescent girls. This investigation was initiated in the team sport of netball in order to determine if participation in a talent development programme of this kind can be successful in the South African context. A second purpose was to consider the effectiveness of the squad-based model in relation to the traditional school-based model that is commonly implemented for talent development in South African netball. Included in this chapter is a description of the design of the study, the procedures followed and how the data were analysed.

Design

This study was designed originally to follow a non-equivalent-control-group design (Thomas & Nelson, 2001). This design is recommended for research in real-world settings where groups cannot be randomly be formed. Because the subjects in this study were all netball players at high schools in the same region, it was assumed that their physical abilities (not necessarily their skills) would be similar, and that the subjects from the non-treatment schools could serve as a reference group for the subjects receiving the treatment. This would allow for a comparison between the effectiveness of the two different models.

However, the subjects from the historically disadvantaged community scored substantially lower on the physical tests than the subjects from the other communities (see Chapter Four for discussion). This initial difference prevented a fair comparison between the changes achieved by the two groups, which had an effect on the ability to answer some of the research questions. By the time the discrepancy in physical pretest scores was documented, it was not possible to approach the Western Cape Education Department to recruit additional netball players from other schools in historically disadvantaged communities to serve as the control group in 2003. The Western Cape Sport Academy had already indicated that the squad-based training was to serve as its Boland netball development programme for 2003, and they were unwilling to postpone the study for one year. With this unforeseen limitation in mind, the research project went forward.

A more accurate description of the design that was implemented is the static group design, where two non-equivalent groups are compared, one of which receives a treatment (Thomas & Nelson, 2001). It is accepted that no definitive statements can be made about between group changes, and that the subjects in the school-based group can be regarded only as a kind of reference group, not a control group.

Procedures

Identification of Measurement Instruments

Hoare (1997) completed a research project for talent identification for netball in which she wanted to determine which physical, physiological and skill tests are the best predictors of performance. Her test battery was used in this study as the netball-relevant measurements of physical variables. Protocols for the tests are contained in Appendix A. The tests used were as follows:

1. Height.
2. Sitting height.
3. Body mass.
4. Arm Span.
5. Basketball throw.
6. Vertical jump - with and without arm swing.
7. T agility test.
8. 5/10/20/40 metre sprint.
9. 90/90 hamstring flexibility test (Active Knee Extension - AKE).
10. Sit and reach.
11. Multistage shuttle run test.
12. Throwing velocity (initial and final).
13. Catching accuracy.

A subjective evaluation of netball skills was also designed. The two expert coaches recruited to deliver the after-school programme designed a rating scale to evaluate the

game performance of the players in four areas (attacking skills, defensive skills, catch/pass skills, overall ability). This was done using a scale of 1 (poor) to 7 (excellent) (see Appendix B). Thus, the lowest possible score was 4 and the highest possible score was 28.

Involvement of Boland Netball/WECSA

The Western Cape Sports Academy (WECSA) funded the intervention programme through Boland netball. Boland netball proposed this study as the development programme for the Boland region after the investigator approached them with a proposal. WECSA was financially committed for the coaching and transport money. Boland netball was given a report on a monthly basis by the investigator on the progress of the study. The project was called the Boland Netball Development programme.

Identification of Expert Coaches

The Stellenbosch University Netball Club identified the coaches for the development programme after the investigator and Boland Netball decided on the criteria. The coaches from the local club were used since the club provided the training facilities for free. Both coaches had a degree in Sport Science. Following was the criteria that was set before choosing the coaches:

- Level two coaching certificate
- At least two years experience in coaching school children.
- Availability to provide coaching on all training and match days.

Subjects

Participants in the two different models explored in this study were identified in two different ways.

The Special Squad-based Model

For participation in the squad-based model, the investigator approached the principals and netball coaches from two high schools located in two historically disadvantaged townships in the Western Cape. These high schools were within 10km of each other. It was confirmed with the principals and coaches that although there was interest in netball at their schools, it was not possible under the current circumstances to

provide the girls with regular coaching or competition. A full discussion took place that included an explanation of the purpose of the research project and a description of the content of the special after-school programme. Emphasis was placed on the access to expert coaching and competition that would be provided for participants selected for the programme.

The teachers invited all the girls interested in participating in the special netball programme to take part in the netball talent identification tests developed by Hoare (1997). A total of 23 girls volunteered to be tested from one school and 25 girls from the other school. The investigator administered the test battery at each of the schools with support from trained test administrators. After assessing all the girls (who were between the ages of 14 and 18), the top 30 girls were chosen according to the results of the talent identification tests.

The girls who were selected were given letters which contained details of the study and appropriate consent forms for their parents/guardians to sign and returned to their teacher before the after-school programme commenced (see Appendix C). It was clearly stated that the after-school programme was a voluntary extramural activity and that at any stage a girl could withdraw from participation.

The Traditional School-based Model

The girls in the reference group were recruited from three different schools in the Western Cape where netball has been offered in a structured manner as a school activity for many years. Regular practices with the school's netball coach and a formal schedule of competitions are provided. With the permission of the principals, the investigator explained the purpose of the research to the school coaches, with specific emphasis on the need to have data from school-based programmes in order to gain insight into the relative effectiveness of the alternative squad-based programme. The school coaches agreed to invite the top 20 netball players from each school to participate in the same pre- and post-tests as the subjects in the squad-based group. Seventy-four players volunteered to participate and the appropriate consent forms were completed. Members of this reference group of volunteers were all between the ages of 14 and 17 years. The reference group followed no special intervention programme, but they did continue to follow the netball programme at their specific schools.

Sequence of Events

The following sequence was followed during the implementation of this study:

- The administration of the pre-test measurements of the dependant variables to girls from one group who had been invited to follow a special development programme, and from a second group who followed the traditional programme at their own school.
- Game play pre-assessment for subjects in the special development programme.
- Provision of an eight-month intervention period, during which a special squad-based training programme was delivered to the group from the historically disadvantaged community, while the second group followed their traditional school programme for netball development.
- Focus group discussions
- Administration of the post-intervention measurement of the dependant variables, repeated for both groups.
- Game play post-assessment for subjects in the special development programme.

Pretest of Physical Variables

The talent identification tests (Hoare, 1997) were administered at the schools for all of the subjects in this study. This involved five different locations. A total of 48 girls from the two schools in the historically disadvantaged communities were tested, and 74 girls from the three schools with traditional school netball programmes were tested.

The test administrators were volunteers, all of whom had one or more degrees in Sport Science. Each administrator was given a written description of the tests they were asked to administer. During the testing session, a rotation was established and as soon as a subject completed one station, she would move on to the next station. All the netball tests were completed at the stations. The tests were administered in the following order:

Anthropometry (height, sitting height, body mass, arm span - in any order)

Sit and reach

Hamstring flexibility

Sprint

Agility run

Vertical jump

Basketball throw

Throwing velocity

Throwing accuracy

Shuttle run.

The same warm-up prior to testing was completed by all the subjects. They received 10 minutes of easy jogging and stretching, followed by six stride-throughs over 20m, building in intensity from 85-100% maximum with walk recovery, followed by four sprints from stationary starts over 10m, building in intensity from 90-100%.

The Squad-based Programme

The talent development programme provided in this study began two weeks after the subjects were selected. The top 30 of the original group of 48 girls pre-tested, were invited to come to the University to begin the special programme at the University netball courts.

Pretest Skills Assessment: During the first week of the programme, the coaches divided the subjects into two squads. The purpose of this division was to group the girls into “more skilled” and “less skilled” squads in order to maximise skill improvement. The squads were selected on the basis of the qualitative evaluation of game play during match practice, using the rating scale described earlier in this chapter. Each squad consisted of two teams of seven or eight players each. Both squads trained with the same coach for the entire programme. Both the coaches were qualified Netball South Africa Level 2 coaches.

Year Plan: The pre-testing, programme and post-testing was conducted over ten months. The intervention programme was eight months in length, with occasional breaks allowing for school holidays. A break down of the 10 months is as follows:

- Pre-Testing
- Coaches' evaluation and team selection
- 3 weeks of training
- 1 week of school holiday
- 10 weeks of training
- 4 weeks of school holiday
- 10 weeks of training
- 1 week of school holiday
- 3 weeks of training
- Weekend camp and Post-Testing

With the exception of school vacations, each week consisted of two 90-minute practice sessions, and one competitive match most of the weeks. The subjects were picked up after school and brought to the University grounds where their coaches would meet them for training. After training, they were taken back to their respective schools. A sample plan for a practice session for each squad can be seen in Appendix D.

As part of the programme, the subjects played a match once a week in the University's residence league. Each team played approximately eleven matches during the league. At the end of the University league, three additional matches were organized with different high schools in the Boland region. These 14 games provided the necessary match practice needed for a development programme.

A few special training sessions were scheduled throughout the year. During these sessions, the coaches and investigator scheduled special events like teambuilding sessions, games, meeting South African national team netball players, etc.

On two different occasions during the training year, the investigator held focus groups with the subjects. Each group consisted of three to four subjects at a time (two

groups from each squad). A few questions were asked with regards to the programme. Each focus group discussion continued for approximately 10 minutes. The questions and answers are presented in Chapter 4.

At the end of the intervention programme the subjects went away for a weekend camp and that included the formal closing of the programme. The camp was held at a coastal town approximately an hour's drive away from the University. Both coaches, a teacher from each school and the investigator joined the subjects at the camp. In addition to post-testing, activities such as teambuilding, training, recreation activities, and cooking were part of the camp. A programme of the camp can be seen in Appendix E. There was a closing ceremony the last night of the camp where each subject received a certificate of participation (see Appendix F).

Post-Test

Only 22 of the original 30 subjects in the special programme completed the post-tests during the year-end camp. Procedures identical to the pre-tests were followed, except for the speed test. The subjects completed the speed test during the following day due to rain on the test day and no 40m indoor surface was available at the camp site. The investigator supervised the testing with the help of both coaches whom were familiar with the tests.

Post-tests of physical variables for subjects in the traditional school-based model took place two weeks after the end of their respective league. A total of 45 of the original 60 subjects completed the posttest. Procedures identical to the pre-tests were followed.

Data Analysis

Access to data processing was made possible by the Centre for Statistical Consultation at Stellenbosch University. Group means, standard deviations and t-tests were used to determine within group variance and changes in pre- to posttest performances. The Centre recommended use of the repeated measures of analysis of variance (RANOVA) to determine possible differences between the two groups for all the physical variables that were pre- and post tested. In certain cases where the RANOVA results seemed suspect, the non-parametric bootstrap method was used to verify the

RANOVA results. Bonferroni post hoc tests were used to compare pair wise groups with one another.

Summary

This study focused on determining the effect of participation in a special squad-based netball development programme on the netball skills and physical abilities of girls from historically disadvantaged communities. This model for talent development may provide a viable option in South Africa where many schools do not have the facilities or sport coaching expertise to provide students with a school-based talent development. In order to gain insight into the relative effectiveness of the special model in relation to the more traditional school-based model, observation of differences between the two models were made in terms of changes in abilities and skills over the eight-month period . The results of the statistical treatment of the data gathered are presented in Chapter Four.

Chapter 4

Results and Discussion

The purpose of this study was to explore the potential of participation in an after-school squad-based netball programme as a model for talent development in South Africa for team sports. The specific focus of this study was on determining the influence of participation in this type of programme on the skills and physical components needed for netball.

Pre- and posttest data related to the research questions were gathered from 22 high school netball players following their participation in an eight-month squad-based talent development programme. The purpose of this data collection was to describe the impact of the programme on:

- Skill development (attacking, defending, passing and catching skills).
- Physical attributes (anthropometry, flexibility, agility, speed, aerobic endurance, power, throwing velocity and eye-hand coordination).
- The perceptions of the players in the squad-based programme.

Pre- and posttest data were also collected from a group of high school netball players (N = 45) participating in the more traditional school-based model for talent development. This group served as a kind of reference group rather than a control group, to provide a context for the interpretation of the results. The results will be presented and discussed according to the stated research questions.

Research Question One

Will there be a significant change in the netball performance of players who participate in a squad-based netball development programme?

The answer to Research Question One is yes. The post-test scores for all four skill components measured did show a significant improvement. Each member of the original squad-based group ($n = 30$) was evaluated during a pre-test match by expert coaches. Following completion of the eight-month intervention period, the remaining members of the squad-based group ($N = 22$) were evaluated on the same criteria during a post-test match by the same expert coaches. A pre- posttest comparison of scores was made for the following components:

- Attacking skills (see Figure 6).
- Defensive skills (see Figure 7).
- Catching and passing skills (see Figure 8).
- Overall playing skills (see Figure 9).

Improvement in skill performance was anticipated because the coaches who delivered the programme were well qualified and the practice sessions were offered on a sustained basis over a period of eight months. A wide variety of skill development activities were provided during the intervention programme, and practices were conducted regularly. According to Starkes (2000), practice is a necessary mediating factor for the attainment of expertise in any domain.

The 22 subjects who completed the programme and posttests may reflect the importance of some of the constructs in Scanlan's sport commitment model (1993). The model suggests that commitment to sport is a function of the following:

- Sport enjoyment.

During the focus group interviews, the players all reported that they enjoyed the squad-based programme.

- The attractiveness of involvement alternatives.

Very few of the players had other options for after-school involvement. Two of the players had ballet or drama lessons on some afternoons, and they did miss some practice sessions in order to participate in their “other” options. In other words, the low drop-out rate may be attributed in part to a lack of alternatives.

- Personal investments in participation.

Personal investment refers to three variables: time, effort and money. As players attended the programme week after week, most of them certainly had invested a great deal of time in the programme. In terms of effort, it is difficult to be sure how serious the players were about their participation in the programme. They certainly put in enough effort to improve their skills. In terms of money, the programme and bus transport was free for the players. This means they invested no money, a potential negative influence on commitment to participate.

- Social constraints.

The construct of social constraints deals with feelings of obligation to continue participating in a sport programme due to social expectations or norms. In this case, subjects may have continued to participate because they felt an obligation toward the investigator. They were all aware that the programme was offered as part of her degree and they may have been sensitive to the need to keep enough subjects in the programme. In terms of social constraints and expectations from their community, it is not clear whether the subjects were supported in their sport participation, or not. Since regular sport training and competitions were not part of their school programme, there is no history of sustained sport involvement among girls of this age from historically disadvantaged communities.

The subjects who dropped-out are a concern, not only because they represent lost data, but also because they could provide information that would allow future programmes to be more attractive to participants. The investigator did try to find out the reasons for

dropping out. A teacher at each school was asked to talk with each player who dropped out in order to determine her rationale for leaving the programme. These teachers never managed to get that information, and when the players were contacted personally, they simply replied that they “just wanted to stop playing.”

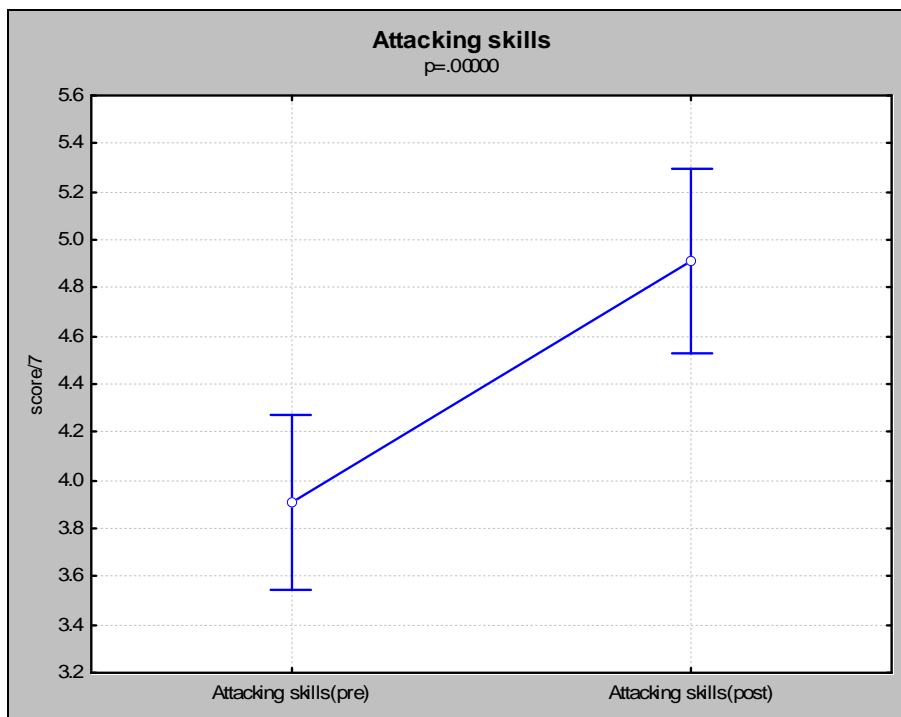


Figure 6

Comparison of pre-and posttest scores for the attacking skills of the squad-based group.

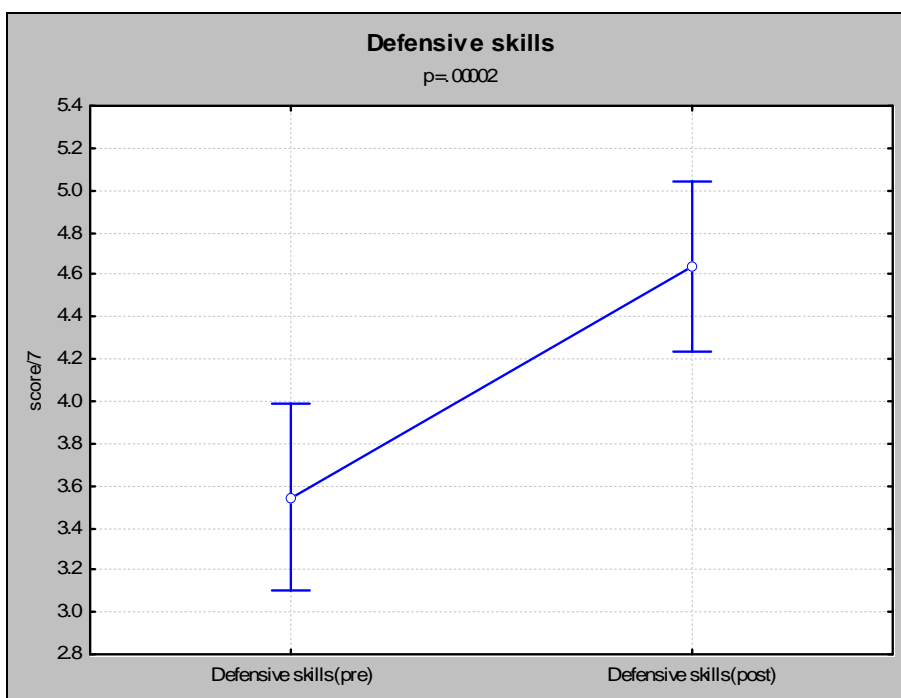


Figure 7

Comparison of pre-and posttest scores for the defensive skills for the squad-based group.

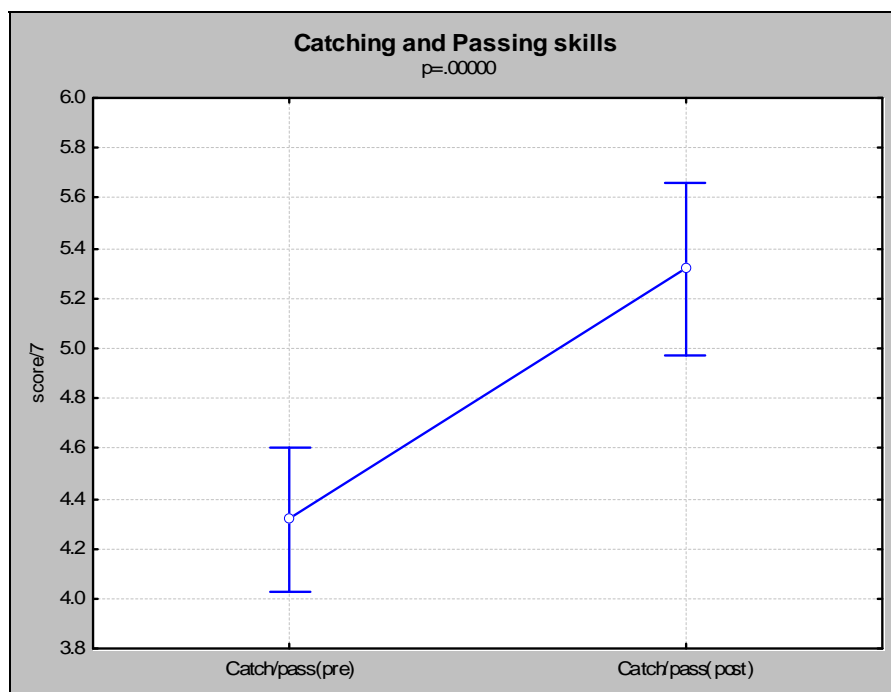


Figure 8

Comparison of pre-and posttest scores for catching and passing of the squad-based group.

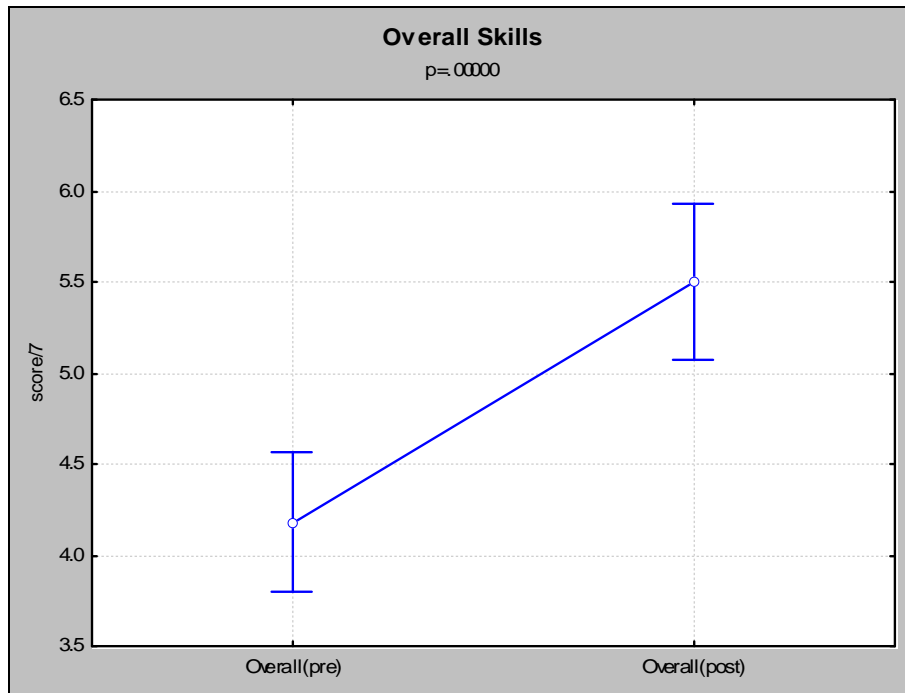


Figure 9

Comparison of pre-and posttest scores for overall playing skills of the squad-based group.

Research Question Two

Will there be any significant changes in any of the physical variables associated with netball performance, after participation in a squad-based netball development programme?

The answer to Question Two is yes (see Table 8). Significant changes were found in the following five physical variables:

- Height.
- Hamstring flexibility of the right leg.
- Speed at 5m, 10m, 20m and 40m.
- Initial and Final velocity of throwing.
- Catching accuracy.

The change in height is a result of growth over the eight month period between pre- and posttest. The improvement in flexibility of the right hamstring only, is puzzling. The right hamstring was less flexible than the left on the pretest, so perhaps the improvement was because there was more “room” for improvement. There was an improvement in both legs, although the left hamstring change was not significant. The squad-based training included regular flexibility work as part of the warming up and warming down process at each practice and game.

The speed of the squad-based group deteriorated significantly. One would not think this would be the case, since functional fitness training was a regular part of the intervention programme. The only explanation that comes to mind is that the players were not putting in 100% effort on the posttest. When the post-testing took place at the end of the intervention programme, there was no incentive for the squad-based group to perform their best. During the pre-test they had been trying to be selected for participation in the programme.

It is interesting to note that there was a statistically significant change in the final and initial velocity as well as catching accuracy. Since these physical variables are closely

related to skill, the investigator believes that the extended practice on skills during squad-based training may be one of the reasons why they improved on the posttest.

Table 8. Distribution of scores for the squad-based group (N=22)

Variable	Mean Pre	SD Pre	Mean Post	SD Post	p
Height (cm)	157.38	4.56	158.15	4.54	0.05*
Weight (kg)	50.20	7.15	51.84	7.21	0.79
Sitting Height (cm)	79.15	3.10	76.72	15.55	1.00
Arm Span (cm)	160.35	6.73	160.85	6.49	1.00
Sit & Reach (cm)	8.86	4.87	9.05	4.35	1.00
Hamstring flexibility (left) (degrees)	8.13	3.62	6.86	3.62	0.48
Hamstring flexibility (right) (degrees)	10.72	3.48	8.45	4.32	0.01*
Agility (secs)	10.61	0.63	10.66	0.55	1.00
5m Speed (secs)	1.23	0.09	1.56	0.20	0.00*
10m Speed (secs)	2.15	0.29	2.47	0.16	0.00*
20m Speed (secs)	3.37	0.52	4.03	0.39	0.00*
40m Speed (secs)	6.43	0.53	7.21	0.65	0.00*
Basketball Throw (cm)	545.45	63.56	544.09	62.99	1.00
Initial Velocity (kph)	34.10	3.38	48.81	6.77	0.00*
Final Velocity (kph)	30.70	3.71	42.40	6.14	0.00*
Vertical Jump (arms) (cm)	32.77	5.24	34.13	4.78	0.73
Vertical Jump (no arms) (cm)	27.68	4.83	28.90	4.85	0.63
Multi Stage Shuttle Run (shuttle)	35.31	10.77	38.22	15.32	1.00
Catching Accuracy (score/10)	6.50	2.26	7.68	1.17	0.01*

*p<0.05

Research Question Three

Will there be any significant changes in any of the physical variables associated with netball performance, after participation in a school-based netball development programme?

Yes, significant changes were found in three variables among participants in the school-based programme (See Table 9):

- Sit and Reach (lower back flexibility).
- Catching accuracy (Eye-hand coordination).
- Multi-stage shuttle run (aerobic fitness).

The improvement in lower back flexibility could be a product of regular stretching included in the sport warm-up and warm-down periods. The improvement on catching accuracy indicates an improvement in eye-hand coordination. This could also be a function of regular netball training throughout the year.

The change in aerobic fitness was not positive. There was a deterioration in aerobic fitness. Unfortunately, the investigator was not able to collect data about the duration and intensity of their practice sessions. It is possible that the testing was not meaningful to the school-based group since they were only serving as a reference group in this research. They may have lacked motivation or commitment to achieve their best on the posttest, since it was scheduled for the end of the season.

Table 9. Distribution of scores for the school-based group (N=45)

Variable	Mean Pre	SD Pre	Mean Post	SD Post	p
Height (cm)	168.84	6.27	169.21	6.41	0.13
Weight (kg)	62.05	10.02	61.38	10.20	1.00
Sitting Height (cm)	85.378	5.94	86.55	3.45	1.00
Arm Span (cm)	170.33	7.66	169.69	9.14	1.00
Sit & Reach (cm)	12.61	5.17	10.39	5.16	0.01*
Hamstring flexibility (left) (degrees)	6.97	3.66	7.66	3.09	1.00
Hamstring flexibility (right) (degrees)	6.65	3.10	7.45	2.61	0.57
Agility (secs)	9.94	0.79	9.94	0.65	1.00
5m Speed (secs)	1.49	0.26	1.55	0.17	0.50
10m Speed (secs)	2.37	0.27	2.37	0.16	1.00
20m Speed (secs)	3.91	0.36	3.97	0.25	1.00
40m Speed (secs)	6.87	0.57	7.01	0.47	0.25
Basketball Throw (cm)	615.56	82.25	616.29	112.29	1.00
Initial Velocity (kph)	47.99	10.68	48.79	9.66	1.00
Final Velocity (kph)	41.15	10.42	41.79	9.57	1.00
Vertical Jump (arms) (cm)	34.93	4.74	34.77	5.05	1.00
Vertical Jump (no arms) (cm)	29.05	4.40	29.43	4.52	1.00
Multi Stage Shuttle Run (shuttle)	54.38	22.97	47.48	20.03	0.03*
Catching Accuracy (score/10)	5.16	2.44	6.25	2.30	0.00*

*p<0.05

Research Question Four

Will there be any significant differences in physical variables between members of the squad-based group, compared to members of the school-based group?

The answer to research question is yes, significant differences were found in nine of the variables tested. All the tests results will be discussed according to the variables.

Anthropometry

No significant differences between the two groups on both the pretest and posttest can be noticed on any of the four anthropometric measurements (Figures 10, 11, 12, 13). The differences in the pre-test mean scores indicate that the squad-based group was smaller and lighter than the school-based group. Since all the girls in the squad-based programme came from previously disadvantaged communities, there could be a variety of genetic, nutritional or other environmental factors affecting these variables. Another possible explanation is that the school-based programme was conducted at schools that are historically good sporting schools. Parents at these schools may encourage their children from an early age into sporting codes they believe are suited for them. Netball is a sport associated with height, so perhaps generally larger girls participate in netball at these schools. Girls from previously disadvantaged communities seldom have the luxury of choosing the best sporting code for themselves, and often have to take part in the sporting codes available to them.

The decrease in sitting height reported for the squad-based group (Figure 13) is not possible, which means there was a mistake in the data collection due to human error. This is a problem associated with field testing. Some field tests lack reliability. The reported decrease in sitting height can be due to a variety of circumstances, such as incorrect posture for some of the subjects, a lack of motivation on the part of some subjects (not trying to sit up straight when the measurements were taken), or failure of the test administrator to pay careful attention to the test protocol or the measurement process.

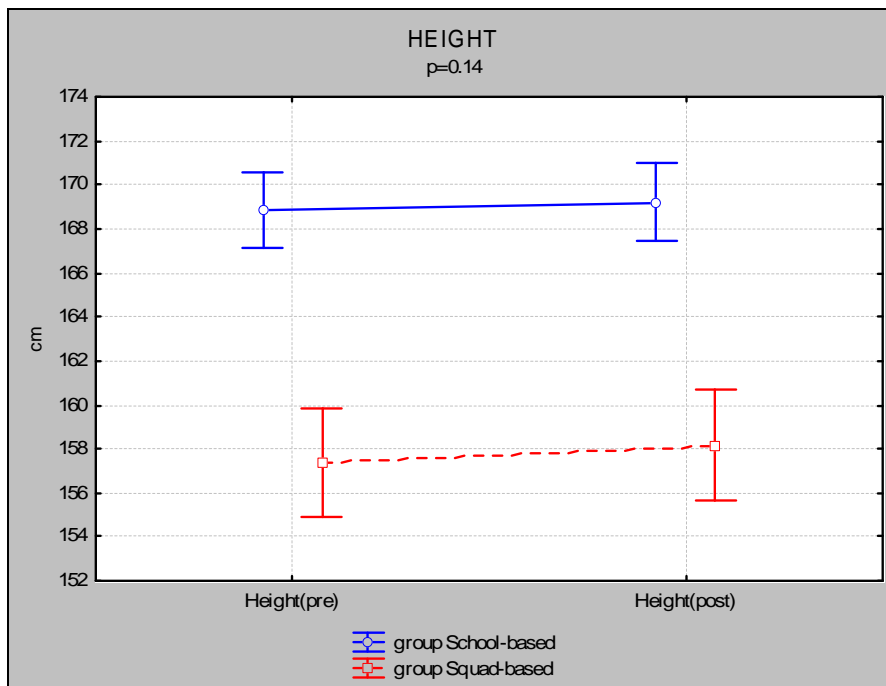


Figure 10

Comparison in height between the pre- and post-tests for the squad-based and school-based groups.

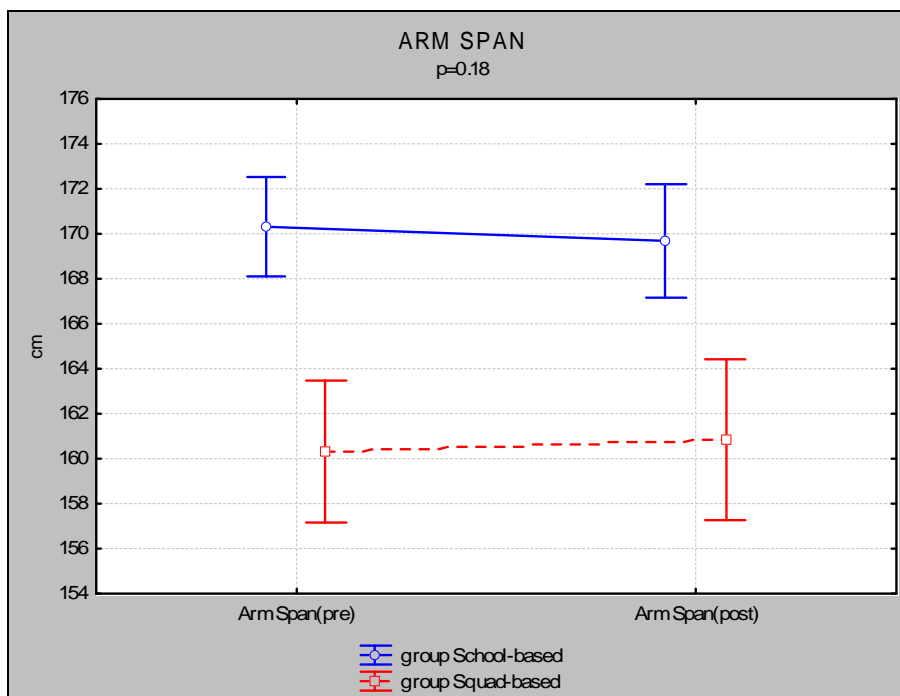


Figure 11

Comparison in arm span between the pre- and post-tests for the squad-based and school-based groups.

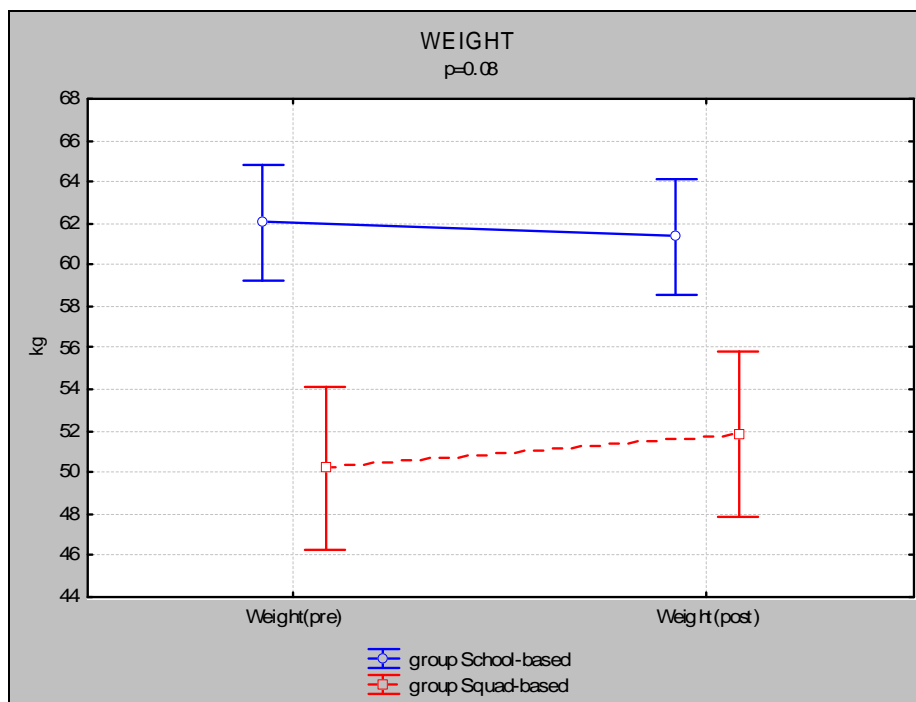


Figure 12

Comparison in weight between the pre- and post-tests for the squad-based and school-based groups.

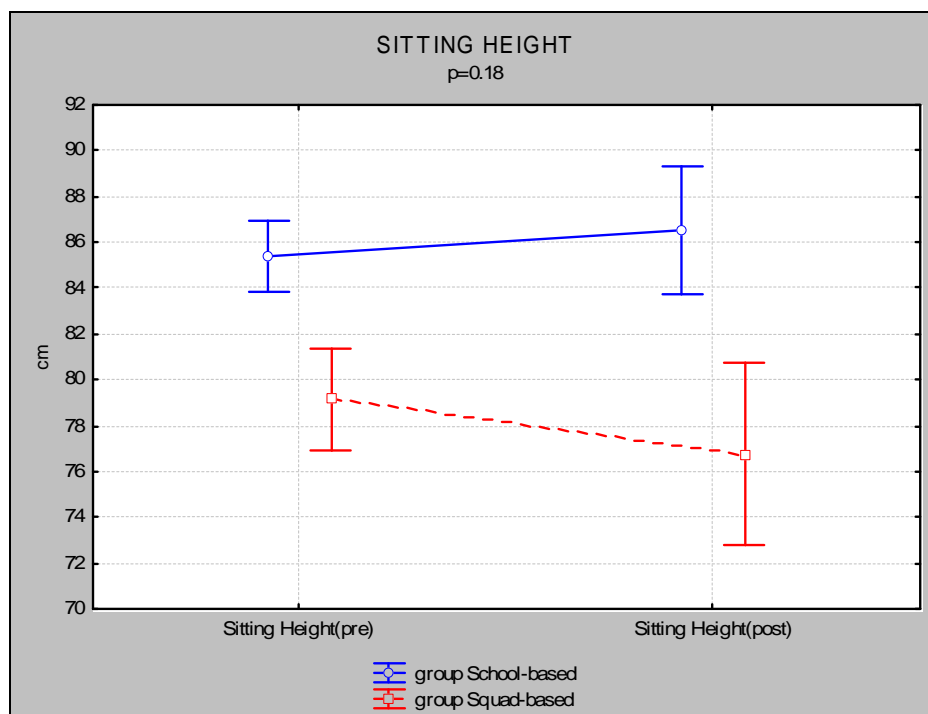


Figure 13

Comparison in sitting height between the pre- and post-tests for the squad-based and school-based groups.

Flexibility

There was a significant difference between groups on the pre-test scores for lower back and hamstring flexibility as measured by the sit and reach test (Figure 16). Girls from the squad-based group were less flexible than their school-based counterparts. There was a significant difference ($p = .01$) in the change in lower back and hamstring flexibility reported after the programme for the two groups, with the school-based group displaying a significant loss in flexibility when compared to the squad-based group.

There were also significant differences between groups in left and right hamstring flexibility (Figures 14 and 15). Girls in the squad-based group were significantly less flexible. These results agree with the results of the sit and reach pretest. When comparing the changes in flexibility following participation in the programme, a significant difference can be noted between the right hamstring scores of the squad-based group when compared to the school-based group ($p = .00$). Although the difference was not statistically significant ($p = .08$), Figure 14 shows that there was an improvement in flexibility for the squad-based group and a decrease in flexibility for the school-based group.

Although the reasons for loss of flexibility among girls from the school-based programme cannot be explained, the improvements among girls from the squad-based programme could be attributed to the quality of the coaching they received. The coaches were very careful to make sure that the necessary stretches were done during the warm-up and warm-down routine at training sessions and matches. This may have resulted in the improvement of the flexibility components.

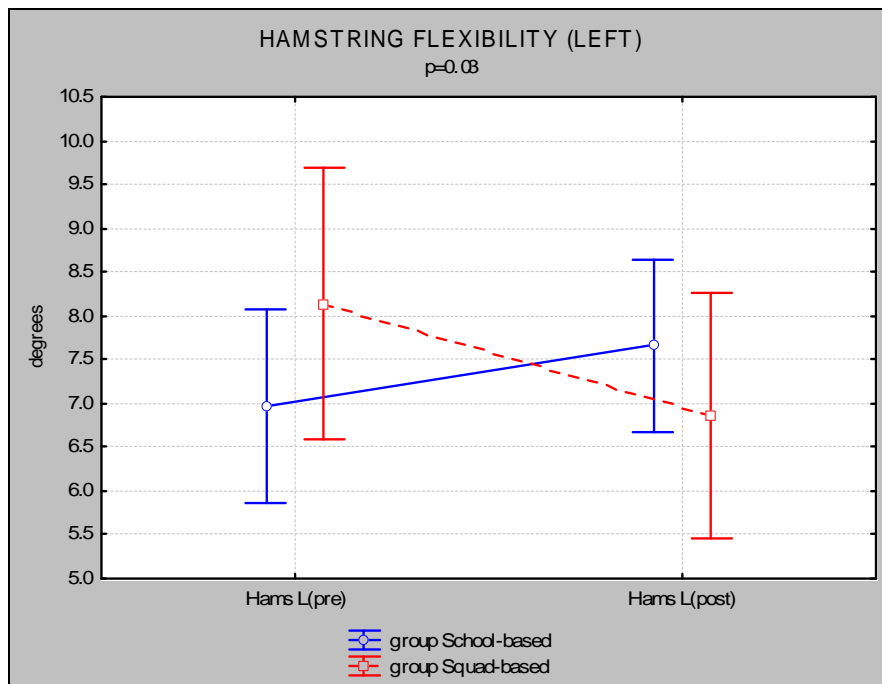


Figure 14

Comparison in hamstring flexibility for the left leg between the pre- and post-tests for the squad-based and school-based groups.

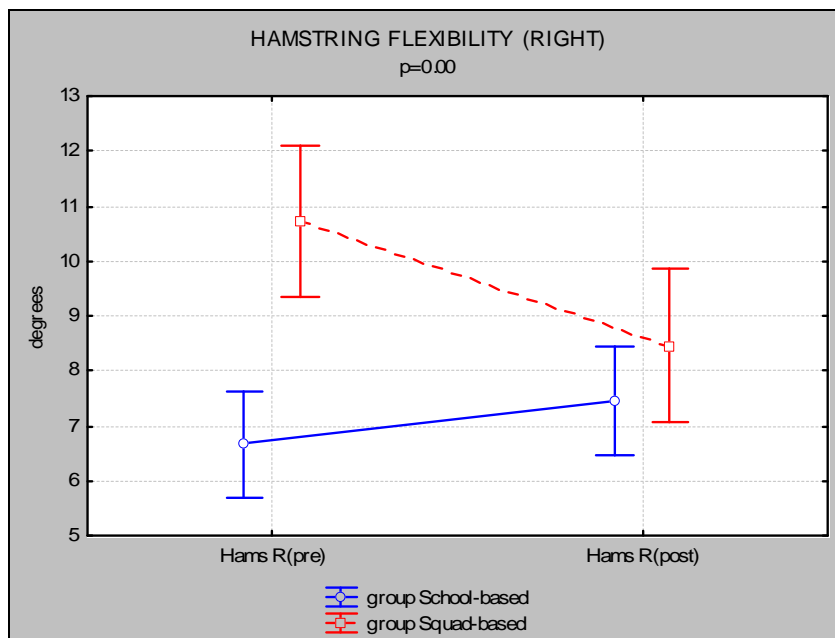


Figure 15

Comparison in hamstring flexibility for the right leg between the pre- and post-tests for the squad-based and school-based groups.

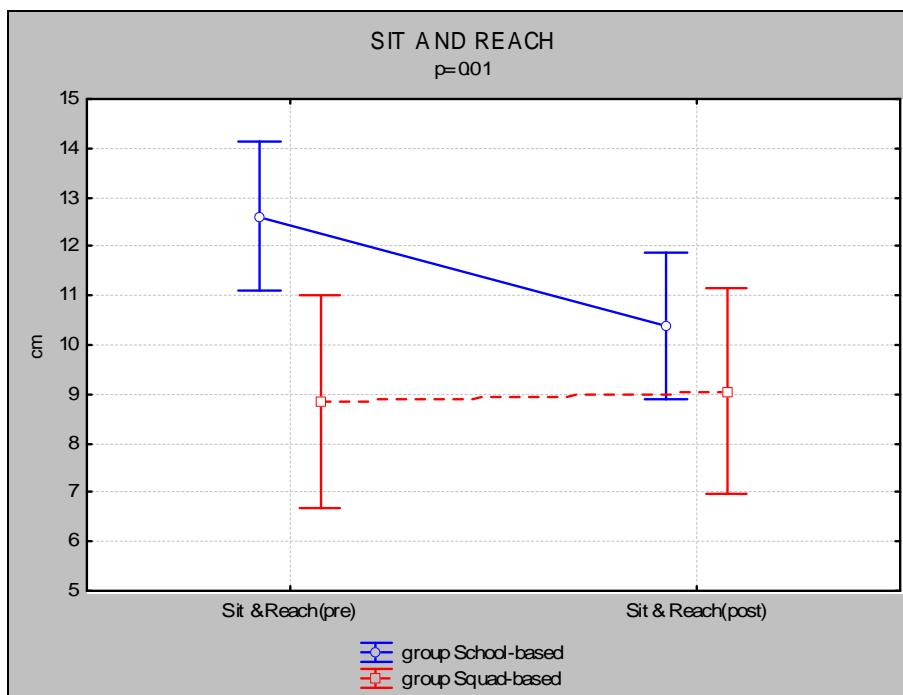


Figure 16

Comparison in the sit and reach test between the pre- and post-tests for the squad-based and school-based groups.

Power

In looking at all three pre-tests for power, girls from the squad-based group scored significantly lower than girls from the school-based group (Figures 17, 18 and 19). Once again this documents a physical difference in the status of the two groups.

In terms of upper body power as measured by the chest pass, there was no significant difference in the impact of the programmes ($p = .91$). In fact, it appears that almost no improvement in this variable was achieved by either group. For the squad-based group, this may be due to not enough attention being paid to improving upper body explosive power. A lack of specific upper body training was evident in the training logs. There was also no significant difference in the impact of the two programmes on lower body/leg power ($p = .36$ and $p = .16$). The squad-based group did show some improvement on this variable, perhaps because jumping activities are integral to netball skill training and their coaches did implement vigorous skill development drills.

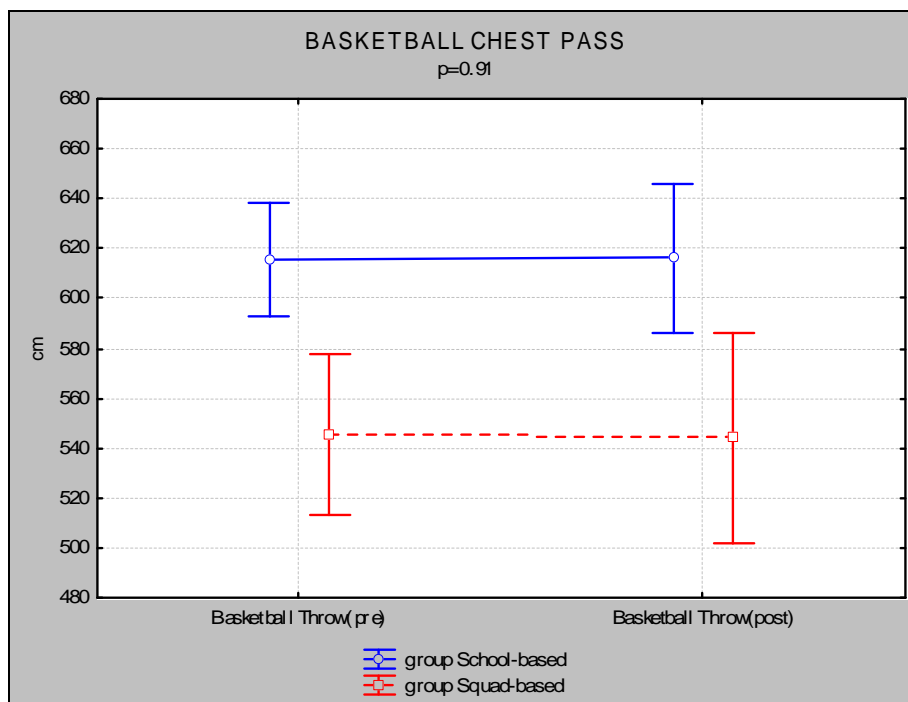


Figure 17

Comparison in the basketball chest pass between the pre- and post-tests for the squad-based and school-based groups.

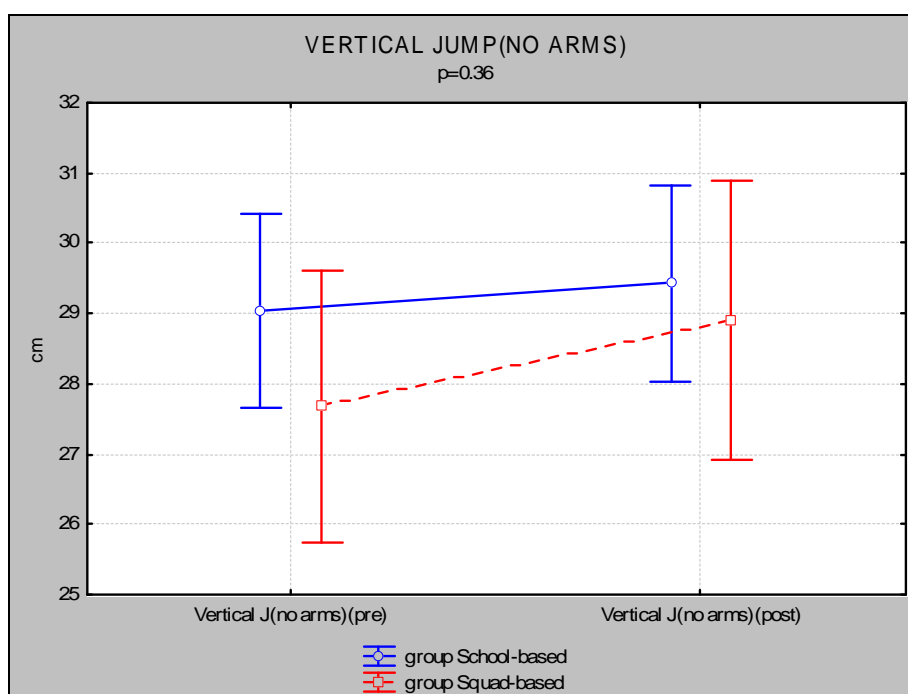


Figure 18

Comparison in the vertical jump(no arms) between the pre- and post-tests for the squad-based and school-based groups.

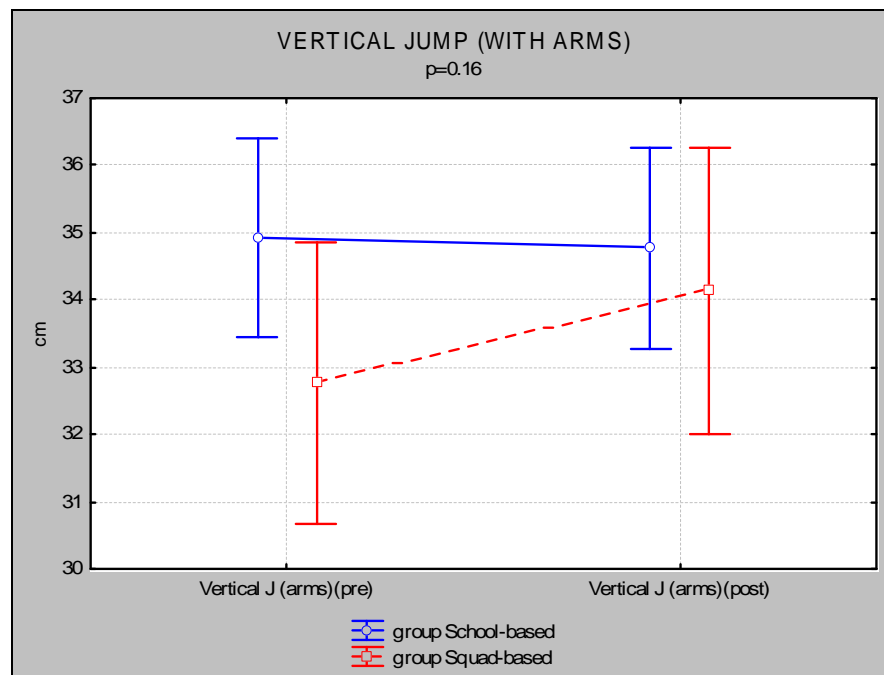


Figure 19

Comparison in the vertical jump (with arms) between the pre- and post-tests for the squad-based and school-based groups.

Agility

There was no significant difference ($p = .76$) between the two programmes in terms of an impact on players' agility. However, the scores do document again the significant differences between the physical condition of the girls from the squad-based group in comparison to the girls from the school-based group (Figure 20). Agility requires dynamic balance, speed and coordination. Netball is not linear, but rather requires the ability to move in multiple directions over short distances. In order to improve agility, it is necessary to train at full pace and with great urgency. The coaches reported that the girls in the squad-based group were not accustomed to intense training and that they were not used to the amount of running included in the squad-based training. This may be the reason why no significant change was achieved in agility for the squad-based players.

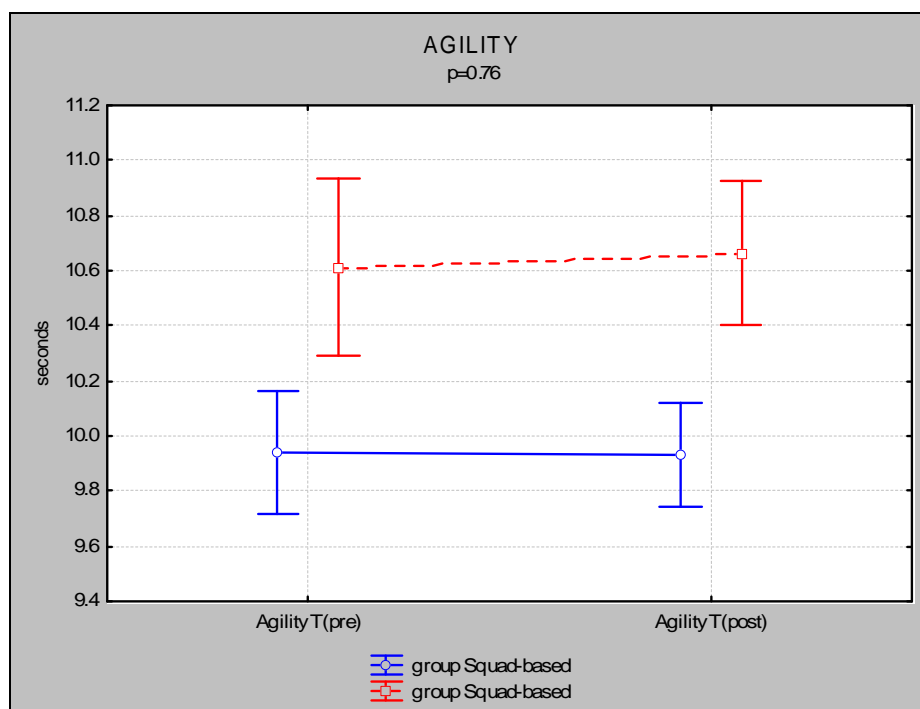


Figure 20

Comparison in the Agility T test between the pre- and post-tests for the squad-based and school-based groups.

Speed

Speed was the only component for which the squad-based group performed better than the school-based group on the pre-tests (Figures 21, 22, 23 and 24). The girls from the squad-based group were significantly faster over every distance. However, when the impact of the two programmes is compared, the squad-based group's performance deteriorated significantly in relation to the school-based group's changes in speed ($p = .00$ for all distances).

Only one explanation occurs to the investigator. During the pre-test, there were 48 girls "trying out" for the squad-based programme – only 30 were to be selected. This may have created a competitive environment and a motivation that was expressed as running as fast as possible. This test may have become a kind of race to make the squad. This motivation would be lacking on the posttest, where the girls would have nothing to prove and nothing to gain by running their fastest. This kind of result may indicate an emotional approach to testing situation, which would have to be controlled for in talent identification and selection testing.

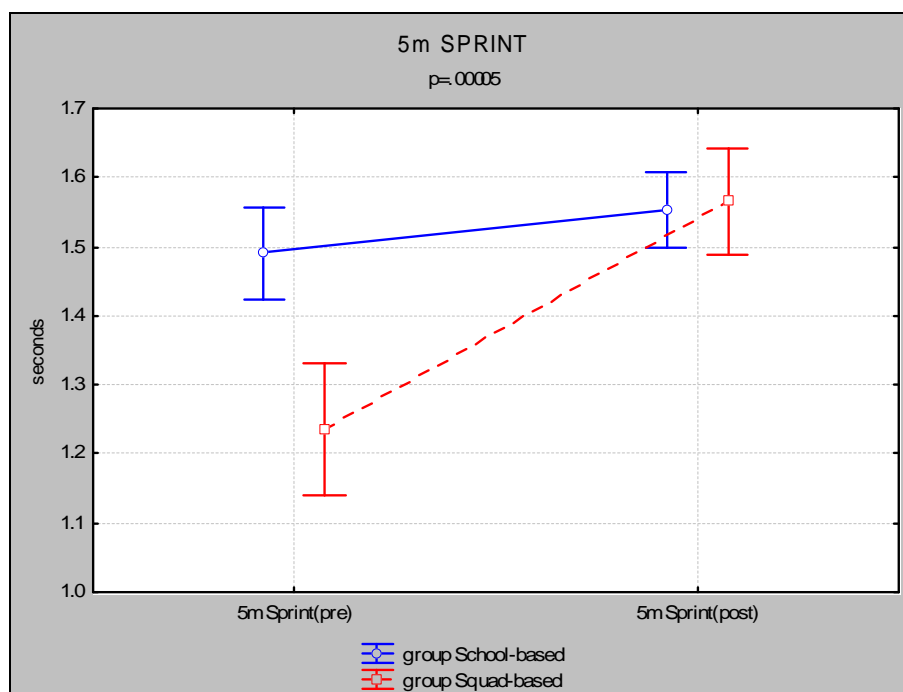


Figure 21

Comparison in 5m Sprint between the pre- and post-tests for the squad-based and school-based groups.

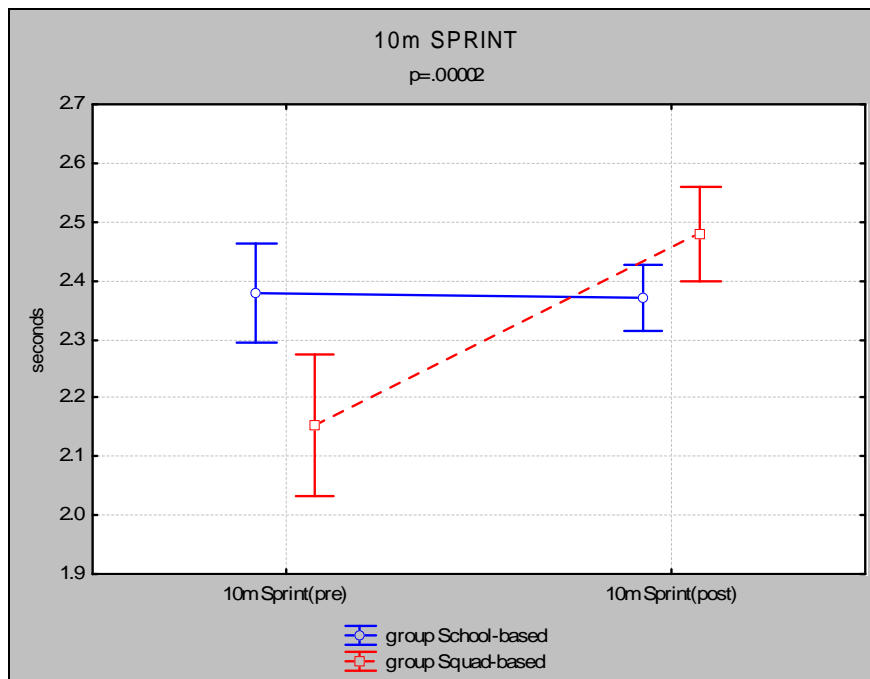


Figure 22

Comparison in the 10m sprint between the pre- and post-tests for the squad-based and school-based groups.

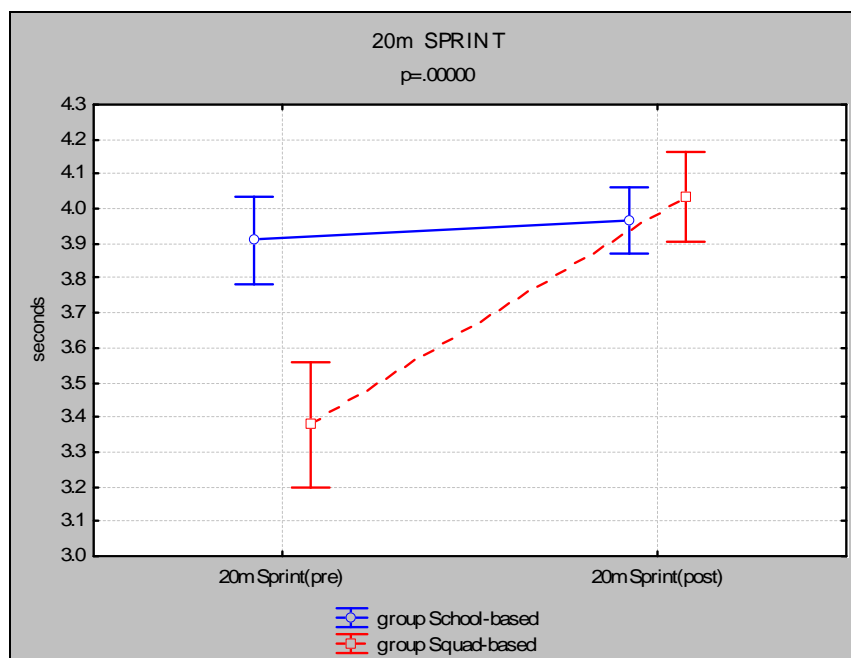


Figure 23

Comparison in the 20m sprint between the pre- and post-tests for the squad-based and school-based groups.

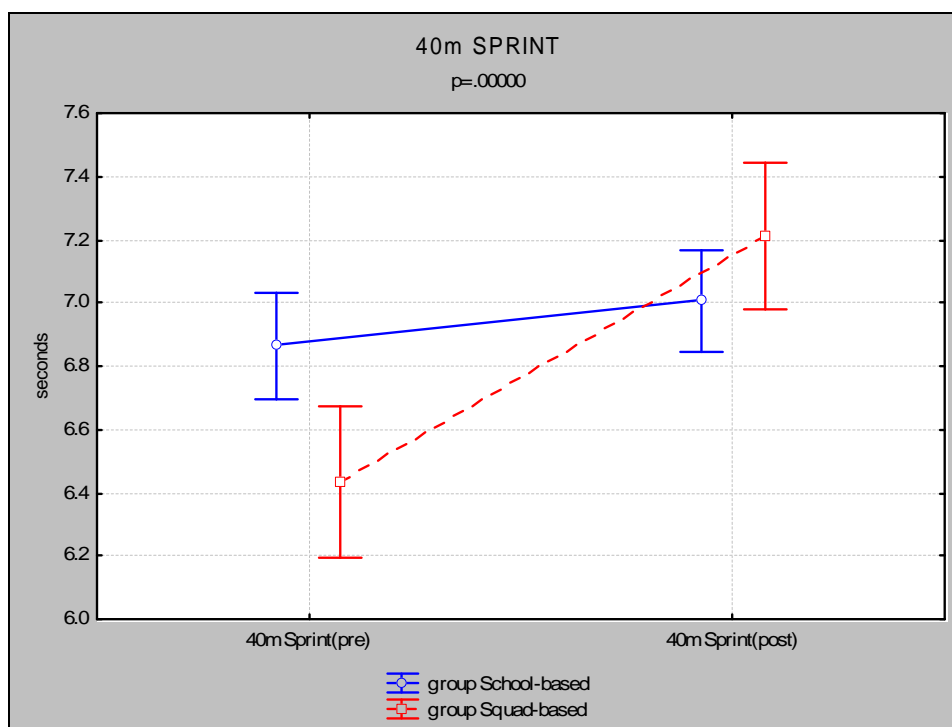


Figure 24

Comparison in the 40m sprint between the pre- and post-tests for the squad-based and school-based groups.

Throwing Velocity

A repeat in the pattern of statistically significant differences between the squad-based group and the school-based group on pre-test scores can be noted for both initial and final throwing velocity (Figures 25 and 26). Throwing velocity is a measure of both strength and total body coordination. When comparing the impact of the two programmes on throwing velocity, the squad-based programme was significantly more effective ($p = .00$ for both initial and final velocity). Because the squad-based group worked on their coordination and skills in every training session over various distances and intensities, a significant improvement in throwing velocity is understandable. It is also encouraging to look at the post-test scores, which indicate that the squad-based group “caught up” to the school-based group on both initial and final velocity. This demonstrates that players can catch up performance-wise if they have access to coaches who can teach them the necessary skills.

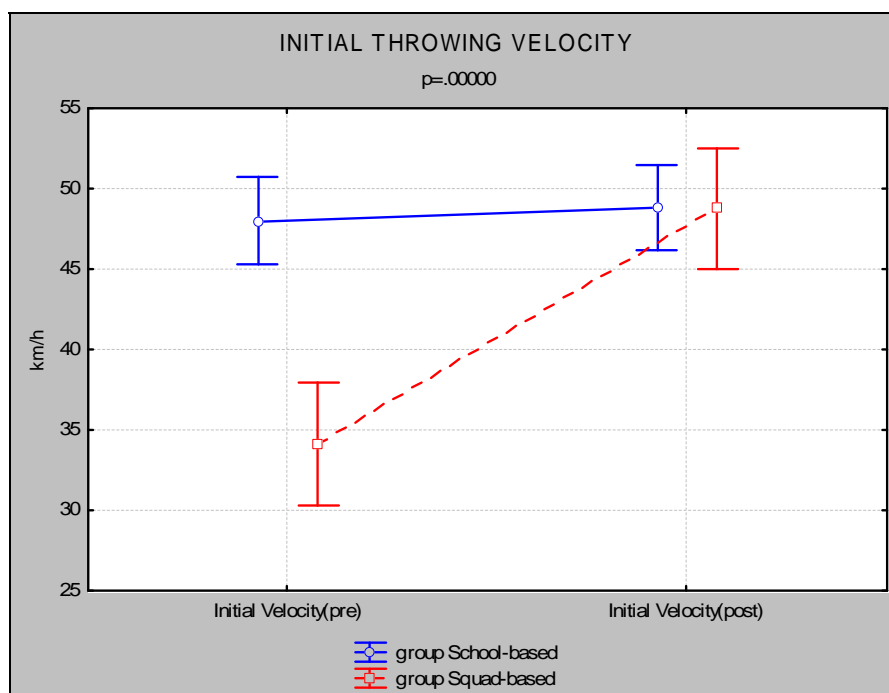


Figure 25

Comparison in initial throwing velocity between the pre- and post-tests for the squad-based and school-based groups.

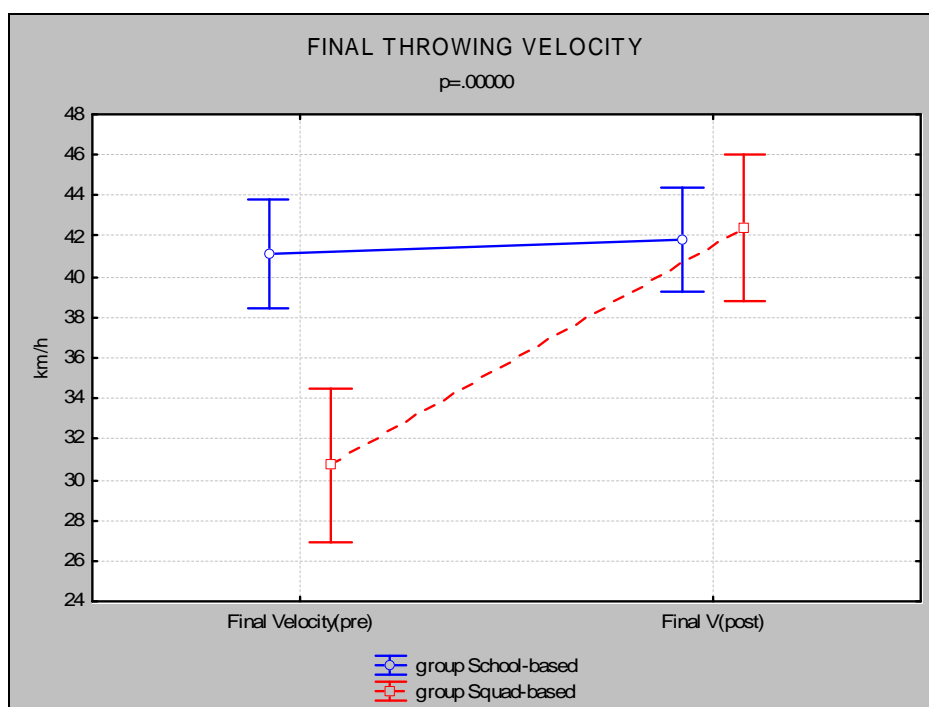


Figure 26

Comparison in final throwing velocity between the pre- and post-tests for the squad-based and school-based groups.

Catching Accuracy

There were no significant differences between the groups in terms of catching accuracy (Figure 27). Both the squad-base and school-base groups showed a significant improvement in catching accuracy between the pre-test and post-test scores, but the difference in the effectiveness of the two different groups was not statistically significant ($p = .85$). This indicates that both programmes were equally successful in improving the players catching accuracy (eye-hand coordination).

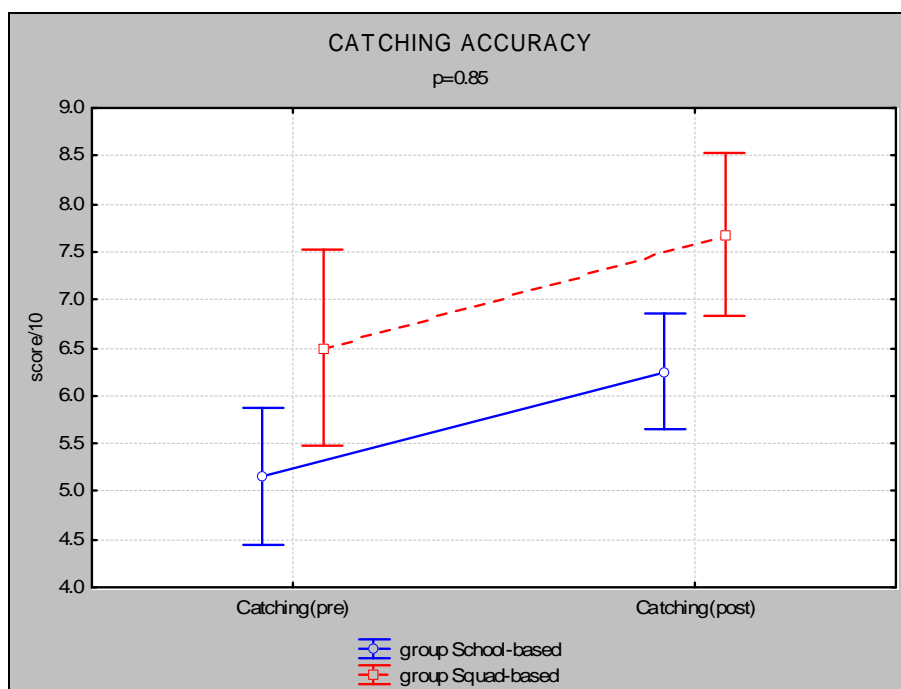


Figure 27

Comparison in catching accuracy between the pre- and post-tests for the squad-based and school-based groups.

Aerobic Fitness

A substantial difference in pre-test performance levels can be seen once again between the squad-based and school-based group (Figure 28). The difference in the impact of squad-based compared to the school-based group on aerobic fitness was significant ($p = .02$). The girls from the squad-based programme did improve their results somewhat on the posttest, probably due to aerobic fitness training that was incorporated into the intervention programme. Although the squad-based group did not enjoy many of the running activities, these activities appear to have had a positive effect on their test scores. The significant deterioration in the scores of girls in the school-based group was discussed in Research Question Three.

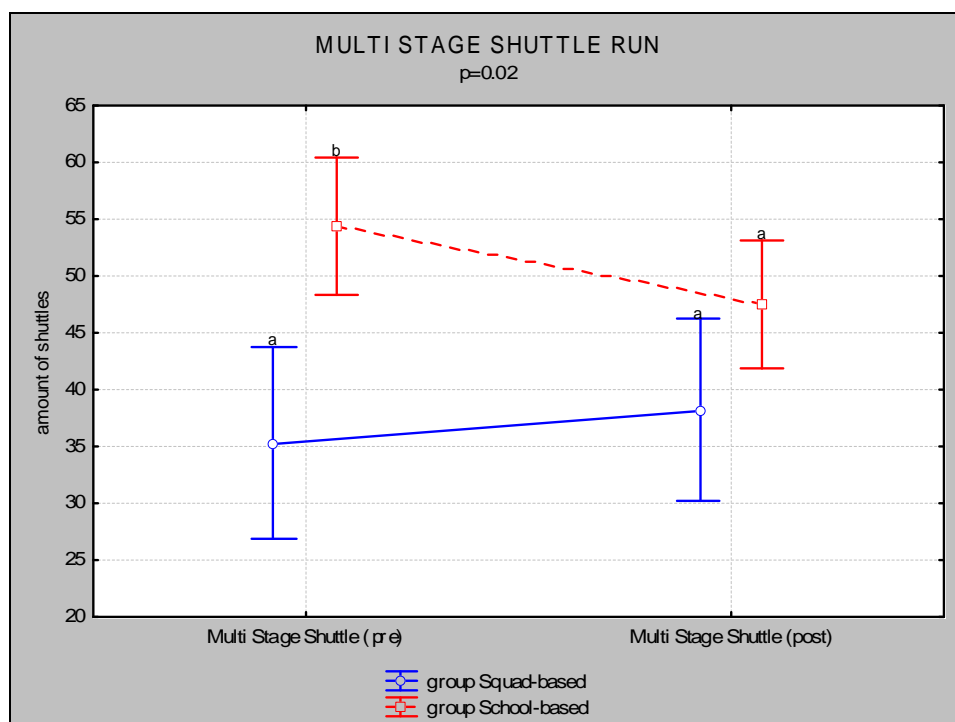


Figure 28

Comparison in the Multi stage shuttle run between the pre- and post-tests for the squad-based and school-based groups.

Research Question Five

What were the perceptions of the players of this squad-based experience?

Following the focus group discussion, the investigator organized the responses into five categories or themes.

Regarding the Content of the Programme

Question: Is the training more intensive at your schools and in what ways?

All the children answered yes to the first part of the question. There were two ways in which the intensity of the squad-based training differed from their school practices:

- We do more running here.
- We train specific skills and tactics. At the schools we usually only do passing and play games.

The intensity of any netball programme is important if the goals of talent development is to be achieved. The perception of greater intensity in terms of aerobic fitness and the focus on skills and tactics, indicates that there is a need for coaching development in communities known as “previously disadvantaged,” in conjunction with player development.

Regarding Enjoyment

Question: What are the things you enjoy most about this netball programme?

- Playing matches.
- The good training facilities and the specialised equipment.
- Good coaching.
- Leaving the community for a while and being able to meeting new people like meeting Bronwyn Bock (SA Netball captain).
- Going as a team to senior provincial matches.

Question: What do you enjoy most of the matches?

- Using the skills we have learned.
- Playing games against strong competition.
- To learn through match practice.

It is clear that the participants did enjoy playing the game, enjoyed learning and improving skills and liked meeting new people. They also mentioned that they liked the challenge of playing against strong competition. These factors must definitely be kept in mind for future talent development programmes. Having good facilities on which to train was also identified as a source of enjoyment.

Lack of Enjoyment

Question: What are the things you don't enjoy about this netball programme?

- Fitness training.
- Too much training.
- Getting home much later than usual in the afternoon.

Question: What don't you enjoy about the matches?

- Losing.
- Playing against players being much taller than we are.

In all training programmes there will be aspects that the participants enjoy less than others. Early in the programme the coaches picked up that the subjects in the squad-base group wasn't accustomed with intensive training. They didn't enjoy any physical activities to be done repeatedly or enjoy any running activities (short or long distance). The coaches struggled to keep the intensity at a high pace during training. This tendency agrees with the "training to train" stage of athlete development, which teaches young athletes how to train (Balyi & Hamilton, 2001). The coaches and investigator agreed that this was the most common reason that eight of the original 30 girls did not complete the programme, and that

the squad-based group did not show significant improvement on most of the physical components.

Although the teams did lose most of the matches, it was the only workable league we could enter the teams in to get the necessary match practice. It seems that the girls enjoyed strong competition, but did not enjoy losing regularly. Match practice at a sufficient level of challenge is a difficult but important ingredient to include in development programmes, since it can be a source of both positive and negative sentiments.

Regarding the Coaches

Question: What do you or don't you like about the coaches?

- We think they are very good coaches.
- We like it when they give us special treats (sweets).
- Sometimes they get too mad at us.

The players seemed to like the coaches and respect the fact that they have the necessary experience and skills necessary to coach them.

It is important to keep in mind that different cultures have different perceptions of work and effort. It is possible that they (the players) may not have been used to the strictness associated with coaching in the “train to train stage.”

Regarding General Programme Expectations

Question: What do you want from this programme?

- We want to have fun.
- We want to improve our skills.
- We would like to go away for a training camp.
- We want special tracksuits for our group.

According to the question above, the girls wanted to have fun and wanted to improve their skills. Based on their responses to the other questions, both of these expectations were met. They seem to have enjoyed quite a few aspects of the programme. The squad-based group also improved their skills according to the results in Research Question One.

In order to meet the other expectations of the girls, a week-end training camp was scheduled at the end of the intervention programme. The squad-base group requested tracksuits, but due to financial limitations we could only give them t-shirts. An additional impetus for attaining success is the ability to acquire the appropriate apparel and equipment associated with specific sports (Singer & Janelle, 1999). From a players perception it seems as if the talent development programme was successful.

Conclusion

In general, the squad-based programme was similar to the school-based programme in terms of impact on the development of physical variables for netball. Because the squad-based programme produced significant improvements in skills, it can be concluded that it is a legitimate model to implement when working with players from previously disadvantaged communities who do not have access to a quality school-based programme.

There are factors that could limit the potential of this – or any type – of talent development programme to produce positive outcomes:

- Attendance to the programme (see Appendix G).

In a programme of this length (eight months) it is not surprising that there would be some absences due to health, schoolwork or other activities. The average attendance for the squad-based group was between 60% - 70% of the sessions. Some players missed more sessions, which could have affected their posttest scores.

- Not enough individual attention.

Each squad coach had 15 players with whom to work. This may have meant that not enough time was spent with each girl.

- Coach not somebody with whom they could identify.

Both coaches were from a different racial and cultural background than the players in the squad-based group. It is possible that the girls would have benefited more, or differently, if the coaches had been from their community.

- Age group too broad (14-18 years)

Although there was not a great deal of difference in the initial skill levels of the girls in the squad-based group, the coaches reported that the older girls seemed to learn faster. Socially, it did seem there was an age-split in the group, with the older groups talking together, getting on the bus and taking their places first, etc. A more narrow age range might be advisable when working with teenagers, in order to create more homogenous groups for coaching.

Bloomfield (1980) stated that early talent identification and development of sport talent leads to improved sports performance. Although research is limited in team sports (Pienaar et al., 1998) performance criteria is more crucial for team sports since mini-performances must be conceived within a context, considered against the strengths and weaknesses of other team members and the given demands of each position. Because talent development plays such a major role in the talent identification role and the development process in South Africa lacks a specific model, it was considered reasonable to investigate whether the suggested model will reveal positive changes in skill and physical characteristics through a squad-based development programme.

Chapter 5

Conclusions and Recommendations

The purpose of this study was to explore the potential of participation in an after-school squad-based netball programme as a model for talent development in South Africa for team sports. The specific focus of this study was on determining the influence of participation in this type of programme on skills and the physical components needed for netball.

Conclusions

The results of this study lead to some general conclusions:

1. Participation in a squad-based talent development programme can help high school netball players from historically disadvantaged communities improve their netball skills. In this study, performance improvements were documented in terms of attacking skills, defending skills, catching and passing skills and general game playing skills, as assessed by a group of netball coaches who observed the players in game situations.
2. Participation in a squad-based talent development programme can have a positive effect on the physical variables needed for netball performance. In this study, there was a significant increase in height attributed to growth over the eight-month intervention period. There were also significant improvements achieved for the following physical variables: hamstring flexibility of the right leg, throwing velocity (fastest and slowest speeds) and catching accuracy (eye-hand coordination). Although not statistically significant, there were improvements achieved for the following variables too: hamstring flexibility (left leg), lower/back & hamstring flexibility (sit and reach), leg power (two measurements of vertical jump, agility, aerobic endurance (multi-stage shuttle run). The Increase in arm span was attributed to growth.
3. Participation in the traditional school-based model for netball programme appears to have positive affects on some of the physical variables that support

netball performance. Data documented the following changes attributed to growth: height, sitting height and weight. Data collected in this study indicated improvements for the following variables: 10m running speed, throwing velocity (fastest and slowest speed), Vertical Jump (no arms), sitting height and catching accuracy. Only the sit and reach flexibility tests and catching accuracy were statistically significant.

4. Although it was not possible to make accurate comparisons between the squad-based and school-based models, it can be concluded that both models do help develop some of the physical variables needed for netball performance. It can also be concluded that the squad-based model is a viable model for talent development and deserves continued research in order to determine the communities and circumstances under which it can produce successful results.
5. There was a significant difference in the physical “starting points” for high school girls from historically disadvantaged communities, when compared to girls from more advantaged backgrounds.

Talent identification tests are aimed at finding talented prospects for a sport, among persons who are not participating in that sport. The implication of these results for talent identification testing may be that a different set of norms may be necessary for school girls from advantaged backgrounds than for school girls from disadvantaged communities. It may also mean that no direct comparison in the results of talent identification tests can be made between these two groups. Each group should be judged by its own standards in order to find the more talented players in their group. Then, the talent development programme should be adapted so that the athletes from the disadvantaged schools can “catch up” to their privileged counterparts.

Talent selection, defined as the identification of young athletes currently participating in a sport using experienced coaches and/or physical, physiological and skill tests, also need to be considered in light of these results. If players from previously disadvantaged communities are physically smaller and less fit, a talent selection screening process may not be a viable option, since both the observers

and the objective tests may pass over such players as “not yet ready for selection.”

In terms of talent development programmes, the difference in starting points for players from different social, cultural and economic backgrounds may be of great importance. The specific stages for training, e.g. the Fundamental Stage, the Training to Train Stage in particular, may need to be re-examined. The results of this study may be an indication that the training stages for athlete development will have to be adapted for athletes from disadvantaged communities in the South African context. Perhaps additional transitional stages must be developed to address physical as well as other concerns that may impede talent development in sport.

Recommendations for Future Programmes

Many talented athletes fail to reach their potential because of incorrect training methods (Kutsar, 1991). The diversity in cultures and race, as well as the impact of the economical and political influences, demands the exploration of a variety of approaches to the development of sporting talent in South Africa. Development in team sports, for example, may benefit from both a squad-based and a school-based approach. There may be other models as well, that could support the development of talent in team sports.

Multiple-models for talent identification, selection and development are recommended because these are very complicated areas of academic study and professional practice. The following observations support this point of view:

- For some sports, physical prerequisites for achieving expert levels have been identified. However, possession of these prerequisites is no guarantee for success. In team sports in particular, other variables have as great or greater influence on ultimate level of achievement, e.g. skill and decision-making (Thomas, 1994). Models for the development of team sport participants must emphasize skill development and tactical game play in order to develop expert players.
- Talent development models should include more than just a focus on the development of the players. Development of coaches and technical officials are crucial as well. The outcome of this study might have been very different if the two

coaches had not been highly rated and competent coaches, or if the players had not had access to regular match play with rated officials and referees in control.

- Using an established sport-specific test battery is helpful. Hoare's (1997) test battery, which was used in this study, did cover most of the physical components which are necessary for netball players. However, revision of the battery should be considered. The catching accuracy test is a score out of 10 using a tennis ball throwing machine. The applicability of the task for assessing netball catching skills is questionable as it is unclear whether there is any transfer between catching skills using the small ball and a netball.

Two versions of the vertical jump were used, one without the use of the arms and one with the use of the arms. Essentially the difference is that without the arms protocol is more a measure of explosive power in comparison to the with arms protocol which measures co-ordination as well as power. Since the throwing test is also a measure of coordination, perhaps the "without the arms" version is more relevant as a measure of leg power and a more economical use of the subject's time.

As an outcome of this research, some specific insights were gained into the implementation of the squad-based model:

- Match practice played an important role in the squad-based model. Matches are crucial if players are to learn how to implement the tactics, skill and knowledge acquired during training. It is also a relevant way to assess the progress and game sense of the players. However, the notion of optimal challenge must be employed. In this research, the subjects played regularly against more skillful and older students. The squad-based group became unmotivated by losing to the older players on a regular basis. Playing against peers and/or persons of similar or slightly better skill levels, may be more motivating for the improvement skills and physical condition.
- A code of conduct/agreement should be formulated at the beginning of the programme, and implemented consistently for the duration of the programme.

These rules of behaviour should stay the same throughout the programme to help facilitate accurate and open communication between the coaches and the players. This may be especially critical in team sports where there is a need to create a feeling of equality in the group, and in multi-cultural settings where the opportunities for mis-communication and mis-perceptions are easily formed.

- Enlisting more sport science support might have helped motivate the players in the squad-based programme, for example, sport psychology in terms of goal setting, self-management skills, etc. It also could have expanded their knowledge about training, for example, sport nutrition. According to Du Randt (1992), full scientific support is required in the process of reaching the full potential of developing athletes.
- For any programme where schools are involved, it is essential to have a person at the school committed to the programme. This person will be in contact with the participants on a daily basis to facilitate communication. This person should be included as a valued member of the support group. He/she will help motivate, communicate and support the players who are part of the programme. This person can provide critical personal information about players, and can also share insights about community and cultural issues that might have an effect on the programmes.

Future Research

The results of this research also leads to recommendations about the focus of future research projects:

- More research is needed specifically into the training methods of athletes from previously disadvantaged areas. One outcome of this line of research would be to determine if the general four-stage approach to formal athletic development will work in all South African contexts, or if a different organization of stages is more relevant.
- The research emphasis on talent identification is well underway (Burwitz, Moore & Wilkonson, 1994), but there is still the need to investigate the nature of certain talent predictors. This would include the influence of the family on the sportsperson and the influence of sport injuries on the sportsperson. Research is

lacking in terms of the outcomes of various models for talent development. Exploration of a variety of models would contribute to an understanding of how talent can be developed in sport.

- Research to identify suitable predictors of success for transition to each successive performance stage in the development continuum could help inform coaches and players about when they are ready for the next stage of training intensity and duration.
- A need exists to explore various models of talent development for boys versus a talent development programme for girls. There may be subtle, or not so subtle, differences in model variations that could have a profound effect on the success of development. Unique outcomes may be associated with programmes for the different genders, as well as unique methods or programme content.
- The content and methods of programmes for persons who have been “identified” rather than “selected” requires exploration. For example, there might have to be an intensive “Fundamental Stage” for new recruits to a sport. The packaging of that kind of stage, and when those players would be ready to integrate into the mainstream development programme, is a decision that calls for more information about talent development.
- Longitudinal talent development projects should be implemented to determine the factors and patterns that contribute to the development of talented athletes. These projects would include training models for talent development which permit the monitoring of progress and decline of athlete development.

Concluding Remarks

Talent development starts from the premise that there is an opportunity for all to participate in a broad range of sporting activities and then to pursue excellence in the sport of their choice. This research was an attempt to deliver a talent development model in the team sport of netball.

The programme certainly had more success than was immediately evident in the results. In the year after the development programme, two of the players from the squad-

based programme were selected for provincial squads. The first athlete received a scholarship to one of the only netball institute in South Africa, and was selected for the u/19 Boland Provincial side. The other player was chosen for the u/15 Boland Provincial team. While it is not certain that these two players have begun to emerge as provincial level talent because of their squad-based experience, it is known that the year of training contributed significantly to their skill development and provided them with match experience they would never have had if they had followed their own school's netball programme.

Factors in the external environment played an undetermined role in the development of the players in the squad-based group. The investigator had no control over these factors since the players left their community to participate in the programme, then returned to their community following every session. A residential model for training may be another viable approach to developing athletes from historically disadvantaged communities.

The potential value of squad-programmes and school-based programmes should not be minimised. Although this investigation did not demonstrate that either model is superior in developing the physical variables that support netball performance, the squad-based model was able to make a significant contribution to the development of skill. Continuous refinement of current models and even the creation of new models, may one day create systems where every child can reach toward his or her own sporting potential:

Each child has inherited his or her own complex of qualities that generally makes it possible to succeed in a certain event. Therefore it can be said that there are, within reason, no untalented children, only children that take part in unsuitable events (Kutsar, 1991).

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Appendix A

Testing Protocols

Height

Equipment

- Stadiometer or steel measuring tape firmly mounted on a wall, accurate to 0.1 cm
- Ensure the wall does not have a skirting board
- If a measuring tape is used, a set square will also be required
- A spirit level should be glued to the horizontal edge of the set square
- Ensure the floor surface used is even and firm

Procedure

- The athlete stands erect in bare feet with heels, buttocks and shoulders pressed against the stadiometer or tape measure.
- The heels are together with the arms hanging freely by the side (palms facing thighs).
- The tester applies gentle upward traction to the skull behind the ears to ensure the body is fully stretched (ensure the head is not tilted backwards).
- The athlete is instructed to look straight ahead, take a deep breath and stand as tall as possible.
- Ensure the athlete's heels are not raised.
- If using a stadiometer, lower the platform until it makes firm contact with the top of the head. If using a tape measure, place the set square against the wall with the base on top of the head ensuring the set square is level by using the spirit level as an indicator.

Scoring

Record standing height to the nearest 0.1 cm.

Sitting Height

Equipment

- Stadiometer or steel measuring tape firmly mounted on a wall, accurate to 0.1 cm
- Ensure the wall does not have a skirting board
- If a measuring tape is used a set square will also be required
- A spirit level should be glued to the horizontal edge of the set square
- Ensure the floor surface used is even and firm
- Small bench of known height (approximately 40 cm)

Procedure

- Place the bench centrally at the base of the stadiometer or measuring tape.
- The athlete sits on the bench with the knees forward and bent, and hands resting on the thighs which are parallel with the floor.
- The buttocks and shoulders rest lightly against the stadiometer/tape which is positioned vertically in the midline behind the athlete.
- The tester applies gentle upward traction to the skull behind the ears to ensure the body is fully stretched (ensure the head is not tilted backwards).
- The athlete is instructed to look straight ahead, take a deep breath and sit as erect as possible.
- If using a stadiometer, lower the platform until it makes firm contact with the top of the head. If using a tape measure, place the set square against the wall with the base on top of the head ensuring the set square is level by using the spirit level as an indicator.

Scoring

The height of the vertex is recorded to the nearest 0.1 cm. To obtain the athlete's sitting height subtract the height of the bench from the recorded measurement.

Body Mass

Procedure

- The athlete should be barefoot and wearing only bathers or light clothing (t shirt and shorts/skirt).
- Ensure the scale has been zeroed.
- Have the athlete stand still and erect with weight evenly distributed on the centre of the scale.

Scoring

Record the athlete's body mass to the nearest 0.5 kg and if necessary correct for scale errors using calibration information.

Arm Span

Equipment

- Tape measure (at least 3 metres in length and accurate to 0.1 cm) mounted horizontally on a wall approximately 1.5 metres above the ground. A corner of the wall should be used as the zero point.
- Ruler

Procedure

- The athlete stands erect with their back against the wall, feet together; and heels, buttocks and shoulders touching the wall.
- The arms are extended laterally at shoulder level (horizontal) with the hands facing forwards.
- The tip of the middle finger is aligned with the end of the tape measure. If the athlete is tall/short and their arms are above/below the tape measure ensure the arms are held in a horizontal position and use a ruler held vertically to line the end of the finger tip up with the tape measure.
- Measure the distance from the end of the tape to the tip of the middle finger on the other arm.

Scoring

Record arm span to the nearest 0.1 cm.

Sprints (5, 10, 20 and 40 metre)**Equipment**

- Stopwatch and wickets hats (10)
- Electronic timing gates, leads and related timing equipment
- 40 metre running track that is straight, level and placed cross wind. If a grass surface is used ensure that it is dry.

Procedure

- Mark a 40 metre running track with wickets hats at 0 and 40 metres.
- Place timing gates at 0, 5, 10 and 20 metres.
- The athlete starts in a standing position with their front foot exactly on the line.
- No rocking or step toward the starting line should be allowed.
- The athlete does a maximal sprint effort through the timing gates.
- The athlete first performs two trials over 20 metres. These are separated by a rest period.
- Move the 20 metre timing gates to the 40 metre line. The athletes then complete two trials over 40 metres separated by a rest period.

Scoring

The timing gates will automatically record times for 5, 10 and 20 metres for the first two trials.

The timing gates will automatically record the time for the 40 metre trials.

Record the time taken for the fastest trial to the nearest 0.01 of a second for the 5, 10, 20 and 40 metre distances.

Agility Run

Equipment

- Stopwatch
- Measuring tape
- Witches hats (4)

Procedure

- The witches hats are placed 5 metres apart (from the centre of each hat).
- Shoes should be worn for this test. The surface used should be flat, even and slip resistant.
- The player starts facing cone 4 with the feet shoulder width apart and the right foot level with cone 1.
- The first movement is to the right using a side step.
- The player then turns and runs forward to cone 2.
- The player must change direction at cone 2 by using a right foot plant to face forward. The foot plant should be at or past the cone.
- The next movement is a forward run back past cone 1 to cone 3 where there is another change of direction back toward cone 1 using a left foot plant to face forward.
- Note that these change of directions must be made with the player facing forward (toward cone 4) however the run movement is forward and towards cones 1,2 and 3 (i.e. not a side step).
- The player then moves back to cone 1 where the right foot is planted close to the cone (within 20 centimetres) for a change of direction toward cone 4.
- Having run forward to cone 4 the player then changes direction by planting either foot at or past this cone.
- The final movement is back to cone 1 by using a backwards run.
- The timing starts with the player's first movement toward her right and finishes as the player passes cone 1.
- Allow two trials for each player.

Scoring

Record the time taken for the best trial to the nearest 0.1 of a second.

Vertical Jump

Equipment

- Powder chalk (talcum powder or flour is appropriate)
- Wall mounted board covering heights from 150 to 350 cm (accurate to 1 cm).

Procedure

- The athlete dips the fingertips of the preferred side into the powder chalk.
- The athlete stands with the preferred side nearest the board and reaches upward with their arm closest to the wall and touches the board with their middle finger to leave a mark at the highest possible point.
- The feet should be flat on the floor and the arm/hand extended as high as possible.
- Record the position of the initial mark to the nearest 1 cm (reaching height).

Without arms protocol

- The athlete's arms are to remain in the same position as above (the preferred arm is raised vertically and the non-preferred arm held by the side) as they go into a crouch. The athlete can choose the depth of crouch and is allowed to 'bounce' if desired. The athlete is not allowed to swing the arms to assist momentum.
- The athlete then springs upward from this position to touch the wall at the highest possible point with the outstretched arm closest to the board.
- Allow two trials for each athlete.

With arms protocol

- The athlete is allowed to swing their arms and use a counter movement (bend knees)
- The athlete is required to use a two foot take-off to jump upwards and touch the wall at the highest possible point with the outstretched arm closest to the board.
- Allow two trials for each athlete.

Scoring

Record the reaching height to the nearest cm.

Record the final height (to the nearest cm) the athlete jumped on the best trial for each protocol.

Subtract the reaching height from the vertical jump height to obtain the vertical jump distance in centimetres.

Basketball Throw**Equipment**

- Size 7 basketball
- 20 metre tape measure accurate to 5 cm

Procedure

- The athlete sits with their buttocks, back and head resting against a wall. Their legs rest on the floor horizontally in front of the body.
- The athlete uses a two handed chest pass to push the ball in the horizontal direction as far forward as possible. A one arm or shoulder pass is not allowed.
- Ensure that the athlete keeps the head, shoulders and buttocks in contact with the wall and the ball is thrown only using the arm and shoulder muscles.
- Allow two trials for each athlete.

Scoring

Record the longest distance thrown to the nearest 5 cm (measure from the base of the ball where it makes contact with the ground on the first bounce).

Hamstring Flexibility Test(Active Knee Extension [AKE] or 90/90 Test)**Equipment**

- Goniometer with extended arms and spirit level
- Firm plinth/table

Procedure

- Landmark the inferior border of the lateral malleolus and the head of fibula.
- Have the athlete lay supine with head resting on the table (no pillow) with arms crossed on chest.
- Passively flex the hip of the testing leg until the thigh is vertical (use the spirit level to align).
- This position is maintained throughout the test by support behind the posterior thigh.
- Maintain opposite leg in fully extended position throughout the test by 'pushing' the heel away from the body.
- Keep the foot relaxed and actively straighten the knee until the thigh begins to move from the vertical position.
- In cases where full knee extension is achieved without thigh movement, the knee is flexed while the thigh is moved to 30 degrees past the vertical position. With a relaxed foot, the knee is again straightened until the thigh begins to move.

Scoring

The angle from complete knee extension at which the thigh begins to move is recorded by aligning the goniometer with the landmarks described above and the vertical plane.

In cases where the hip is further flexed to 120 degrees flexion, the measurement is recorded as 120-x.

Sit and Reach**Equipment**

- Sit and Reach box or similar box with a stiff ruler in 1 cm divisions

Procedure

- The athlete sits on the floor with legs straight and feet together (shoes removed).
- The feet should be hard up against the front of the measuring box.
- The athlete slowly reaches along the scale with two hands extended one on top of the other until they can go no further (the finger tips of each hand must be even).
- This furthest point should be held for three seconds with the knees fully extended.

- Three attempts are made and recorded to the nearest centimetre. A positive figure is one recorded from past the toes and a negative value is recorded when the athlete cannot reach their toes.

Scoring

Record the best trial to the nearest centimetre.

Shuttle Run

Equipment

- Cadence audio tape for shuttle run, cassette player
- 20 metre marked distance on a surface that is flat, even and slip resistant
- Stopwatch, witches hats (4)

Procedure

- Check the speed of the cassette player using the one minute calibration period and adjust the running distance if necessary (this is described on the tape and in the tape manual).
- Measure the 20 metre distance and mark with tape and witches hats.
- Start the cadence audio tape.
- Instruct the athlete to run to the opposite end and place one foot behind the line by the time the next beep sounds. If they arrive before the beep they should turn (pivot) and wait for the signal, then run to the opposite line to reach this in time for the next signal.
- At the end of each minute the time interval between beeps is decreased, thereby running speed becomes progressively faster.
- Ensure the athlete reaches the end line each time and does not turn short. Emphasise to the athlete to pivot and turn rather than run an arc which some tend to do (this takes more time).
- Each athlete continues running for as long as possible until he/she can no longer keep up with the tape. The criterion for eliminating an athlete is two lengths in a row where he/she is more than two steps from the end.

Scoring

Record the last level and shuttle the athlete successfully completed.

Throwing velocity**Equipment**

- Radar gun
- Standard netball

Procedure

- The student throws the netball with a shoulder pass as far forward as possible
- The student's feet must stay behind the throwing line
- Allow two practice throws and three measured trials for each student.
- It is particularly important to ensure students are adequately warmed up (with stretching and non-maximal throws) before performing this test.

Scoring

Record the fastest speed thrown to the nearest 0.1 km/h.

Record the slowest speed thrown to the nearest 0.1km/h.

Catching Accuracy**Equipment**

Tennisball machine

13 Tennis balls

Procedure

- The student stands approximately 15-20m away from the tennis ball machine.
- The students must catch as many balls in succession as possible.
- Each student gets three practice catches and ten measured trials.

Scoring

The number of catches are measured.

Appendix B

Coach Rating Sheet

Talent Identification for Netball Coach Rating Sheet

Boland Netball Development Programme - 2003

- *Please rate the player's performance in the following areas in comparison to all other players in the programme*

Evaluated by _____

		Poor		Average		Excellent	
Name: _____	Attacking skills	1	2	3	4	5	6 7
	Defensive skills	1	2	3	4	5	6 7
	Catch/pass skills	1	2	3	4	5	6 7
	Overall Ability	1	2	3	4	5	6 7

Name: _____	Attacking skills	1	2	3	4	5	6 7
	Defensive skills	1	2	3	4	5	6 7
	Catch/pass skills	1	2	3	4	5	6 7
	Overall Ability	1	2	3	4	5	6 7

Name: _____	Attacking skills	1	2	3	4	5	6 7
	Defensive skills	1	2	3	4	5	6 7
	Catch/pass skills	1	2	3	4	5	6 7
	Overall Ability	1	2	3	4	5	6 7

Name: _____	Attacking skills	1	2	3	4	5	6 7
	Defensive skills	1	2	3	4	5	6 7
	Catch/pass skills	1	2	3	4	5	6 7
	Overall Ability	1	2	3	4	5	6 7

Appendix C

Consent Form

4 Maart 2003

Geagte Ouers/Voogde

Ek is tans besig met my Doktersgraad in Sportwetenskap aan die Universiteit van Stellenbosch. As deel van my studies gaan ek in samewerking met Boland Netbal en WECSA (Western Cape Sport Academy) 'n Netbal Ontwikkelingsprogram loods en wil ek graag u kind uitnooi om aan hierdie program deel te neem.

Ons doel met hierdie program is om u kind se netbal vaardighede te ontwikkel.

Hierdie program sal oor 'n periode van 9 maande geskied (Maart tot November) en sal twee keer per week op 'n Dinsdag- en 'n Donderdagmiddag vir 90 minute aangebied word. Ons hoop ook om vanaf April 2003 wedstryde te begin speel. Ons beplan om u kind elke middag met oefening by die skool op te laai en dan na die Universiteit van Stellenbosch se bane te vervoer. Daar sal hulle kundige afrigting ontvang. Om streeks 16:00 sal die bus hulle weer oplaai by die bane en terug vat skool toe. Wynland Toere is verantwoordelik vir die busvervoer.

Omdat hierdie program deel vorm van my studies, moet ek ook u toestemming kry sodat ek u kind se netbal ontwikkeling kan toets. Die doel hiermee is om te kyk of die leerlinge wel teen die einde van die program verbeter het of nie. Ek sal u kind aan die begin en die einde van die program toets.

Lees asseblief die aangehegde toestemmingsvorm wat u kind se regte verduidelik. Ek wil net dit duidelik maak dat die deelname aan die program nie-verplichtend is nie. Stuur asseblief die afskeurstrokie so gou as moontlik terug skool toe. Ek sal die strokies op Vrydag 7 Maart weer kom afhaal. Ons beoog om ons eerste sessie op Dinsdag 11 Maart te hê.

Baie dankie en indien u enige vrae het kan u my kontak by 808 4915 (universiteit) of 0823787607.

Groete

Karin Hugo

**TOESTEMMINGSVORM VIR DEELNAME AAN
DIE BOLAND NETBAL ONTWIKKELINGS PROGRAM**

- * Die doel van deelname aan die program is duidelik.
- * Ek neem kennis dat deelname aan die program vrywilliglik is en dat resultate gebruik sal word vir Doktersgraaddoeleindes.
- * Ek neem kennis dat die resultate van die studie as vertroulik hanteer sal word en dat identiteite anoniem sal bly.
- * Ek neem kennis dat ek op enige tydstip, as ouer/voog, verdere verduidelikings van die studie mag aanvra.
- * Ek gee toestemming dat my kind per bus vervoer mag word vir oefensessies en dat ons geen van die bogenoemde partye verantwoordlik sal hou indien 'n ongeluk sou gebeur nie (Boland Netbal, WECSA, Universiteit van Stellenbosch, Karin Hugo).

VAN, VOORLETTERS VAN OUER/VOOG : _____

NAAM VAN KIND: _____

HANDTEKENING VAN OUER/VOOG : _____

ADRES VAN OUER/VOOG : _____

KONTAKNOMMER : HUIS : _____

WERK : _____

Appendix D

Coaching Training Log

COACHES TRAINING LOG: Squad 2

Date: 22 April 2001

	Description				
Attacking skills Shooters Defenders Attackers	Center passes (one for each team) Team 1: C-WA-GS-C-GA Team 2: C-GD-GS-WA-GA				
Defensive skills Shooters Defenders Attackers	Man to man defence 1 st phase: Stay on opponent/ Defender 2 nd phase: 3 feet away, hands up in the air				
Catch/pass skills Shooters Defenders Attackers	Passing and catching of ball (mainly chest and shoulder passes) Passing with movements to the side, front and back				
Tactics/ strategies Shooters Defenders Attackers	Throw in: Goalkeeper moving out of circle and goal defense moving into the circle. No throws may be taken by the goal attack.				
Fitness Shooters Defenders Attackers	Speed	Agility	Power	Anaerobic	Aerobic
	✓	✓			✓
	✓	✓			✓
	✓	✓			✓
Other Shooters Defenders Attackers					
Problems: If the players do not pitch for practice it is very disruptive to the lesson plan and other players					
Comments: 2 of the players wrote letters to excuse themselves from practice. Reasons for missing practice was a) Boland Trials and b) Drama lessons					
Absent Player/s Zelda, Pamela, Lesley-Anne					

COACHES TRAINING LOG: Squad 1

Date: 15 April 2003

	Description/Time				
Attacking skills Shooters Defenders Attackers	Work over the length of the court. Run to the line and then to the inside of the court, catch the ball on a every occasion. Work in a square, catch ball in space				
Defensive skills Shooters Defenders Attackers					
Catch/pass skills Shooters Defenders Attackers	Shoulder and chest passes Run at an angle of 45° catch ball and land with two feet, pass the ball back. Run to next beacon and repeat.				
Tactics/ strategies Shooters Defenders Attackers	Learn how to handle the landing. Discus and demonstrate foot faults and proper landings.				
Fitness Shooters Defenders Attackers	Speed	Agility	Power	Anaerobic	Aerobic
	✓		✓		
	✓		✓		
	✓		✓		
Other:					
Other Shooters Defenders Attackers	Mini-game				
Problems: Lazy, and they don't listen					
Comments: They lack concentration					
Absent Player/s Marthina, Pateka, Masha, Candice, Carlene					

Appendix E

Camp Program

FRIDAY	SATURDAY	SUNDAY
15:30 Departure from schools	6:30 Wake-up	8:00 Breakfast
17:00 Arrival, Unpacking	7:00 Jog session	9:00 Testing
18:00 Preparation of supper	8:00 Breakfast	11:00 To the Beach
19:00 Supper	9:00 Training session	12:30 Lunch
20:00 Teambuilding	10:30 Break	13:30 Packing and cleaning
21:30 Free time	10:45 Game	14:00 Leave for schools
23:00 Lights out	11:15 To the Beach	15:15 Arrive
	12:30 Prepare lunch	
	13:00 Lunch	
	14:00 Training	
	15:00 Break	
	15:10 Games	
	16:15 Free Time	
	18:15 Prepare supper	
	19:00 Supper	
	20:00 Year end function and show	
	23:00 Lights out	

What to bring to the Camp

- Own bedding
- Swimming costume and towel
- Training shoes
- Training Clothes
- Water bottle
- Warm clothes
- Eating Utensils

Appendix F
Participation Certificate

Appendix G

Attendance Figures of Squad-base Group

Percentile	Participants
90-100%	0
80-90%	4
70-80%	3
60-70%	10
50-60%	4
< 50%	1